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Determinants of Private Investment in Jordan: An ARDL Bounds Testing Approach

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ABSTRACT

This study investigates the determinants of private investment in Jordan for the period 1976-2012. The ARDL (Autoregressive Distributed Lag) approach to cointegration is employed to test the existence of a long run relationship, as well as to study the short run dynamics of private investment in Jordan. To that end, demand for private investment is estimated as a function of real Gross Domestic Product (real GDP), real interest rate, and real public investment.

The original problem focuses on the assessment of factors that have either stimulated or dampened private sector investment in Jordan during the study period. The results of this study confirm some results found elsewhere in the empirical literature. Econometric evidence indicates that private investment is positively related to real GDP growth, and negatively related to real interest rates, and real public investment.

The study concluded that improving the productive sectors in the national economy may enhance private investment in the long run, and the government capital expenditures have insignificant role in boosting private sector investment initiatives, implying that public investment projects should be reviewed, reassessed, and prioritized so that crowd in private investment.

Keywords: Private Investment, Jordan, Real GDP, ARDL

INTRODUCTION

The pivotal role of investment on economic growth is a rooted issue in economic literature, the accumulation of real investment has long been regarded as one of the major determinants of economic development. However, there is an enormous debate on whether public investment or private investment has a more considerable impact on economic growth.(1)

Recently, authentic challenges facing Jordanian economy include vulnerability to fluctuations in the energy market due to its high energy import dependency (95%), and the disruption of gas inflows from Egypt during 2011 and 2012, resulting in expensive fuel imports; high unemployment rate of 12.2% in 2012 (International Monetary Fund, 2013), high dependency on remittances especially from the Gulf Arab States; increasing pressure on already scarce water resources, and political uncertainty in the region especially escalating direct and indirect inverse impacts from the Syrian conflict because of a large influx of refugees.

In addition to that, the Jordanian economy depends heavily and excessively on foreign aid, domestic and foreign debts, in addition to workers' remittances, and all of these factors are subject to the economic and political fluctuations that occur on the regional and international levels, which make the Jordanian economy to be exposed to these fluctuations. Hence, the best possible way to improve the performance of the Jordanian economy and reduce exposure to sharp fluctuations and create sustainable jobs is to promote investment, particularly private investment which includes both domestic and foreign, and this is consistent with the local private sector-led growth strategy, given that, investments have a remarkably positive effect on economic development.

Therefore, the research problem of the article lies in the assessment of factors that have either stimulated or dampened private sector investment in Jordan, and make recommendations to the decision-makers in this context. As we mentioned that much is known about the topic, but

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the knowledge is either scattered or the results are contradictory, the expected outcomes of this study may fill the research gap by adopting a new analysis method compared to the techniques used to investigate the same topic in earlier studies on Jordan.

This article aims at identifying the determinants of private investment in Jordan so that design policy recommendations that may help to improve and boost the economic growth in order to facilitate deteriorating fiscal metrics.

The study stems its importance from the increased attention paid by the government to promoting private investment in Jordan, coupled with the Jordanian experience with the privatization which created a debate around the private sector-led growth strategy. Hence, the analysis of the determinants of private investment in Jordan would contribute to the ongoing policy debate as well as assistance to designing policy to promote private investment. Finally, most investment studies conducted in Jordan focused on foreign direct investment and its relationship with economic growth, the only exception was for Hallaq and Mrayyan (2000); which analyzed the contribution of private investment to the economic growth and the constraints of that investment, which in turn makes this study one of few studies in this field.

The paper proceeds as follows. Section II reviews literature and previous studies. Section III provides an overview of the sources of data and the trends of private investment as a percentage of GDP during (1976-2012). Section IV is allocated to the model building. Empirical part of the study is described in section V, and the last section addresses findings and conclusion.

Literature Review and Theoretical Background

Review of Literature

The economic literature on private investment is quite prosperous and miscellaneous. During the last few decades, many studies have been carried out within the field of private investment in both developed and developing countries. Most of them were concerned with the analysis of productivity of private investment and its relation to economic growth. A vast research has been carried out to figure out whether public or private investment has more productivity [Buiter, 1977; Balassa, 1988; Frimpong and Marbuah, 2010; Majeed and Khan, 2013 among others]. Other research line investigated the determinants of foreign direct investment (FDI) such as Gharaybeh and Azzam (1996). A lot of research has been done to identify what factors that mainly influence private investment [Naa-Idar, *et al.*, 2012; Hassan and Salim, 2011; Ang, 2010].

