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# ANALYSIS OF NEXUS BETWEEN FOREIGN DIRECT INVESTMENT, AIDS ANDECONOMIC GROWTH IN JORDAN

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**Abstract**

The part played by foreign aid differs from one country to another. Jordan has depended on the foreign aid to sustain its growing programs since independence and the aid continue to be the highest proportion in the foreign capital inflows to Jordan. In the past decade, the fundamental problems associated with the real gross domestic product (GDP) in Jordan are apparent since the foreign aid is highly influenced by macroeconomic shocks that have severely affected the GDP through changes in macroeconomic factors. However, this relationship has not been adequately addressed. The main objectives of this paper is to investigate the influence of foreign direct investment and aids on economic growth in Jordan by employing time series data from 1976 to 2015. The Autoregressive Distributed Lag (ARDL) model was employed to examine the relationship between the variables empirically. The findings revealed the existence of a long-run relationship among the variables. Foreign direct investment (FDI) is positive and significantly influencing the economic growth in both short run and long run. Moreover, aid is significant and negatively influencing the economic growth in the short run, while insignificant in the long run. The interaction term of foreign direct investment aids has a negative and significant influence on economic growth in both short run and long run. The results recommended that higher foreign investment may decrease the ability of aids to increase the economic growth. Therefore, policy makers should balance between investment friendly policies such as foreign direct investment that will be attracted into the country for sustainable economic growth.

**Keywords:** ***Interaction term of foreign direct investment and aids, Foreign Direct Investment, (FDI), Aids, Autoregressive Distributed Lag (ARDL) model, Economic growth***

## 1. Introduction

In developing countries, for example, Jordan, to finance the development program foreign aid is considered as an essential source. Foreign aid has been a topic of intense debate for its role played in the growth process of Jordan. Foreign aid with its implications and assassination in struggling poverty decrease in developing countries is a significant topic. Moreover, its role in stimulating and prodding economic growth is to strengthen internal basis of finance, for example, reserve funds, in this way raising the amount of speculation and capital stock. Hence, it is essential to take note of that in current circumstances there has been a prominent change in help proceeds and commitment to advancing nations although different sorts of commitment, for example, other private streams and foreign direct investment are blurring. For example, as per the Organization for Economic Corporation and Development (2014), pronounced that other private streams and foreign direct investment are on the drop, and enclosures are expected to drop essentially in 2009. Spending plans of different developing nations were pounded hard by rises costs of oil and sustenance in the most recent decade. Numerous nations are not in a solid financial circumstance to talk about the existing financial crisis. The estimation of foreign aids to the economies of developing nations does truly exist; it is important to comprehend its offering to the economic increase.

However, there are many types of foreign aid, which incorporate loans and foreign direct investment, the grants, export credit, technical assistance and emergency relief, project and non-project assistance, and many more. Regardless the fact that all the under developed nations require outside capital inflows for their growth, the volume and the type of the nation estimate and the financial conditions of the nation are the real determinants of the size and the type of the foreign aid. For example the minimum developed nations of Africa have depended on the foreign aids, while the developed nations of the East-Asia are the biggest recipient of the foreign direct investment. In case of Jordan, the foreign aid is a significant variety of the foreign capital inflow and has a huge part for the nation's advancement which can be observed from the story of economic growth.

Therefore, in the past decade, the fundamental problems associated with the GDP in Jordan are apparent since the foreign aid is highly influenced by macroeconomic shocks that have severely affected the RGDP through changes in macroeconomic factors. In recent years, the real growth rate of Jordan was unstable. Figure 1.1 below showed that in 1980, the real GDP had decreased by 88 from 2% of 1976. Similarly, the real GDP documented an increase of 0.24% from 0.13 in 2000. Conversely, in 2010 real GDP showed a decrease of 0.59% from 0.24 (World Bank, 2017). Hence, the main objectives of this paper are to examine the impact of foreign direct investment, foreign aid and interaction terms of foreign direct investment foreign aid on economic growth in Jordan. The parts of this paper are organised into the following sections. The second section discussed the previous empirical related studies; the third section discussed the research methodology and theory, the fourth section discussed the results of the study, the fifth section discussed the summary and recommendations.

## 2. Previous Empirical Related Studies

The empirical studies reviewed indicated that some of the revealed positive linkages between foreign aids, foreign direct investment, and economic growth, while others found a negative relationship.

