The Impact of Investment and Financial Intermediation on Economic Growth: New Evidence from Jordan

Suleiman W. Almasaied[*]

Faculty of Financial and Business Administration, P.O. Box 130040, Al-Bayt University,
Al-Mafraq 25113, Jordan

Abstract. In this paper, we explore the hypothesized proximate drivers of economic growth in Jordan - domestic investment, financial intermediation, foreign direct investment (FDI), exports, and human capital. The empirical results based on Pesaran's Autoregressive Distributed Lag (ARDL) approach can be summarized as: (i) there exist a long-run relationship among per capita real GDP and its determinants, (ii) domestic investment and exports are crucial in determining the long-run growth process in both short-run and long-run, (iii) FDI has a positive and significant effect on the economic growth but of lesser magnitude compared with domestic investment, (iv) the level of financial and human capital development are crucial in determining the long-run growth process, (v) "domestic led growth" hypothesis is observed, and (vi) development of both financial markets and human capital should also be given priority as our results suggest that a better financial system can absorb and gain significantly from FDI.

Therefore, it is worthwhile for the authorities to encourage domestic as well as foreign investments to enhance Jordan economic growth.

Keywords: Domestic investment, FI, ARDFL, Human capital, Exports, Jordan.

1. Introduction

Foreign capital started to flow to Jordan and its neighboring countries at accelerating rates from the early 1980s. Investors were attracted to these countries because of their markets and sound macroeconomic fundamentals.

This foreign capital is a critical issue to create high economic growth in Jordan as it is a country with scarcity recourses, and high unemployment and poverty rates. Therefore, high economic growth is an important challenge for policy makers. Policy makers need to know what factors are crucial in determining the long-run economic

---

[*] Corresponding author: Tel. +962 (2) 6267066, +962 (0777) 261936, E-mail: sulimanw@yahoo.com
(Suleiman W. Almasaied)

growth process. In particular, what causes economic growth and what retards it? And, does FDI contribute directly to economic growth? Is domestic and/or foreign factors lead economic growth?

The aims of this study are two-fold: first, the paper seeks to investigate the long-run and short-run impacts of domestic investment and financial intermediation on economic growth in Jordan. Second, we seek to provide evidence in support of the "domestic led growth" hypothesis based on recent methodology (Autoregressive Distributed Lag approach to cointegration) (ARDL hereafter) analysis. The inclusion of short-run and long-run effects of domestic investment, human capital and financial intermediation in our estimation model allows testing "domestic led growth" hypothesis.

This research was conducted following recent events such as the increase in economic growth rates in Jordan during the 2000s combined with the inflow of foreign capital, export expansion and domestic investment, and the search for new policy options that could contribute to the sustained economic growth in Jordan.

The remainder of the paper is organized as follows. Section 2 reviews Jordan's historical economic background. This is followed by the relevant theoretical literature. Sections 4 and 5 provide model specification and estimation techniques. Section 6 contains data description and empirical results. Finally, the last section contains the concluding remarks.

2. Jordan's Economic Background

Jordan tries to follow the newly industrialized countries (such as Singapore and Malaysia) who successfully transformed themselves from being inward-oriented (import substitution industrialization), inspired by the "infant industry" argument, to being outward-oriented (export oriented industrialization) in the late 1960s to the early 1970s, while Jordan is starting its effort in the late 1990s. Foreign investment inflows to Jordan in the last few years particularly from Arab and European regions due to the stability in Jordan and trade agreements between Jordan and other countries such as the United States of America.

The Jordanian economy has, in fact, shown inconsistent growth rates. Table 1 shows that Jordan had rapid GDP growth rates during the 1980s, while it had the lowest growth rates during the 1990s (around 2%), and good rates during the first half of 2000s as it ranged from 4.1% to 7.7%, but in contrast, domestic investment ratio did not show any improvement during 2000s. With the exception of 1980s, domestic investment as a percentage of GDP was a modest percentage and it ranged between 19% and 22% during the 1990s and the first half of 2000s. The gross domestic investment was matched mostly by low rates of domestic savings as shown in the table. Thus, the need arises to fill the gap in resource by the inflow of foreign capital, mainly in the form of either foreign direct investment (FDI) or foreign borrowing.

Due to the enhanced policies, domestic investment and FDI have increased in Jordan. These policies offered special tax incentives and subsidies to attract foreign capital besides enhancing investors to invest in Jordan. An influential economic rational for treating foreign capital favorably is that FDI and portfolio inflows encourage technology transfers that accelerate overall economic growth in recipient countries. In other words, capital inflow increases investments, and increased investment contributes to the achievement of higher growth according to investment-led growth hypothesis. Higher growth invites more investment and more investment attracted further capital flows. This virtuous cycle of capital inflows and economic growth was indeed an integral part of what was known as the Asian 'miracle' [1].

Over the years financial deepening as measured by M2/GDP in Jordan took place. For instance, the ratio increased from 85% in 1980 to 113% in 1990 and from 124% in 2000 to 133% in 2004. Indeed, various policies and measures have been introduced to promote exports of goods. Therefore, Jordan integration efforts led to a significant increase in new FDI as well domestic investment. For example, there is a surge in FDI into Jordan's Qualifying Industrial Zones (QIZs) motivated by the country's privileged access to the United States market for goods produced in those qualifying zones. The total amount of investments in Jordan's QIZs has reached ($ 600) million, and the total exports jumped from 700 million JD in 1990 to more than 2700 million JD in 2004, around 30% of the total exports is going to the United States market.

Table 1. Macroeconomic indicators for Jordan

Key Indicators	Years						
	1980	1990	2000	2001	2002	2003	2004
GR	11	1.6	4.8	5.3	5.7	4.1	7.7
GDI	38.8	23	22.4	21.1	20.4	21.2	19.8
GDS	19.3	5	11.7	10	14	20	19
M2	84.5	113	124	124	125	134	133.1
FDI	10.2	25	577.7	97.6	52.8	309.3	461.6
X	15	25.5	23	25.6	29.3	30.9	34.7
M	61.4	62	54.4	54.2	53.7	57.7	71
Inf	15	14.4	0.7	1.8	1.8	2.3	3.4

Note: Gr, growth rates of real GDP; GDI, gross domestic investment as a percentage of GDP; GDS, gross domestic savings as a percentage of GDP; M2, money deepening as a percentage of GDP; X, exports of goods as a percentage of GDP; M, imports of goods as a percentage of GDP; Inf, inflation rates. Sources: Various issues of monthly statistic bulletin of Central Bank of Jordan and various issues of national accounts of the Department of Statistics.