Many empirical and theoretical studies have discussed the investment process, of which have distinguished between public and private investment, arguing each type of investment may have different functions and productivity to the economy [Hassan and Salim, 2011; Majeed and Khan, 2013 among others]. Also Ramirez (2012) shows that public investment spending and inward FDI flows have a positive impact on economic growth and productivity in Argentina, also Ashauer (1989) argues that the decline in public infrastructure spending was the main cause in the US productivity decline. Public-Private Partnership Authority (2011) indicates poor infrastructure impedes the effective functioning of the economy and international competitiveness. More attention will be paid to research in Jordan.

Meanwhile, many studies have been carried out to identify the main determinants of private investment. In Jordan, some general studies on investment have recently been established. During the last two decades in Jordan, increasing attention has been paid to the analysis of both private and public investment and their impacts on economic growth. Some of these studies analyzed the determinants of FDI, others investigated the relationship between FDI and domestic investment.

However, very limited literature has argued this area of interest in particular, only one not up-to-date study by Hallaq and Mrayyan (2000) discussed the contribution of private investment to the economic growth and the determinants of private investment in Jordan, the study findings revealed a positive relation between private investment and economic growth, and a negative relation between private investment and each of; interest rate, public investment, debt service, and indebtedness size.

Gharaybeh and Azzam (1996) analyzed the determinants of foreign direct investment (FDI) in Jordan, the main results indicate that economic growth, political stability, terms of trade, and exchange rate are the main factors that affect FDI in Jordan.

Khamayseh (2012) investigated the relationship between FDI and domestic investment, and the impact of economic growth on aggregate investment during (1985-2010). The study found that the FDI crowds out domestic investment, also it demonstrated a clear positive relationship between economic growth and aggregate investment. Other studies measured the impact of the FDI

and domestic investment on employment (Alkhalili, 2013). Al-Abdulrazag and Bataineh (2007) investigated the causal relationship between FDI and net domestic savings in Jordan over the period 1971-2005. The results showed that FDI is complementary to net domestic savings.

Theoretical Background

An investment theory stipulates that there are different factors associated with the process of investment. The theory will involve looking closely at a wide range of determinants to identify how to go about choosing the right investments for a particular purpose.(2) Gordon (1992) indicates that the choice between Neoclassical and Keynesian assumptions of the future profoundly affects the behavior of investment theory. Keynes (1936) and Fisher (1930) both argued that investments are fulfilled until the present value of expected future revenues is equal to the opportunity cost of capital used in the investment process. This means that investments are made until the net present value is equal to zero.

In general, investment is the change in capital stock during a period, so we can calculate the investment flow in a period as the difference between the capital stock at the end of the period and the capital stock at the beginning of the period as follows:

$I_t = K_t - K_{t-1}$

where K_t is the stock of capital at the end of period t and K_{t-1} is the stock of capital at the end of period t-1.

The theoretical framework on private investment is quite rich and diverse. Analysis of the productivity of private investment, its relation to economic growth, and identifying the determinants of private investment have gained an increasing attention in both developed and developing countries during the last few decades.

Economic Growth and Private Investment

Based on previous empirical works, there is a positive and reciprocal relationship between private investment and economic growth. In other words, an increase in private investment will enhance economic growth via the investment multiplier, meanwhile economic growth will give investors optimism and confidence about the future and the successful outcome of economy to carry out new investment projects.

Empirical studies on the determinants of investment have generally associated increased levels of investment with a macroeconomic environment characterized by high growth and stable prices (Everhart and Sumlinkski, 2001). Also Schatz (2007) indicated that a high rate of capital accumulation is necessary for rapid economic development and economically feasible. The accelerator hypothesis of net investment states that the level of net investment depends positively on the change in expected output (Gordon, 2006).

Public investment and Private Investment

Many studies have investigated the relationship between public investment and private investment, some of which indicate that the trend is still unclear (Erden and Holcombe, 2005), other studies indicate a negative relationship between the two variables, which means there is a "crowding out" effect indicating that most of investments utilized by public sector, thereby exerts a negative influence on private investment (Buiter, 1977; Balassa, 1988; Hassan and Salim, 2011; Majeed and Khan, 2013).