The study of Ekanayake and Chatrna (2010) examined the impact of aid on the economic growth of emerging countries. The study used panel data from 85 emerging countries covering Africa, Asia, Caribbean as well as Latin America cover from 1980-2007. The study tested the hypothesis that aid can stimulate economic growth in emerging countries. Moreover, the findings of the study showed that foreign aid has diversified effects on economic growth in emerging economies. The study of Al-Foul, (2013) studied the long-run linkages between per capita real foreign aid and per capita real GDP for Jordan from 1965-2005 and Egypt from 1960-2005. Their study applied the newly developed method to cointegration by Pesaran *et al*. (2001). The results found that a long-run association exists between the variables in Jordan, while in Egypt there is no evidence of a long-run relationship that exists. Moreover, the result of Granger causality test showed one-way causal relationship from foreign aid to economic growth in Jordan. But, in Egypt, the results showed no causality between foreign aid and economic growth. Similarly, Bhattarai, (2016) investigated that if Foreign aid from the contributors may or may not promote the economic growth of the receiving countries. They increased investment to see that if the extent of aid is related with the conditionality of exports, it will have negative influences on the economic growth rates. Simulation of the systematic model indicated that if TFP grows wilder in the recipient countries more than in the contributors, then emerging countries can meet in the investment saving ratios and capital output ratios with related economic growth patterns as their progressive country contributors over the long horizon. However, if the resource flows out of the emerging countries in return to foreign aid inflows this will have risky effects in economic growth of emerging economies. Econometric estimates revealed that investment rather than foreign aid was a factor contributing to economic growth of the emerging countries. Also, an export tied to foreign aid has been risky for economic growth of receiving countries. While the panel data analyses showed that British aid has contributed to economic growth in receiving nations as British exports to Asian DCs were positively associated to by their level of per capita income regardless of the extents of British aid to those economies. Ibrahim and Dahie, (2016) examined the influence of aid, domestic investment, and FDI on the economic growth in Somalia from 1970-2014. The study also employed regression analysis of the ordinary least square (OLS) procedure. The result of the

study showed the strong positive link between aid, domestic investment, FDI and economic growth. Recently, Chacon-Hurtado, *et, al* (2017) explored the short-run and long-run association between Aid, External Debt, Domestic Saving and Economic Growth in Pakistan from 1980-2014. Their study employed Error Correction Mechanism (ECM) and Autoregressive Distributive Lags Model (ARDL) techniques. The results found that negative association between Aid and economic growth exists in the long run, but the positive relationship in the in short run. Conversely, domestic saving revealed a negative association in the short run while the positive association with economic growth in the long run. Also, external debt shows a negative relationship with economic growth in a long and short run. Moreover, Al Amarat, (2016) aimed at identifying the size of foreign direct investment in Jordan and its impact on the rate of unemployment. It also aimed at identifying the factors against the foreign direct investment. The study concluded that the low levels of these investments are endorsed to the absence of flexible legislations that boost foreign investment in Jordan. The study recommends the development of services and infrastructures; besides, the Jordanian concerned departments should prepare and disseminate the information on investment opportunities in Jordan. Also, MENA countries, Pehlivan, and Saglam, (2016) investigated the association between foreign direct investment and economic growth from 1990-2014. The study used Hadri Kruzomi and Pesaran *et al*. Multifactor Error Structure panel unit root tests, Wetland's panel and group cointegration tests. The findings revealed that long run association exists among the variables.