Jordan had inconsistent growth rates during the last four decades. For example, during the period of 1987-1991 growth rates were less than 2%, while in the recent resumption on growth comes on the back of a positive medium-term dynamics that has seen growth picking-up in the late 1990s in Jordan. Real GDP growth jumped from 2% in 1996 to over 5% in 2000s. As an example, during 2000s economic performance in Jordan was subject to challenging developments and outcome, for example, real growth was reported at above 7.5%, 6% in 2004 and 2005 respectively. This inconsistent growth

was combined with inconsistent growth in domestic investment. The domestic investment ranged (in average) from 27% of GDP in 1980s and 1990s to 20% in 2000-2005. FDI inflow started to accelerate in Jordan by the end of 1990s [2], but relatively it is very slow as well as west Asian economies.

The Jordanian external sector pursued its expansion during 2000s due to both stronger imports and exports figures, within the context of a strong domestic aggregate demand and a growing foreign demand. Exports continued to be driven by textile exports from the Qualified Industrial Zones (QIZs). Jordan became an attractive channel for duty and quota-free access to major world markets. Jordan entered the World Trade Organization (WTO) in 2000, signed a free trade agreement with the US in 2000, prior to concluding an association agreement with the EU in 2001.

In conclusion, Jordan has so far a need to sustain a strong economic growth. Thus, it sets a National Agenda, a 10-year reform program drawn up by a broad cross-section of society, set out policies to reform the economic as well as the political, educational, fiscal and social welfare systems over the next decade to push ahead the recent achievements that would determine the country's economic outlook in the short to medium term.

3. Model Specification

Several studies on models explaining economic growth in developing countries have been carried out. These include those by Romer [3], Grossman and Helpman [4], Barro and Sala-I-Martin [5], and Borensztein [6]. A common feature of these studies is the view that economic growth is a result of capital deepening, FDI and human capital.

In addition, in much of the literature, exports are seen as causing growth. In the cases of exports, the empirical evidence is that countries that experience phenomenal growth rates are also countries that are successful exporters. The theoretical argument is that exports orientation increase the openness of the economy and, by exposing it to foreign technology and foreign competition, provokes a rapid rate of technological progress. The empirical evidence provides a strong support of export-led growth hypothesis (see [7, 8]). All in all, these authors suggest that countries with higher exports growth over extended period tend to grow faster than others. Also, FDI may help transitional countries to achieve modernization and upgrading by importing foreign technologies, diffusing knowledge and adopting western practices, by developing foreign trade and by reaching external help and financial support [9, 10].

In the case of financial intermediation, there is no general agreement among economists that financial development is beneficial for growth. Ever since Schumpeter (1911), and more recently McKinnon [12] and Shaw [13], the relationship between financial development and economic growth has been extensively studied. It is now well recognized that financial development is crucial for economic growth. The sign on financial development can be either positive or negative, depending on whether financial

development reduces or increases capital flight. If it reduces capital flight, then it will have a positive sign, otherwise the variable carry a negative sign. Also, another fundamental reason for a positive effect of financial structure on growth is the more efficient undertaking of investment, and more efficient capital allocation because agents can have better information about the nature of shocks (aggregate versus idiosyncratic) that hit particular projects.[1] Indeed, a very recent study finds that financial intermediation is crucial to enhance the effect of FDI on economic.

Finally, it should be noted that investment has also been linked with growth and with exports. For example, one hypothesis holds that an increase in exports will be correlated with growth because higher investment demand causes a rise in exports (see, e.g. [14]). Similarly, Young [15] argues that in contrast to export-led growth, the success of the NICs can also be explained by policies that promoted investment in productive resources and human capital. According to this view, investment would be causally prior to output growth.

In this article, we follow the theoretical exposition in Borensztein [6] and more recently, Akinlo [10] in specifying a model to identify major determinants of economic growth. Most econometric models of economic growth have included various subsets of the following variables as the exogenous variables: FDI, domestic investment, financial intermediation, exports and human capital (see for example Romer [3], Serven and Solimano [16], Fry [17, 18], Borensztein [6], Levine [19], King and Levine [20], Beck [21], Xu [22], Prodrecca and Ford [23] and Baharumshah [25]). Thus, to investigate the impact of the above variables on Jordan's economic growth, the econometric model is specified as follows:

$$y = \alpha_0 + \alpha_1 FDI + \alpha_2 FI + \alpha_3 GDI + \alpha_4 X + \alpha_5 H + \alpha_6 trend + \alpha_7 Dum + \varepsilon \ . \tag{1}$$
$$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5 > 0$$

where, y denotes the logarithm of real per capita GDP[2], FDI denotes the logarithm of foreign direct investment, GDI denotes the logarithm of gross domestic investment, FI denotes the financial intermediation proxied by M2/GDP, H denotes secondary school attainment as a proxy of human capital, X is the logarithm of export of goods and services, and Dum denotes dummy variable for 1989 JD depreciate. The disturbance term ε is to capture the unobserved effects and is assumed to have zero mean and constant variance. We have applied the model Eq. (1) to Jordan using data over the period 1980-2004 employing the ARDL approach to cointegration analysis as explained below. We note that this choice of the variables chosen is guided by previous studies as well as the data availability[3].

---

[1] For more information on the relationship between financial intermediation and economic growth, see Christopoulos and Tsionas [26] and Levine [27].

[2] The growth rate of GDP measure is annual real per capita GDP (see [6]).

[3] Recent studies have included the catch-up effect by adding initial income in the model. Preliminary results show that the variable is insignificant and sometimes carrying wrong sign. Since it is insignificant we have

As stated in the introduction, one of the objectives of this study is to determine the role of financial markets in Jordan. Besides estimating the baseline model given by Eq. (1), we extended the analysis to consider the development of financial markets and human capital on the foreign capital, specifically the role of financial markets as an additional channel of growth.