However, there is a widely accepted view that public investment may be complementary to private investment, rather than competing with it. Public investment may underpin and stimulate private investment through many ways in developing countries; by provision of public goods and services such as education, security, investment incentive regimes and exemptions, transportation, communication, energy, electricity and other infrastructural components. Therefore, investing in infrastructure makes up one of the main mechanisms to enhance private investment and productivity and consequently, the competitiveness of an economy. Which means a positive relationship between the two variables, which is so-called a "crowding in" effect (Wai and Wong, 1982; Greene and Villanueva, 1991; Atukeren, 2005; Ang, 2010),

Real interest rates and Private Investment

The investment theory stipulates the negative relationship between real interest rate and investment (Modigliani and Miller, 1958). Also the Keynesian model and the neoclassical theory indicate that investment is negatively related to the real rate of interest. This inverse relationship empirically has been confirmed (Greene and Villanueva, 1991; Hallaq and Mryyan, 2000; and Bader and Malawi, 2010).

However, McKinnon (1973) and Shaw (1973) formulated new approach to investment which stresses

the importance of high interest rates as drivers of economic growth. They assume that, if the economies operate in normal conditions, this will induce savings, investment and economic growth. In other words, according to them, investment is positively related to the real rate of interest.

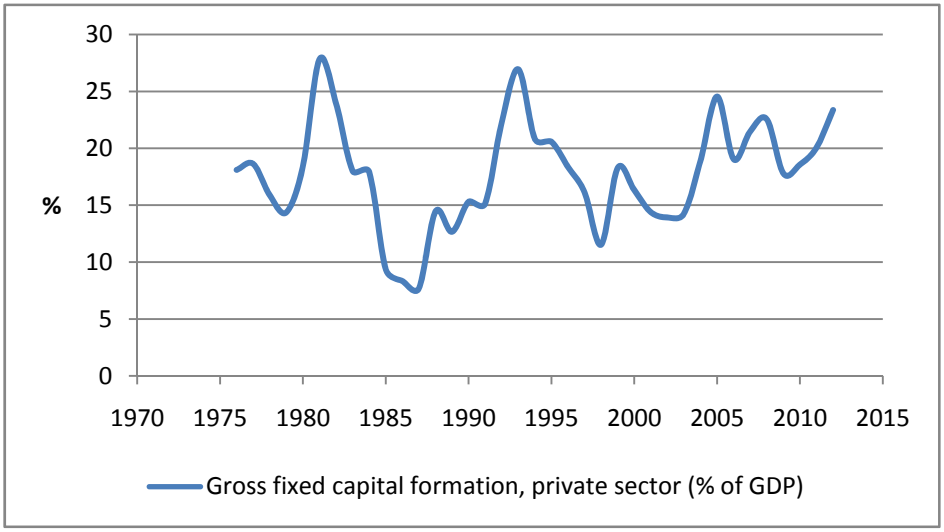
Trends of private investment

Trends of Private Investment in Jordan

The Government of Jordan has taken several investment incentive regimes and exemptions[3] under the Investment Promotion Law No. (16) of 1995 and its related amendments that were designed to make the country an attractive location for investment in most economic sectors. Among these regimes; The Free Zone Regime, The Aqaba Special Economic Zone (ASEZ), Development Areas, Industrial Estates, and Temporary Admission and Duty Drawback (TADD). The main goals of these incentives are: to provide infrastructure for the development of industrial projects within customs territory, to allow for manufacturing and storage of goods outside customs territory, to provide storage facilities for goods primarily destined for the local market, to provide investors targeting the local market the ability to defer payment of sales tax and duties until goods enter the customs territory, and to encourage imports of inputs used to manufacture exports.

In spite of the huge efforts and measures taken by the government of Jordan recently and during the last two decades in order to promote and enhance the investment climate in Jordan, however, as shown in Figure 1, the private investment as a percentage of GDP, slightly increased from 16.3 percent during (1976-1994) to 17.4 percent only during (1995-2012). This implies that these measures and efforts were not productive to underpin private investment and enhance the investment climate. This result is consistent to some extent with other studies' results conducted in the Middle East and North Africa region (MENA) during the 1980s and the 1990s, which indicated that private investment in MENA had on average shown a decreasing or stagnant trend (Aysan *et al.*, 2007).