In a recent study of Kalai, and Zghidi, (2017) analyzed the interrelationship between international trade, foreign direct investment and economic growth for 15 selected North African and Middle Eastern countries over the period 1999-2012. They employed Autoregressive Distributed Lag (ARDL) techniques Vector Error Correction Model (VECM). The results indicated that one-way long-run causal relationship is running from FDI to economic growth in MENA countries. The study also showed that FDI has a positive impact on economic growth in MENA countries. In Tanzania, Ramadhan *et al*. (2017) analyzed the Influence of aid and economic growth using annual time series data cover the period of 1992-2014. The study employed Vector Error Correction Model (VECM) to explore the long-run and short-run effect of aid on economic growth in Tanzania. Moreover, they applied Granger Causality technique to examine the relationship between aid and economic growth. The result displayed that there is evidence of a long-run association between foreign aids and economic growth. However, in short-run, aid does not Granger cause economic growth. The result recommended that government should pursue other forms of foreign aids that are received to encourage their economic growth. The previous work of Flora and Agrawal, (2017) studied that foreign direct investment inflows and outflows have a substantial impact on the world economy, and are important for both advanced and emerging countries. The study assumed that foreign investments have positive influences on a country's economy, and to be the principal factors supporting accelerated economic growth. Moreover, the study found that in the literature, among the most-cited causes of Asia's strong economic growth in the recent time has been the inflow of FDI into the region. This inward FDI has also confirmed to be an actual means over which Asian countries are assimilated with rest of the world and vice-versa. Currently, most countries are motivated to attract FDI, because of the expected favorable effects on income generation from advanced technology, capital inflows, and market know-how and management skills. In emerging countries, such as China and India, the attraction of foreign capital is considered to be a necessary means for economic growth. It is widely recognized that FDI offers economic reimbursements to receiving countries by providing foreign exchange, technology, and capital, and by growing both access to foreign markets and competition. Moreover, Ojewumi and Akinlo, (2017) Examined the dynamic relationships between the economic growth, the inflow of FDI and environment quality of the Sub-Saharan African (SSA) countries. The study employed Panel Vector Error Correction (PVEC) and Panel-Vector Autoregressive (PVAR) techniques on a sample of thirty-three SSA countries. The findings of the study showed that dynamic cointegration relationship exists between economic growth, foreign direct investment and environment quality. In Iran, Khoshnevis, Homa, and Soheilzad, (2017) studied the long-run and short-run interaction among tourism, FDI, and economic growth. The study applied annual time series data from 1985 to2013, the Error Correction Model (VECM) and Autoregressive Distributed Lag (ARDL). The results revealed a positive linkage between tourism and economic growth in both short-run and long-run. The results similarly showed a positive relationship between foreign direct

investment (FDI), the real effective exchange rate (REER) and economic growth. The result of Granger causality test showed a two-way causal relationship between tourism and economic growth.

## 3. Theory and Methodology

### 3.1 The endogenous growth model

The endogenous growth model was established by Solow and Swan (1956).It is made of an aggregate, constant return to scale production function that pooled capital with diminishing marginal returns and labour in the production of the commodities. The technology improved at an exogenous rate, while savings are expected to be a fixed fraction of output. Consider the following Cobb- Douglas production function:

$$Y = WA^{\theta}F^{1-\theta}\ 0 < \theta < 1$$

Where Y indicated output, A the Aids received, F is the foreign direct investment and W indicated any other factor that contributes to the determinant of growth. This paper used the foreign aids and foreign direct investment.

### 3.1 Model Specification

This paper employed time series data between 1976 and 2015.The model includes the following variables: Gross Domestic product Per Capita, Foreign Aids and Foreign Direct Investment. The functional relationship of the model is captured as:

$$GDPC_t = f(FA_t, FDI_t, (FA \times FDI)_t)$$

Where $GDPC$ (gross domestic product per capita) is the dependent variables, while $FA$ (Foreign aids), $FDI$ (Foreign direct investment), $FA \times FDI$ (Foreign aids Foreign direct investment interaction term), are the independent variables.

For the econometric analysis, the functional equation will be transformed into a linear function as:

$$LNRGDPC_t = \theta_0 + \vartheta_1\, LNFA_t + \vartheta_2\, LNFDI_t + \vartheta_3\, LN(FA \times FDI)_t + \varepsilon_t$$

### 3.2 Unit root test

To applied Autoregressive Distributed lag (ARDL) bound test numerous steps were implemented. First, the stationarity of the variables were investigated to see the order of integration. To do the analysis of stationarity two unit root Augmented Dickey-fuller and Philip-Perron tests was used.