Meanwhile, we have added an interactive term to the equation—the interaction between FDI and the development of financial markets (FDI*FI). And, for the purpose of comparison, we also estimated another version of the model with the role of human capital (FDI*h) (well-educated labor force) as the focus. The purpose is to ascertain the robustness of our findings to an alternative specification. The rationale for the finance-growth nexus is well known: financial markets provide services such as mobilizing savings, diversifying risks, and allocating savings to investment. Through these services, financial markets may promote growth.

In Borenstein [6], they argued that in order for FDI to have a beneficial impact on growth, the host country must have attained sufficient high level of human (education) and financial development. We do not dispute more human capital that would result in higher economic growth, but the positive contribution of FDI to growth as reported in this study challenges the notion that FDI can be beneficial only in the presence of sufficient levels of human capital.

4. Data and Estimation Techniques

4.1. Source of data
The annual data for Jordan was computed from different sources, and its time period is between 1980 to 2004. The data definitions and statistical sources used in this study are listed in Table 2.

Table 2. Description of the data and statistical sources

Variable	Description of the Data	Source
y	Per capita Real GDP[4]	IFS, IMF, CBJ
FDI	Foreign Direct Investment	IFS, IMF, CBJ, MOTI
GDI	Gross Domestic Investment (non FDI)	IFS, IMF, CBJ, DOS
FI	Financial intermediation proxied by M2 /GDP	CBJ
H	Human capital proxied by secondary school enrolment	UNESCO, DOS, MOE
X	Export of goods and services	IFS, IMF

Note: CBJ, denotes Central Bank of Jordan; DOS, Departments of Statistics, International Finance Statistics; MOE, Ministry of Education; MOTI, denotes Ministry of Trade and Industry. We use the logarithm form except h and FI

dropped the variable from estimation. The overall results did not change much without the (y) initial income.

[4] Borensztein et al. (1998) use per capita real GDP as a measure for economic growth rates.

4.2. Estimation techniques

To examine the short-run as well as the long-run relation between the per capita GDP in Jordan and its determinants, we employed the autoregressive distributed lag (ARDL) cointegration procedure introduced by Pesaran [28, 29]. First, we test the null hypothesis of no long-run relationship against the existence of long-run relationship. One important difference between ARDL and other cointegration techniques such as Johansen's procedure is that ARDL does not require pre-testing for unit roots. The main advantage of this procedure is that it can be applied regardless of the stationary properties of the variables in the sample and allows for inferences on long-run estimates, which is not possible under alternative cointegration procedures [29]. Hence, ARDL has the advantage of avoiding the classification of variable into I(0) or I(1) since there is no need for unit root pre-testing. Moreover, unit root tests yield different conclusions not only due to their different power, but also due to different lag length selected in each test.

According to Pesaran and Pesaran [30], the ARDL method has an additional advantage of yielding consistent estimates of the long-run parameters that are asymptotically normal irrespective of whether the variables are I(0), I(1) or mutually integrated. Additionally, Pesaran and Pesaran [30] and Pesaran [23] show that appropriate lags in the ARDL are corrected for both residual correlation and endogenity.

As long as the ARDL model is free of residual correlation, endogeneity is less of a problem (see [30]). The important advantage of ARDL against the single equation cointegration analysis such as Engle and Granger [33] is that the latter suffers from problems of endogeneity, while the ARDL method can distinguish between dependent and explanatory variables. Indeed, one of the important advantages of ARDL procedure is that the estimation is possible even when the explanatory variables are endogenous [33].

There are two steps involved in the approach introduced by Pesaran [28]. First, we test the existence of long-run relationships in levels among the variables under investigation using the BT as coined in Pesaran [28]. Once the long-run relationship has been verified, we proceed with the second step in which the parameter of the long-run relationship and the associated short-run dynamic error correction model are estimated by applying the autoregressive distributed lag as suggested in Pesaran and Shin [31].

To present a brief outline of the procedure, consider a model with three variables $[y, x, z]$. The variables can be distinguished by estimating each equation considering each of the variables as a dependent variable as shown below[5]:

$$\Delta y = \alpha_{0y} + \sum_{i=1}^{n} b_{1y} \Delta y_{t-i} + \sum_{i=0}^{n} b_{2y} \Delta x_{t-i} + \sum_{i=0}^{n} b_{3y} \Delta z_{t-i} + \gamma_{1y} y_{t-1} \qquad (2)$$
$$+ \gamma_{2y} x_{t-1} + \gamma_{3y} z_{t-1} + \varepsilon_{1t}$$

---

[5] For a more comprehensive description of this technique the reader may refer to Pesaran [28].

$$\Delta x = \alpha_{0x} + \sum_{i=0}^{n} b_{1x} \Delta y_{t-i} + \sum_{i=1}^{n} b_{2x} \Delta x_{t-i} + \sum_{i=0}^{n} b_{3x} \Delta z_{t-i} + \gamma_{1x} y_{t-1} \tag{3}$$
$$+ \gamma_{2x} x_{t-1} + \gamma_{3x} z_{t-1} + \varepsilon_{1t}$$

$$\Delta z = \alpha_{0z} + \sum_{i=0}^{n} b_{1z} \Delta y_{t-i} + \sum_{i=0}^{n} b_{2z} \Delta x_{t-i} + \sum_{i=1}^{n} b_{3z} \Delta z_{t-i} + \gamma_{1z} y_{t-1} \tag{4}$$
$$+ \gamma_{2z} x_{t-1} + \gamma_{3z} z_{t-1} + \varepsilon_{1t}$$

To test for the existence of a long-run relationship between y, x and z, we may rely on two testing procedures. An F-test of joint significance of lagged level of the variables is involved [27]. The null hypothesis for testing the non-existence of the first long-run relationship (Eq. (2)), i.e. $H_0 : \alpha_0 = \gamma_{1y} = \gamma_{2y} = \gamma_{3y} = 0$ is denoted by $F_y (y; x, z)$. The F-test for the null hypothesis for testing the non-existence of the second long-run relationship (Eq. (3)) is $H_0 : \alpha_0 = \gamma_{1x} = \gamma_{2x} = \gamma_{3x} = 0$ denoted by $F_x (x; y, z)$ and the F test for the null hypothesis for testing the non-existence of the third long-run relationship (Eq. (4)) is $H_0 : \alpha_0 = \gamma_{1z} = \gamma_{2z} = \gamma_{3z} = 0$ denoted by $F_z (z; y, x)$. If the $F_y (y; x, z)$ is shown to be greater than the upper bound of the critical values (tabulated by Pesaran [27]), while $F_x (x; y, z)$ and $F_z (z; y, x)$ are lower than the lower bound of variables. In this relationship, y is the dependent variable and x and z are the "long-run forcing variables."