Figure 1 shows the evolution of private gross fixed capital formation as a percentage of GDP during the period (1976-2012) according to the World Bank's estimates. The percentage is volatile and characterized by a number of peaks and troughs; the deepest trough was in 1987 (7.7 percent) while the highest peak percent was in 1981 (27.8 percent). The second highest peak was in 1993 (26 percent), while the second lowest trough occurred in 1998 (11.5 percent).



Source: Researchers Calculations based on the World Bank, 2014

Figure 1. Gross Private Fixed Capital Formation (% of GDP) (1976-2012)

Description of Variables and Data Sets

This study employs data from several sources; the Central Bank of Jordan (CBJ), the World Bank, and the International Monetary Fund (IMF). However, most of the data are collected from the World Development Indicators (WDIs), a publication of the World Bank. All

data series are annual and span through the period, 1976 - 2012. Four determinants of private investment are used to estimate the private investment models; gross private fixed capital formation is used as a proxy for private investment; these figures were calculated according to the World Bank's estimates of private gross fixed capital formation as a parentage of GDP.(4) Data on constant GDP as a proxy for income was taken from the online database compiled the CBJ. Public investment was proxied by government's capital expenditure. Finally, weighted average interest rates on loans and calculated by the CBJ are used as a proxy of the interest rate. To get figures in real terms, private investment and public investment figures were adjusted using the Consumer Price Index (CPI) while interest rate was adjusted by the inflation rate.

Model and Econometric Methodology

As highlighted above, a large number of studies have analyzed the determinants of private investment using different econometric techniques. Except for GDP, which is almost used in all investment studies,(5) it is rare to find two studies sharing exactly the same set of determinants.(6) Following Heim (2008), Frimpong and Marbuah (2010) and Ajide and Lawanson (2012), private investment is modeled as a function of output, public investment and real interest rate.(7)

$$I = f(Y, G, r) \quad (1)$$

Where: I denotes real private investment, Y stands for real income, G represents real public investment, and r indicates real interest rate. Interest rate and output are central determinants of investment whether form the Kenyesian or neoclassical view. Public expenditure was included in the model to capture the crowding-in (or crowding-out) effect.

A semi-log(8) representation is applied to Equation (1) to capture the long-run relationship between real private investment and its determinants. A time trend is added to the model to capture the average rate of growth of investment through time (Greene, 2003).

$$\ln(I_t) = \beta_0 + \beta_1 \ln Y_t + \beta_2 \ln G_t + \beta_3 r_t + \beta_4 T + u_t \quad (2)$$

Where (ln) denotes natural logarithm, β_0 is the intercept to be estimated with the other coefficients $(\beta_i, i = 1, \dots, 4)$, T is a time trend variable and u_t is a stochastic error term assumed to be normally distributed. The subscript t represents time $(t = 1976 - 2012)$. The form of Equation (2) has the virtue that the coefficients are interpreted as the elasticities of private investment with respect to their arguments except for the real interest rate and time.(9)

The first step before estimating Equation (2) is to test the stationarity of all the variables. Assuming that none of the variables is I(2), the second step is testing for cointegration using the Autoregressive Distributed Lag (ARDL) bounds test. Recently ARDL approach has been used extensively (Frimpong and Marbuah, 2010; Hamuda *et al.*, 2013; Kolade, 2014, among others). ARDL technique, pioneered has several advantages over other techniques of testing cointegration. Particularly, it does not require testing stationarity in advance, it can be used whether the variables are I(0), I(1), or mutually cointegrated and finally it is suitable when the sample size is small (Pesaran *et al.*, 2001)

The ARDL model can be represented by the unrestricted error correction model (UECM) described in Equation (3).

$$\Delta \ln I_t = \alpha_0 + \partial T + \alpha_1 \ln I_{t-1} + \alpha_2 \ln Y_{t-1} + \alpha_3 \ln G_{t-1} + \alpha_4 r_{t-1} + \sum_{i=1}^{p_1} \alpha_i \Delta \ln I_{t-i} + \sum_{j=0}^{p_2} \alpha_j \Delta \ln Y_{t-j} + \sum_{k=0}^{p_3} \alpha_k \Delta \ln G_{t-k} + \sum_{l=0}^{p_4} \alpha_l \Delta r_{t-l} + \varepsilon_t \quad (3)$$

Where Δ denotes the first difference operator and α_0 represents the intercept and ∂ is the time trend coefficient. The coefficients $\alpha_1, \alpha_2, \alpha_3, \alpha_4$ are the long-run coefficients. While $\alpha_i, \alpha_j, \alpha_k, \alpha_l$ are the short-run coefficients, ε_t represents a white noise error term. $p_i, i = 1, 2, 3, 4$ corresponds to the lag length.