### 3.3 Bound Test and Long run and Short run Relationship

The paper applied Autoregressive Distributed Lag (ARDL) approach referred to as the bound test as displayed by Pesaran and Shin (1999) and stretched out by Pesaran, Shin, and Smith (2001). As against the ordinary Johanssen cointegration technique that uses a series of the condition to assess long-run association. The use of ARDL forestalls issues related with deciding short time series data (Enisan and Olufisayo, 2009). The ARDL procedure, in reality, was perceived to have extra focal points of yielding predictable assessments of the short-run and the long-run coefficients (Abudalu, 2014). The approach can test for cointegration among the variables paying little respect to whether the underlying variables are$I(0), I(1)$, or partially incorporated. However, the approach has a

confinement with regards to integration of order two $I(2)$. Also, the long and short-run parameters of the model are evaluated simultaneously. Therefore, the inability to test hypotheses on estimated coefficients in the long-run associated with Engle-Granger method is avoided. Thusly, the ARDL model in this study is determined as follows.

$$\Delta LNGDPC_t = \theta_1 + \sum_{i=1}^{n} \vartheta_1 \Delta LNGDPC_{t-i} + \sum_{i=0}^{n} \vartheta_2 \Delta LNFA_{t-i} + \sum_{i=0}^{n} \vartheta_3 \Delta LNFDI_{t-i} + \sum_{i=0}^{n} \vartheta_4 \Delta LN(FA \times FDI)_{t-i} + \delta_1 LNGDPC_{t-1} + \delta_2 LNFA_{t-1} + \delta_3 LNFDI_{t-1} + \delta_4 LN(FA \times FDI)_{t-1} + \tau_{1t}$$

Where $\Delta$ is a first-difference operator, and *n* is the optimal lag length. Analyzing the presence of the long-run relationship amongst the variables in the above equations and is done using bounds testing procedure, which is the first stage in ARDL cointegration method and is based on the F-test statistic. Each equation combined both the long run and short run parameters.The Joint significance test, which implies the null hypothesis gives no cointegration $H_0: \vartheta_1 = \vartheta_2 = \vartheta_3 = 0$. Therefore, rejecting the null hypothesis, i.e. $H_1: \vartheta_1 \neq \vartheta_2 \neq \vartheta_3 \neq 0$ implies that cointegration exist amongst the variables. Two bounds of critical values are computed by Pesaran *et al*. (2001) for decision rule. The lower bound accepts that all the variables are *I(0)* and upper bound assumes they are all *I(1)*. If the computed F-statistic is greater than the upper critical value, there is cointegration. But when the F-statistic is between the two bounds of critical values, the analyses becomes inconclusive. Lastly, when the F -statistic is less than the lower critical value, it suggests no cointegration. The stability of the estimated coefficients over the sample period will also be examined by adopting the recursive residual test for structural stability. The Aggregate Sum of Recursive Residuals (CUSUM) and the Aggregate Sum of Square of Recursive Residuals (CUSUMQ) obtained from a recursive estimation of the models will be plotted against the time horizon of the sample. These are compared with the bound critical values at specified significance level. If the plot of the CUSUM and CUSUMSQ remains within the boundaries of the 5 percent critical bound the null hypothesis that all coefficients are stable cannot be rejected.

**4. Results and Findings**

**Table 1 Results of Unit Root Test**

| Variables | ADF | | | | PP | | | |
|---|---|---|---|---|---|---|---|---|
| | Level | | 1st Diff. | | Level | | 1st Diff. | |
| | t stats | p values | t stats | p values | t stats | p values | t stats | p values |
| LNFA | -2.020666 | 0.277107 | -5.756822* | 2.65E-05 | -1.873914 | 0.340594 | -6.463993* | 3.23E-06 |
| LNFDI | -2.065946 | 0.258954 | -7.296923* | 3.45E-07 | -2.088205 | 0.250309 | -7.296923* | 3.45E-07 |
| LNRGDP | -3.129828** | 0.032465 | -11.09231* | 8.88E-10 | -3.032462** | 0.040576 | -12.90873* | 1.90E-09 |

Table 1 provided the unit root for the variables in the analysis. The results are estimated using ADF test and PP test. We test the existence of unit root using a level and first difference. Gross domestic product per capita was the only variable stationary at level and first difference. Therefore, Gross domestic product per capita has mixed stationarity, that is it was stationary at both $I$ (0) *and* $I$ (1). Moreover, the result indicated that foreign direct investment and foreign aids were stationary at first difference $I$ (1).

**Table 2 Lag Selection**

| Lag | LogL | LR | FPE | AIC | SC | HQ |
|---|---|---|---|---|---|---|
| 0 | -153.9063 | NA | 0.097468 | 9.023219 | 9.200973 | 9.084580 |
| 1 | -105.8500 | 82.38224 | 0.015730 | 7.191430 | 8.080201* | 7.498234 |
| 2 | -92.59591 | 19.69184 | 0.019141 | 7.348338 | 8.948124 | 7.900584 |
| 3 | -63.66146 | 36.37473* | 0.010122* | 6.609226* | 8.920029 | 7.406915* |

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion

Based on Table 2 above the study is going to use Schwarz information Criterion (which is lag 3) because it performs better than others (Narayan, 2004; Pesaran *et al*. 2001).