Conversely, if the computed F-statistics fall within the band, prior information on the order of integration of the variables is necessary to make a decision on the long-run relationship between the variables. If the F-statistics support the existence of a long-run relationship, then a further three-step procedure to estimate the growth model is carried out.

5. Empirical Results

5.1. Bound testing for a long-run relationship
To verify the long-run relationship between per capita GDP (y) and its determinants *(FDI, FI, GDI, X, H)*, we deployed the BT procedure as outline in the previous section. The null hypothesis of non-existence of a long-run relationship between the variables in the model tested against the alternative using F-test as outline earlier. We experimented up to 3 lags on the first difference of each variable and computed F-statistics for the joint significance of lagged levels of variables in Eq. (1). Following Pesaran [28], the order of the lags in the ARDL model selected based on the Schwarz information criteria (SIC). Additionally, we relied on the Bruesch-Pagan *LM* test to check for serial correlation and this step was taken to ensure that the selected model was free of the problem of autocorrelation.

Results of the F-statistics reported in Table 3, show that the calculated $F_{\Delta y}$ statistics is 6.456, which is larger than the upper bound CV at 5% significance level or better. Therefore, we rejected the null hypothesis that there is no long-run relationship between growth and its determinants—FDI, financial intermediation, exports and human capital. To verify the uniqueness of the long-run relationship between the variables, we repeated the same tests for the other variables in the model by treating each of them as the dependent variable and compute the corresponding respective F-statistics[6]. It is worth noting that the corresponding estimated F-values for $F_{\Delta GDI}$, $F_{\Delta FDI}$, $F_{\Delta FI}$, $F_{\Delta X}$ and $F_{\Delta H}$, were found to be lower than the lower bound of CVs or fell within the inclusive range of the CVs such as FDI but it is stationary at I(1) (see Table 3). Additionally, the integration test based on the conventional ADF and Phillips-Perron tests revealed that the variables that fell within the inclusive range were integrated at the order one, I(1), meaning that they appeared as an exogenous forcing variables in the growth system. To conserve space, the results of the unit root tests are not reported here but are available upon request.

Table 3. Testing for the existence of long-run relationship

	F-statistics
$F_{\Delta y}$ (Δy; GDI, FI, FDI, X, H)	4.4920***
$F_{\Delta GDI}$ (ΔGDI; y, FI, FDI, X, , H)	2.7238
$F_{\Delta FDI}$ (ΔFDI; GDI, FI, y, X, H)	2.5162
$F_{\Delta FI}$ (Δ FI; GDI, FDI, y, X, H)	1.5318
$F_{\Delta X}$ (Δ X; FDI, GDI, FI, y, H)	2.0930
$F_{\Delta H}$ (Δ H; FDI, GDI, FI, y, X)	1.2328

Note: The lag order (p) of the underlying ECM was selected using (SBC), the Akaike Information Criteria (AIC) and the LM tests for testing residual correlation of order 2. The F-statistics is compared with the critical bound of the F_{II} statistics for zero restriction on the coefficient of the lagged level variables provided in Pesaran [28] Table C1.ii. provided in Pesaran [28], Table C2.iii. Number of regressors =5. The asterisk **, *** denote that F-statistics is above the 5%, 1% upper bound CV, respectively.

To sum up, two important conclusions have emerged from the analysis so far. First, the statistical results point to the fact that there exists a "unique and stable long-run relationship" between per capita GDP and its determinants. Second, the five independent variables in Eq. (1) can be treated as exogenous variables in the growth model, an issue that has received considerable attention in the literature. Given the existence of a long-run relationship, in the next step we used the ARDL cointegration method to estimate the long and short terms parameters of Eq. (1).

---

[6] Pesaran [27] noted that the bound test procedure is based on a single equation approach and it is inappropriate to apply this test when there exists more than one long-run relationship.

5.2. The short-run dynamics and the adjustment toward long-run equilibrium

We have estimated Eq. (1) using an appropriate selection criterion such as Schwarz Bayesian Criterion (SBC), Akaike information criteria (AIC) and adjusted R^2 criteria. In this study, the optimal lag length and the ARDL specification model are selected based on SBC criterion, because it provides us with the most parsimonious model, consistent results and it is adequate for very small-sample properties (for more details see [31, 34, 35]).

The regression results are given in Table 4, where the error correction (ECM) representation of the short-run estimates and the implied long-run estimates are presented and all estimations are carried out by using Microfit. The optimal lag length for each variable is determined empirically by as Schwarz Bayesian Criterion (SBC). The short-run dynamics of the economic growth based on ARDL (1,0,0,1,0,0) model for Jordan is reported in Table 4. The diagnostic statistics indicate that the equations are well specified. None of the statistics shown in the table are significant at the 5%. The models fulfilled the conditions of non-autocorrelation, homoskedasticity and normal disturbance. The results of χ^2 do not reject the null hypothesis of no serial correlation, no functional form mis-specification and no heteroscedasticity. Thus, serial correlation, mis-specification and heteroscedasticit do not pose any problem. Adjusted R^2 is 0.799 suggesting that the error correction models (ECM) fitted the data reasonably well.

As shown in Table 4, the estimated values of the lagged error-correction term (ECM_{-1}) based on ARDL method range from -0.6047 to -0.6277 and statistically significant, which suggest that the ECM tends to cause per capita GDP to converge monotonically to its long-run equilibrium path in relation to changes in the exogenous "forcing variables".