After determining the appropriate lag structure,(10) the F-test (Wald test) is applied to determine the presence of a long-run relationship by restricting the coefficients of the lagged level variables to zero, i.e., by excluding $\ln I_{t-1}$, $\ln Y_{t-1}$, $\ln G_{t-1}$ and r_{t-1} from Equation (3). In other words, the following null hypothesis of no cointegration:

$$H_0: \alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$$

is tested against the alternative hypothesis

$$H_a: \alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq 0.$$

The next step is to compare the calculated F-statistic with the lower critical bound (LCB) and the upper critical bound (UCB) values reported in Pesaran *et al. (*2001). If the calculated F-value is greater than the UCB then the null of no cointegration is rejected, however, if the

calculated F- statistic is smaller than the LCB then the null of no cointegration is not rejected and if the calculated F- statistic lies between the LCB and UCB then statistical evidence with respect to the existence of a valid long-run relationship between the variables is inconclusive (i.e., no conclusion can be drawn).

For simplicity let Equation (3) be denoted by:

$$F_I(I_t/Y_t, G_t, r_t) \quad (4)$$

Then the above steps will be repeated for other four equations in which the dependent variable in Eq.(3) is changed to $\Delta \ln Y_t$, $\Delta \ln G_t$ and Δr, respectively. For brevity, these equations are given by:

$$F_Y(Y_t/I_t, G_t, r_t) \quad (5)$$

$$F_G(G_t/I_t, Y_t, r_t) \quad (6)$$

$$F_r(r_t/I_t, Y_t, G_t) \quad (7)$$

If the statistical evidence supports the alternative hypothesis of a valid long-run relationship between the variables, then a long-run relationship can be estimated using the following conditional (restricted) ARDL (p, q, r, s) specification.

$$\ln I_t = \alpha_0 + \partial T + \sum_{i=1}^{p} \alpha_i \ln I_{t-i} + \sum_{j=0}^{q} \alpha_j \ln Y_{t-j} + \sum_{k=0}^{r} \alpha_k \ln G_{t-k} + \sum_{l=0}^{s} \alpha_l r_{t-l} + \varepsilon_t \quad (8)$$

Where p, q, r and s are the lag lengths.

Error Correction Model

If the underlying variables are cointegrated, the following error correction model (ECM) representation of the ARDL (p, q, r, s) is used to capture the dynamics of the model:

$$\Delta ln I_t = \rho_0 + \partial T + \sum_{i=1}^{p} \gamma_i \Delta ln I_{t-i} + \sum_{j=0}^{q} \gamma_j \Delta ln Y_{t-j} + \sum_{k=0}^{r} \gamma_k \Delta ln G_{t-k} + \sum_{l=0}^{s} \gamma_l \Delta r_{t-l} + \gamma_{11} ECT_{t-1} + u_t \quad (9)$$

Where ρ_0 is the intercept, γ_{11} represents the speed of adjustment towards equilibrium. ECT_{t-1} stands for a one period lagged error correction term derived form the cointegration Equation (8) as follows

$$ECT_{t-1} = \ln I_t - \alpha_0 - \partial T - \sum_{i=1}^{p} \alpha_i \ln I_{t-i} - \sum_{j=0}^{q} \alpha_j \ln Y_{t-j} - \sum_{k=0}^{r} \alpha_k \ln G_{t-k} - \sum_{l=0}^{s} \alpha_l r_{t-l} \quad (10)$$

Empirical Results

This section discusses empirical findings including stationarity test, bounds test to cointegration, long-run, and short-run estimates of elasticities.