The results in Table 4 suggest that per capita GDP is primarily caused by high growth rates of domestic investment, FDI, and exports, while no evidence on the impact of financial intermediation and human capital on Jordan's economic growth during the short-term. These results suggest that the better investment-climate during the last two decades for both foreign and domestic investment account for the high economic growth in Jordan. This concurs with the great body of empirical literature on "investment-led-growth" hypothesis (see among others [6, 36, 37]). The sign of the coefficients of domestic investment and FDI are positive. The domestic investment coefficient is noticeably higher than those of FDI, indicating that domestic investment has higher impact on economic growth than FDI.

The outcomes of ECM based on ARDL method also confirm the existence of "export-led-growth" hypothesis as there is a positive and significant effect of exports on economic growth. Indeed, its impact (coefficient = 0.1209) is greater than other variables in the model as shown in Table 3. Our findings support the argument that the growth of exports creates profitable opportunities for both domestic and foreign investment. The unprecedented increase in both exports and FDI inflows witnessed during the end 1990s

and the early 2000s mode dynamic economies in Jordan. Vast literature suggests that there exists a complementary relationship between FDI and exports, particularly the FDI inflow from developed to developing countries [38]. Thus, the export-expansion oriented polices are crucial to stimulate both domestic and foreign investment and consequently economic growth of Jordan.

Table 4. Error correction models based on the ardl approach: short-run estimations for growth model for Jordan

	Dependent Variable Per Capita ΔGDP					
	SBC Selected Model					
	Model 1		Model 2		Model 3	
Regressors	Coefficient	T-ratio	Coefficient	T-ratio	Coefficient	T-ratio
ECM (-1)	-0.6277	-5.4123***	-0.6154	-5.2104***	-0.6047	-5.2104***
ΔGDI	0.0590	3.9967***	0.0479	3.5116***	0.0432	3.5116***
ΔFDI	0.0120	3.1638**				
ΔFI	0.0017	1.2092	0.0018	1.8137*		
ΔX	0.1209	2.0871**	0.1409	2.4173 **	0.1454	2.4173 **
ΔH	0.6365	1.4067			0.3823	2.4421**
ΔFDIH			0.0197	3.1638 **		
ΔFDIFI					0.0389	3.2198**
ΔDum	-0.0151	-2.0969**	-0.0164	-2.1291**	-0.0164	-2.1291**
ΔTrend	0.0113	1.2831	0.0173	1.2401	0.0173	1.2401
ΔC	0.4770	4.0293***	0.4770	4.1237***	0.4770	4.1237***
$\bar{R}^2$	0.7998		0.8017		0.8127	

Diagnostic Tests [p-value]

h-statistic	-0.6181	[0.537]	-0.0719	[0.943]	-1.1783	[0.239]
A: AR (1)	0.8277	[0.363]	0.3752	[0.540]	1.3777	[0.241]
B: RESET (1)	1.1544	[0.142]	2.2860	[0.131]	1.3287	[0.249]
C: Norm. (2)	0.6911	[0.708]	1.1715	[0.557]	0.1087	[0.947]
D: Hetero. (1)	1.8372	[0.175]	1.6622	[0.592]	0.9234	[0.337]

Notes: Following Pesaran and Shin (1997), lag order of the ARDL model was selected using Schwarz Bayesian Criteria (SBC), and the LM tests for testing residual correlation. The t-ratios are represented in squire brackets. Asterisks ***, **, * represent 1%, 5%, 10% significant levels, respectively. Δ denotes first difference for each variable. The following notation applies: y, denotes per capita gross domestic product; GDI, gross domestic investment; FDI, foreign direct investment; FI, financial intermediation (M2/GDP); H, human capital; X, export of goods and services; FDIH, denote the interaction between FDI and human capital; FDIFI, denote the interaction between FDI and financial intermediation. The probabilities of χ^2 for the diagnostic tests are represented in square brackets. A: Lagrange multiplier based on Breusch-Pegan test for residual serial correlation; B: Ramsey's RESET test using the square of the fitted values; C: Based on a test of skewness and kurtosis of residuals; D: Based on the regression of squared residuals on squared fitted values.

We also investigate the impact of human capital on per capita GDP, the results show that human capital does not have significant effect on enhancing economic growth in Jordan. This result may be due to the un-consistent of data of human capital that is affected by Gulf War I and II immigration as well as high unemployment of human capital. Theoretically, the high ratio of skilled, employment and good quality of labor are the reasons for why significant effect of human capital on economic growth.

To further investigate the additional role of FDI on growth through financial markets, we interacted FDI with the proxy variable for financial markets (FDI*FI) and used this as a regressor to test for the significance of financial markets in enhancing the positive externalities associated with FDI inflows. As shown in Table 4 (Model 3), the interactive term between the two variables turned out to be positive and significant at the 5% level, an outcome that is compatible with growth-enhancement.

We now turn to the importance of human capital in the growth process. While the level of education by itself is found to be insignificant (Model 1), its interaction with FDI (FDI*H) is statistically significant at the 5% level. This finding is more in line with economic theory and our expectation. This may be in part due to the interaction term capturing an important function that human capital perform—a high human capital in an economy is a mean to an end and not an end in itself. Another way to look at it is that human capital plays a very important role in upgrading the economy into producing high-value added outputs by innovations.

5.3. Long-run equilibrium estimation

The Schwarz Bayesian Criteria (SBC) selects an ARDL (1,0,0,1,0,0) economic growth models for Jordan. The results of ARDL model of Jordan's economic growth are reported in Table 5. As can be seen from the table, most of the variables are significant and the signs are consistent with a priori expectation. With the exception of human capital, domestic investment, FDI, financial intermediation and exports statistically have significant positive effect on economic growth. Thus, our long-run results are consistent with previous literature in that foreign and domestic investment, financial intermediation and exports are the primary sources of economic growth [3, 6, 17, 19, 20, 24, 40].

Table 5 shows a statistically and economically significant relation between financial intermediation and economic growth in Jordan. It's worthwhile to note that recent literature agreed on that financial intermediary sector alters the path of economic progress, but they disagree about the fundamental channels, which connect financial intermediaries to growth. According to Schumpeterian view, the financial intermediary sector alters the path of economic progress by affecting the allocation of savings and not necessarily by altering the rate of savings. Thus, this view highlights the impact of financial intermediaries on total productivity growth. Alternatively, a vast development economics literature argues that better financial intermediaries influence growth primarily by raising domestic savings rates and attracting foreign capital (see among others [11, 22]). Thus our result is consistent with the view that financial intermediation exerts a large impact on economic growth in Jordan at long-term, while there is no

evidence on its impact on short-term. This could be through one or both channels that connect financial intermediaries to growth discussed above.

We now turn to the importance of human capital in the growth process. While the level of education by itself is found to be insignificant in the long run (Table 4), its interaction with FDI (FDI*H) is statistically significant at the 5% level. This finding is more in line with economic theory and our expectation. This may be in part due to the interaction term capturing an important function that human capital perform, a high human capital in an economy, is a mean to an end and not an end in itself. Another way to look at it is that human capital plays a very important role in upgrading the economy into producing high-value added outputs by innovations.

To further investigate the additional role of FDI on growth through financial markets, we interacted FDI with the proxy variable for financial markets (FDI*FI) and used this as a regressor to test for the significance of financial markets in enhancing the positive externalities associated with FDI inflows. As shown in Table 5, the interactive term between the two variables is positive and significant at the 1% level, an outcome that is compatible with growth-enhancement. We note here that its interaction effect (0.0643) is grater than the preliminary analysis (0.0192) when we included FDI as a separate regressor Model 1 & 3 (Table 5). This finding demonstrates the importance of both financial markets and FDI to an emerging economy like Jordan.

Table 5. Long-run coefficients estimates for Jordan's economic growth model

Regressors	Dependent Variable Per Capita GDP					
	SBC Selected Model					
	Model 1		Model 2		Model 3	
	Coefficient	T-ratio	Coefficient	T-ratio	Coefficient	T-ratio
GDI	0.0941	3.9631**	0.0778	3.8772**	0.0714	3.7186**
FDI	0.0192	3.6015**				
FI	0.0270	5.6749***	0.0029	5.4289***		
X	0.1926	2.1330**	0.2289	2.5426**	0.2405	2.8172**
H	0.6365	1.4067			0.6322	2.9127**
FDIH			0.0320	3.2987**		
FDIFI					0.0643	4.8978***
Dum	-0.0241	-2.1610**	-0.0266	-3.1254**	-0.2712	-3.0218**
Trend	0.0148	2.2840**	0.0281	1.9284*	0.0286	2.0897**
C	0.7598	4.3629**	0.7751	4.7689***	0.7888	5.1879***

The period No. of Obs.: 1980-2004 [24]

Note: Following Pesaran and Shin (1997), lag order of the ARDL model was selected using Schwarz Bayesian Criteria (SBC) and the LM tests for testing residual correlation. Asterisks ***, **, * represent 1%, 5%, 10% significant levels, respectively. The t-ratios are reported in square brackets. The following notation applies: y, denotes per capita real gross domestic product; GDI, gross domestic investment; FDI, foreign direct investment; FI, financial intermediation (M2/GDP); H, human capital; X, exports of goods and services; FDIH, denote the interaction between FDI and human capital; FDIFI, denote the interaction between FDI and financial intermediation.

Suleiman W. Almasaied

Finally, we examine the stability of the long-run parameters together with the short-run movements for the equation. To this end, we rely on cumulative sum (CUSUM) and cumulative sum squares (CUSUMSQ) tests proposed by Brown *et al.* (1975). The same procedure has been utilized by Pesaran and Pesaran [30], and Mohsen [41] to test the stability of the long-run coefficients. The tests applied to the residuals of the ECM model (Table 4) along with the critical bounds are graphed in Fig. 1. As can be seen in the figure, the plot of CUSUM and CUSUMSQ statistics stay within the critical 5% bounds for all equations. Neither CUSUM nor CUSUMSQ plots cross the critical bounds, indicating no evidence of any significant structural instability. This result suggests that the per capita of GDP equation for Jordan is stable. It's worth noting that CUSUM and CUSUMSQ tests appear to be stabile after using the dummy variable (Dum) manages the 1989 JD crisis which show that crisis had a negative impact on Jordan's economic growth as shown in Tables 4 & 5.
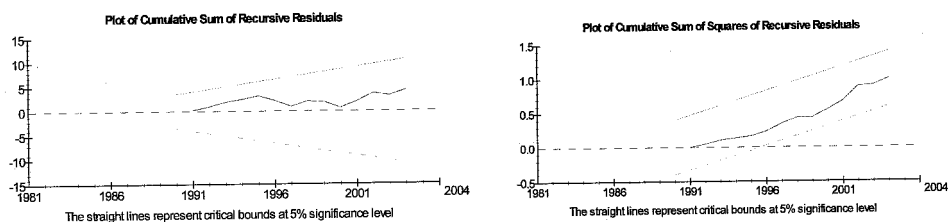

Fig. 1. Plot of CUSUM and CUSUMSQ statistic for Jordan's growth model.

5.4. Granger causality test

Conducted in the Granger causality framework shows that two-way causal connections exist between economic growth, FDI, domestic investment and exports (Table 6). The results also show that one way direction of causality comes from human capital to FDI and to exports of goods and services. Indeed, there is only a unidirectional causal link exists running from financial intermediation to human capital and to domestic investment. That means there is an indirect effect of human capital and financial intermediation on economic growth through both FDI and exports. Taken together, these results are consistent with growth theories in which export promotion or openness, which includes attracting FDI, can generate permanent effects on the level of per capita GDP.

Therefore, it is not surprising to find direct or indirect causal links between economic growth, FDI, exports, financial intermediation, human capital and FDI. Suggesting that export expansion, inflows of FDI, the level of financial and human capital development are crucial in determining the long and short-run growth process that affects economic growth.