Stationarity Test

To test the stationarity of the underlying variables, the standard augmented unit root test of Dickey and Fuller was used**.** As shown in Table 1, the testing results show that only r_t is stationary at 5 percent level, while all other series are not stationary at the level.(11) However, these series become stationary at the first difference.(12)

Table (1)
Augmented Dickey-Fuller Unit Root Test

Variable	Level		First difference	
	t-statistic	Critical value at 5% level	t-statistic	Critical value at 5% level
$\ln I_t$	-0.847097	-2.945842	-6.313122	-2.948404
$\ln Y_t$	-1.559305	-2.945842	-3.391403	-2.948404
$\ln G_t$	-2.917433	-2.945842	-6.526463	-2.948404
r_t	-3.270537	-2.945842		

A t-statistic that is greater than the critical value indicates failure to reject the null hypothesis of non-stationarity.

Bounds Test for Cointegration

Since none of the series is I(2), the bounds test for cointegration can be used. Therefore, the Unrestricted ECM given in Equation (3) is estimated using Ordinary Least Squares (OLS) method, and then the restricted form is estimated in order to calculate the F-value (Wald-test). Based on the estimation results, the calculated F-statistic was 7.3762 which is greater than the 1 percent UCB (6.36). Thus the null hypothesis of no cointegration is rejected. This process was repeated for the models given in Equations 5, 6 and 7. The results reported in Table 2 support the existence of a unique cointegration relationship.

Table (2)
Results of Bound Testing to Contegration

Equation	F-Statistic (Calculated)	Decision
$F_I(I_t/Y_t, G_t, r_t)$	7.3762	Cointegration
$F_Y(Y_t/I_t, G_t, r_t)$	1.3916	No cointegration
$F_G(G_t/I_t, Y_t, r_t)$	3.3915	No cointegration
$F_r(r_t/I_t, Y_t, G_t)$	1.8737	No cointegration
At 1%: Lower bound critical = 5.17 and Upper bound critical value = 6.36 At 5%: Lower bound critical = 4.01 and Upper bound critical value = 5.07 At 10%: Lower bound critical = 3.47 and Upper bound critical value = 4.45		

Source: Pesaran *et al.(*2001, p. 301): Table CI(v) Case V: Unrestricted intercept and unrestricted trend, $k = 3$ is the number of regressors.

Estimation of Long-Run Elasticities

The existence of cointegration relationship implies the existence of a long run relationship between the variables expressed in the ARDL model given by Equation (8). The results of the estimation are given in Table A2 in the appendix. Based on these estimates, long-run estimates of Equation (2) are calculated and reported in Table 3.(13)

Table (3)
Estimated Long Run Coefficients using the ARDL (1,1,0,0) selected based on Schwarz Bayesian Criterion

Regressor	Coefficient	Standard Error	T-Ratio[Prob]
$\ln Y_t$	2.7503	0.63589	4.3252[0.000]
$\ln G_t$	-0.71726	0.25187	-2.8477[0.008]
r_t	-0.020699	0.010026	-2.0645[0.048]
Constant	-10.5849	4.0133	-2.6375[0.013]
Time	-0.057082	0.026268	-2.1731[0.038]

As shown in Table 3, all the estimates are highly statistically significant. The coefficients of income and interest rate have the correct signs as expected by the economic theory. More specifically as real income increases by one percent real private investment increases by 2.75 percent and as real interest rate increase by one percent real private investment decreases by 0.08 percent.(14) Moreover, increase in real public investment by 1 percent reduces real private investment by approximately 0.72 percent supporting crowding-out hypothesis. Finally, real private investment shrinks 6 percent every year.

The long run model is given by:

$$\ln(I_t) = -10.58 + 2.75 \ln Y_t - 0.02 r_t - 0.72 \ln G_t - 0.06T \qquad (11)$$

Short-run Estimates

The results of the short run coefficients obtained from the ECM Equation (9) are given in Table A3 in the appendix. As seen in the Table, the short-run estimates are significant and have the same signs as those in the long-run. In particular, a one percent increase in real income causes an increase in real private investment by 4.34 percent which greater than its counterpart in the long-run. Also an increase in real interest rate by one percent leads to a decrease in real private investment by 0.05 percent, which confirms the fact that real private investment in the long-run is more responsive to interest rate changes. With respect to real public investment, the response is in the short-run is smaller than it is in the long-run; the elasticity is estimated at -0.47, supporting crowding-out effect. Finally, the coefficient of lagged error correction term ECT_{t-1}has the correct sign (negative) and significant at 1 percent level. This confirms the established long run relationship between the variables. Additionally, the value of the coefficient of ECT_{t-1}can be interpreted as the speed of adjustment or convergence towards long run equilibrium. More specifically, about 66.14% of disequilibrium from the past year will be corrected in the next year, put it another

way, adjustment following a shock towards long run equilibrium takes around 1.5 year on average.

Diagnostic Tests

As shown in Table A4 in the appendix, the model passed successfully the tests of serial correlation, functional form, normality and heteroscedasticity. The empirical evidence shows that no serial correlation exists, the functional form of the model is well specified, the residual term is normally distributed and the null of homoscedasticity is not rejected at 5 percent level.(15)

To test the stability of parameters, cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) were used. As shown in Figures 2 and 3, except for a very few values, the remaining values lie within critical bounds of 5 percent. This asserts the stability of short run and long run parameters.

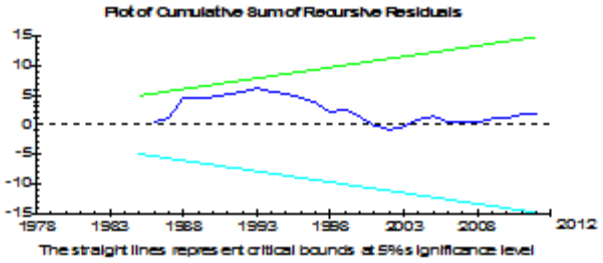


Figure 2. Plot of CUSUM

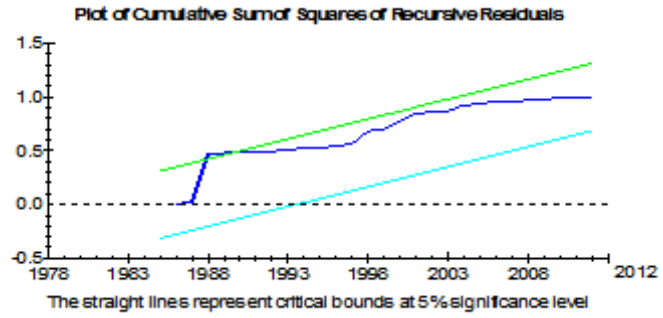


Figure 3. Plot of CUSUM squares

Discussion and Conclusions

Drawing on relevant theoretical foundations and other empirical research done, this study empirically investigated the main determinants of private investment in Jordan during the period 1976-2012. By employing time series econometric techniques such as the ARDL cointegration approach, stationarity, and error correction. The study identifies the following variables; real income, real interest rates, real public investment, and the trends of private investment over time.

Econometric evidence indicates that there is no doubt that real income growth is the engine of private sector investment growth in Jordan. This implies that improving the productive sectors such as agriculture and manufacturing may enhance private investment in the long run.

The significant negative impact of public investment on private investment in the short-run indicates a negative role played by the government in boosting private sector initiatives. In addition to that, the public sector started to crowd out the private sector for borrowing, which led to overcome domestic borrowing on external borrowing during the last decade which is supporting crowding-out hypothesis. As a matter of policy, it is essential for the government to overcome this problem by reviewing and prioritizing public projects, which have the potential to limit long-run growth of the private sector performance. Hence, the government should review and diagnose the imbalances in its capital expenditures, particularly may

be in education and infrastructure. In other words, the government should give more priorities to spending that crowd in private investment, rather than spending on expenditures that crowd out private investment.

Finally, the results also indicate that real interest rate has a negative impact on private investment which is to be in line with the economic theory and some other empirical studies.