Table 6. Granger causality test

Regresors	Wald Test Statistics					
	y	*FDI*	*FI*	*X*	*H*	*GDI*
y		2.912*		7.989***		3.599**
FDI	9.564***			6.520***	3.225**	6.162***
FI	5.608***	2.925*		6.288***		2.604*
X	2.893*	3.646**			4.528**	4.258**
H	3.097*		2.897*			4.166**
GDI	3.774**	4.371**	3.644**	6.433**		

Null hypothesis: column variable does not cause the row variable. Asterisks ***, **, * represent 1%, 5%, 10% significant levels, respectively.

6. Concluding Remarks

This research was conducted following the recent Jordan effort on enhancing economic growth by encouraging FDI and trade agreements such as QIZ and JUFTA. The consequent search for new policy options that could contribute to enhance economic growth is evidently relevant. The ARDL test approach developed by Pesaran [28] is adopted for testing the existence of long-run relationship between the variables besides investigating both long and short-run parameters regardless the order of stationarty.

Overall, our results suggest that FDI not only interacts with human capital, but also with financial development to yield positive spillover effects. We showed that interacting FDI with human capital and financial development yielded a positive effect on growth prospects in the short and long-term. FDI is most likely the main channel through which advanced technology transferred to emerging economies.

The results of the empirical test reveal a positive impact of domestic and foreign capital, on economic growth, suggesting that domestic investment and FDI encourage growth. But, the magnitude of the FDI coefficient is lesser than domestic investment. This suggests that FDI has a less impact on economic. The empirical results also indicate that the development level of financial sector is crucial to economic growth in Jordan. As the financial system becomes more sophisticated, its effect on economic growth becomes more important.

Domestic led growth hypothesis is observed, as we can see domestic factors (domestic investment, exports, human capital and financial intermediation) are crucial in determining – directly on indirectly – the long-run growth process in Jordan.

Finally, the development level for both financial markets and human capital should be given priority as our results suggest that a better financial system and good human

capital development can enhance economic growth and attract more FDI. At the same time, FDI impact will be more significant on economic growth due to its interaction with these variables.

The two important components of globalization – international trade and international investment (FDI) – have positive effect on growth, and therefore we may conclude that globalization is good for Jordan. Sachs (2000) also found these five countries belong to the list with the most successful export-promotion policies and attracting FDI. They also have won the race in absorbing technologies from abroad.

The policy conclusions are clear. First, the role of domestic investment should receive further attention in policy formulation as it appears to have a bigger impact on growth in the longer term. Second, economic policies and institutions aimed at less dependency on FDI and exports appear unlikely to lift the level of output and its rate of growth. A small country like Jordan needs to trade more than a large country with different internal markets.

Reference

[1]   Baharumshah, Ahmad Zubaidi, Thanoon, M. M. and Rashid, S. "Saving Dynamics in the Asian Countries." *Journal of Asian Economics,* 13 (2003), 827-845.
[2]   United Nations, *World Investment Report.* Transnational Corporations and the Internationalization of R&D, New York and Geneva, 2005.
[3]   Romer, P. "Endogenous Technological Change." *Journal of Political Economy,* 98, Part II (1990), S71–S102.
[4]   Grossman, G. and Helpman, E. "Growth and Welfare in Small Open Economy. National Bureau of Economic Research." Working Paper No. 2809, (1989).
[5]   Barro, R. and Sala-I-Martin, X. *Economic Growth.* Cambridge, MA: McGraw-Hill, 1995.
[6]   Borensztein, E.; De Gregorio, J. and Lee, J.W. "How Does Foreign Investment Affect Growth?" *Journal of International Economics,* 45 (1998), 115-135.
[7]   Bahmani-Oskooee, M. and Alse, J. "Export Growth and Economic Growth: An Application of Cointegration and EM Modelling." *Journal of Developing Areas,* 27 (1993), 535-542.
[8]   Baharumshah, A. Z. and Rashid, S. "Exports, Imports and Economic Growth in Malaysia: Empirical Evidence Based on Multivariate Time Series." *Journal of Asian Economics,* 13, No. 4 (1999), 389–406.
[9]   Fabry, N. and Zeghni, S. *Transition in Asia and Eastern and Central Europe: A Closed Door Two Open Windows?* New York: Nova Science Publishers, 2001.
[10]   Akinlo, E. "Foreign Direct Investment and Growth in Nigeria: An Empirical Investigation." *Journal of Policy Modeling,* 26, No. 5 (2004), 627-639
[11]   Schumpeter, J. A. *The Theory of Economic Development.* Leipzig: Dunker and Humblot, 1912. Translated by Redvers Opie, Cambridge, MA: Harvard University Press, reprinted in 1934.
[12]   McKinnon, R.I. "Foreign Exchange Constraints in Economic Development and Efficient Aid Allocation." *Economic Journal,* 74 (1964), 388–409.
[13]   Shaw, E. S. *Financial Deepening in Economic Development.* New York: Oxford University Press, 1973.
[14]   Rodrik, D. *Comments in Trade Policies and Developing Nations by Anne O. Krueger.* Washington, DC: The Brookings Institution, 1995.
[15]   Young, A. "Lessons from the East Asian NICS: A Contrarian View." *European Economic Review,* 38 (1994), 964–973.
[16]   Serven, L. and Solimano, A. "Private Investment and Macroeconomic Adjustment: A Survey." *The World Bank Reserve Observer,* 7, No. 1 (1992), 95-114.
[17]   Fry, Maxwell J. *Money, Interest, and Banking in Economic Development.* 2d ed., Baltimore: Johns Hopkins University Press, 1995.

[18] Fry, Maxwell J. "Saving, Investment, Growth, and Financial Distortions in Pacific Asia and Other Developing Areas." *International Economic Journal*, 12, No. 1 (1998).

[19] Levine, R. "Financial Development and Economic Growth: Views and Agenda." *Journal of Economic Literature*, 35 (1997), 688-726.

[20] King, R. G. and Levine, R. "Finance, Entrepreneurship, and Growth: Theory and Evidence." *Journal of Monetary Economics*, 32 (1993), 513-542.

[21] Beck, T.; Levine, R. and Loayza, N. "Finance and Sources of Growth." *Journal of Financial Economics*, 58 (2000), 261-300.