NOTES

1) The National Agenda (2006-2015) in Jordan states that the performance of the private sector with the government partnership will determine the shape and future of the Jordan economy.
2) This means that the effectiveness of each determinant may vary depending on the investment environment.
3) See Jordan Investment Board www. jordaninvestment.com, the Ministry of Industry and Trade www.mit.gov.jo, Jordan Industrial Estates Corporation www.jiec.com, and The Aqaba Special Economic Zone www.aqabazone.com.
4) Gross fixed capital formation figures published by CBJ were not used to proxy private investment because these figures measure both private and public capital formation.
5) Bakare (2011) is one exception. Nonetheless, he modeled the dependent variable (nominal private investment) as a percentage of nominal GDP and one of the determinants (nominal public investment) as a percentage of nominal GDP, too.
6) See Table A1 in the appendix for a review of the variables used in some studies. Astonishingly, some authors such as Hamuda et al. (2013), Naa-Idar et al. (2012) and Bakare (2011) did not use the interest rate as a determinant of investment.
7) Note that these are not the only determinants used by the authors.
8) The log-linear representation was not used because the real interest rate was negative in some years (see Hassan and Salim, 2011 and Frimpong and Marbuah, 2010).
9) Note that β_3 is partial or semi elasticity; in order to convert it into elasticity it should be multiplied by r_t, which means that the elasticity will not be constant rather it will change as $r_t$changes. To overcome this problem, β_3 will be multiplied by the mean value of r_t. On the other hand when, β_4 had to be multiplied by 100, so as to be interpreted as the growth rate of private investment per year.
10) The appropriate lag length is usually determined with the assistance of the Akaike Information Criterion and/or the Schwarz Bayesian Criterion. In our case the letter one was used.
11) These results were reached assuming the existence of intercept. The test was redone a couple of times; once assuming the existence of intercept and trend and once assuming the absence of trend and intercept. Under these assumptions only r_t remains stationary. The unit root test was also performed using Phillips-Perron method; $\ln G_t$ becomes stationary at 5 percent level while conclusions about the other variables remain unchanged.
12) Note that the first difference of the logarithm of a variable is a close approximation of the percentage change or the growth rate of the variable.
13) They are calculated using delta method (See Baranzini et al., 2013). More specifically $\beta_0 = \frac{\alpha_0}{1-\sum_{i=1}^{p}\alpha_i}$, $\beta_1 = \frac{\sum_{j=0}^{q}\alpha_j}{1-\sum_{i=1}^{p}\alpha_i}$, $\beta_2 = \frac{\sum_{k=0}^{r}\alpha_k}{1-\sum_{i=1}^{p}\alpha_i}$, $\beta_3 = \frac{\sum_{l=0}^{s}\alpha_l}{1-\sum_{i=1}^{p}\alpha_i}$ and $\beta_4 = \frac{\partial}{1-\sum_{i=1}^{p}\alpha_i}$
14) For calculations see footnote 10 above.
15) Heteroscedasticity is not of great importance for time series data.

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محددات الاستثمار الخاص في الأردن: باستخدام نموذج (ARDL) لتحليل السلاسل الزمنية

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ملخص

تهدف هذه الدراسة إلى بحث محددات الاستثمار الخاص في الأردن في الفترة الممتدة ما بين 1976 و2012. تم استخدام طريقة ARDL لإختبار وجود علاقة طويلة الأجل فضلا عن ديناميكية الاستثمار الخاص في الأردن في المدى القصير. وتم تقدير الطلب على الاستثمار الخاص كدالة في الناتج المحلي الإجمالي الحقيقي، وسعر الفائدة الحقيقي، والاستثمار العام الحقيقي.

تركز مشكلة البحث الرئيسية على تقييم العوامل المحفزة أو المثبطة لاستثمار القطاع الخاص في الأردن خلال فترة الدراسة. وتؤكد نتائج هذه الدراسة على نتائج دراسات تطبيقية أخرى، حيث تشير نتائج التحليل القياسي إلى أن الاستثمار الخاص يرتبط بشكل إيجابي مع نمو الناتج المحلي الإجمالي الحقيقي، بينما يتأثر سلبا بكل من سعر الفائدة الحقيقي والاستثمار العام الحقيقي.

خلصت الدراسة الى نتيجة مفادها أن تحسّن القطاعات الإنتاجية في الاقتصاد الوطني سيحسن الاستثمار الخاص في المدى الطويل، كما ان النفقات الرأسمالية الحكومية لها دور سلبي في دعم مبادرات القطاع الخاص الاستثمارية، وهذا يقتضي مراجعة وتقييم وإعادة أولويات المشاريع الاستثمارية الحكومية لكي تعزز الاستثمار الخاص.

الكلمات الدالة: الاستثمار الخاص، الأردن، الناتج المحلي الإجمالي الحقيقي، ARDL.

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