[22] Xu, Z. "Financial Development, Investment, and Economic Growth." *Economy Inquiry*, 38, No. 2 (2000), 331-344.

[23] Prodrecca, E. and Ford, G. "Fixed Investment and Economic Growth: New Results on Causality." *Applied Economic*, 33 (2001), 177-182.

[24] Hecht, Y.; Razin, A. and Shinar, N. G. *Interaction Between Capital Inflow and Domestic Investment: International Panel Data.* NBER, 2002.

[25] Baharumshah, A. Z. and Thanoon, M. "Foreign Capital, Saving and Economic Growth: A Dynamic Panel Study on the East Asian Countries." Paper Presented at the *International Conference in Economics*, September 11-14, 2002, Ankara, Turkey, from the World Wide Web at: http://www.econ.utah.edu/ehrbar/erc2002/pdf/P263.pdf

[27] Peseran, M. H.; Pierce, R.G. and Smith, R. J. "Testing the Existence of a Long-run Relationship." DAE Working Paper No. 9622, Department of Applied Economics, University of Cambridge, (1996).

[28] Pesaran, M. H.; Shin, Y. and Smith, R. J. "Bounds Testing Approaches to the Analysis of Long-run Relationships." *Journal of Applied Econometrics*, 16 (2001), 289-326.

[29] Sezgin, S. and Yildirim, J. "The Demand for Turkish Defense Expenditure." *Defense and Peace Economics*, 13, No. 2 (2002), 121–128.

[30] Peseran, M. H. and Peseran, B. *Working with Microfit 4.0: Interactive Econometric Analysis.* Oxford: Oxford University Press, 1997.

[31] Pesaran, M. H. and Shin, Y. "An Autoregressive Distributed Lag Modeling Approach to Cointegration Analysis." In: S. Strom (ed.), *Econometrics and Economic Theory in the 20th Century: The Ragnar Frisch Centennial Symposium.* Ch. 11, Cambridge: Cambridge University Press, 1999.

[33] Alam, M. Imam and Quazi, R. M. "Determinants of Capital Flight: An Economitric Case Study of Bangladesh." *International Review of Applied Economics*, 17, No. 1 (2003).

[34] Engle, R. and Granger, C. "Cointegration and Error Correction Representation, Test and Telling." *Econometrica*, 55, No. 2 (1987), 251-276.

[35] Quinn, B. G. "A Note on AIC Order Determination for Multivariate Autoregression." *Journal of Time Series Analysis*, 9 (1988), 241-245.

[36] Madson, J. B. "The Causality between Investment and Economic Growth." *Economics Letters*, 74 (2002), 157-163.

[37] Alguacial, M. T.; Cuadros, A. and Orts, V. "Foreign Direct Investment, Exports and Domestic Performance in Mexico: A Causality Analysis." *Economic Letters*, 77 (2002), 371-376.

[38] Marchant, M. A.; Cornell, D. N. and Koo, W. "International Trade and Foreign Direct Investment: Substitution or Complements?" *Journal of Agricultural and Applied Economics*, 34, No. 2 (2002), 289-302.

[39] Morimune, K. and Mantani, A. "Estimating the Rank of Cointegration after Estimating the Order of a Vector Autoregression." *The Japanese Economic Review*, 46, No. 2 (1995), 191-205.

[40] IMF, International Financial Statistics. Home page: http://ifs.apdi.net/imf/, accessed on 1 May 2004.

[41] Mohsen, Bahmani-Oskooee and Ng, R. W. "Long-run Demand for Money in Hong Kong: An Application of the ARDL Model." *International Journal of Business And Economics*, 1, No. 2 (2002), 147-155.

أثر الاستثمار والتمويل الوسيط على النمو الاقتصادي: نتائج جديدة من الاقتصاد الأردني

سليمان وارد المساعيد

كلية اقتصاديات المال والأعمال، قسم اقتصاديات المال والأعمال،
جامعة آل البيت، ص.ب ١٣٠٠٤٠ ، المفرق، الأردن

ملخص البحث. تهدف هذه الدراسة إلى اكتشاف العوامل الرئيسية التي تقود النمو الاقتصادي في الأردن ؛ كدولة غير نفطية ، وتحديدا التعرف على دور الاستثمار المحلي والأجنبي المباشر والتطور في مؤسسات التمويل الوسيطة ورأس المال البشري على النمو الاقتصادي في الأردن. وقد تم استخدام منهجية حديثة نسبيًّا في هذه الدراسة وهي منهجية التحليل القياسية المعروفة باسم Autoregressive Distributed Lag (ARDL) والتي من خلالها نستطيع أن نحدد الآثار طويلة وقصيرة الأمد للمتغيرات الاقتصادية على النمو الاقتصادي. حيث توصلت الدراسة إلى عدد من النتائج الهامة ، منها : (١) هناك علاقة تكاملية ما بين النمو الاقتصادي في الأردن ومحدداته ؛ و(٢) الاستثمار المحلي والصادرات من السلع والخدمات يعتبران أهم العوامل التي تقود النمو الاقتصادي في الأردن ؛ و(٣) رفع كفاءة ومستوى القطاع المالي ورأس المال البشري يؤثران تأثيرا فعّالاً مباشرًا وغير مباشر على النمو الاقتصادي ؛ و(٤) زيادة تدفق الاستثمارات الأجنبية تسهم بصورة مباشرة في دفع عجلة النمو الاقتصادي، لكن الدراسة بينت أيضًا أن دور الاستثمار الأجنبي يرتبط بصورة مباشرة بمستوى المؤسسات التمويلية الوسيطة ورأس المال البشري في الأردن من خلال التفاعل بينه وبين هذه المتغيرات. كما توصي الدراسة ؛ وبعد أن مهدت فترة الاصلاحات الاقتصادية البيئة الاستثمارية المناسبة، إلى بذل المزيد من الجهد لزيادة الصادرات الأردنية، وجذب المزيد من الاستثمارات الأجنبية المباشرة للحفاظ على مستوى النمو الحالي للناتج المحلي الإجمالي.

كلمات مفتاحية: الاستثمار المحلي، الاستثمار الأجنبي، التكامل المشترك، التمويل الوسيط، الأردن، ARDL.