**Bound test to Cointegration**

**Table 3 Cointegration Bound Test Analysis**

| Variables | *LNGDPC* | | |
|---|---|---|---|
| Optimum-lags | (3,3,1,2) | | |
| F-Bound | 5.347* | | |
| Critical values | 1% | 5% | 10% |
| Upper bound | 3.90 | 3.21 | 2.89 |
| Lower bound | 2.73 | 2.17 | 1.92 |
| Diagnostic test: | | | |
| $R^2$ | 0.73 | | |
| Adj-$R^2$ | 0.58 | | |

Note: *, ** and *** show the significance at the 1%, 5% and 10% levels

The Table 3 above showed the cointegration F-bound test for cointegration and the calculated F-statistics (5.347) exceeds the critical upper and lower bounds values at 1%, 5%, and 10% level of significance as indicated. This confirmed that there is existence of co-integral relationship between foreign aid, foreign direct investment and economic growth in Jordan. And the null hypothesis which says that there is no significant cointegration relationship between foreign aid, foreign direct investment and economic growth in Jordan in Jordan is rejected at 1%, 5% and 10% level of significance. (The critical bound values used are from Pesaran table case ll). The result of the estimation indicated that the explanatory variables account for about 73% variation in economic growth in Jordan. The results is supported by Ekanayake and Chatrna (2010), Bhattarai, (2016), Pehlivan, and Saglam, (2016), Sabra, and Eltalla,. (2016) and Kalai, and Zghidi, (2017).

**Table 4 Long Run and Short Run Estimates**

| Long Run Coefficients Estimates | | | | |
|---|---|---|---|---|
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| *lnFDI* | -0.55572* | 0.195500 | -2.842592 | [0.008] |
| *lnFA* | 0.105728 | 0.466180 | 0.226796 | [0.822] |
| *lnFAFD* | 0.13149* | 0.042304 | 3.108274 | [0.004] |
| *Constants* | -0.417527 | 9.513725 | 0.438868 | [0.664] |
| Short-run coefficients Estimate | | | | |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| D(lnFDI) | -1.82846** | 0.794523 | -2.301341 | [0.029] |
| D(lnFA) | -0.444178 | 0.288874 | -1.537619 | [0.135] |
| D(lnFAFD) | 0.09673** | 0.040452 | 2.391321 | [0.023] |
| ecm(-1) | -0.64008* | 0.162752 | -3.932889 | [0.000] |

$$LNRGDPC_t = -0.42 + 0.11\,LNFA_t - 0.56\,LNFDI_t + 0.13\,LN(FA \times FDI)_t + \varepsilon_t$$

Once co-integration existed among the variables, the conditional ARDL long-run and Short run model for economic growth can be estimated. The results are presented in Table 4 above. Table 4 indicated that the coefficient of foreign aids, foreign direct investment, and the interaction term are 0.11,-0.56 and 0.13 (Long run estimates) and -0.44,-1.83 and 0.09 (Short run estimates) respectively. The values are positive and statistically significant at 1 percent and 5 percent level respectively. It is vital to address the stability of the long-run coefficients that are used to form the error-correction term in conjunction with the short-run dynamics. Given this, the study applied CUSUM and CUSUMQ test as proposed by Borenstein *et al.*, (1995). The same tests have been used by Pesaran and Pesaran (1997) and Mohsen *et al.*, (2002). The CUSUM test shows that if the cumulative sum of recursive residuals goes outside the two boundaries, then the model is not stable. The same is applied to CUSUMQ (squared recursive residuals) test. Figure 1 and 2 indicated the estimate of the CUSUM and CUSUMQ test of each model based on AIC. As can be seen, the plot of the CUSUM and CUSUM-sq statistics stay within the critical bounds confirming the significant association between economic growth and its determinants. The results indicated that the parameters are stable in assessing the long-run relationship between aids, foreign direct investment and economic growth at the five percent level of significance. Moreover, Bannerjee *et al*., (1998) reported that "a highly significant error correction term is further proof of the existence of the stable long-run relationship." The estimates indicated that the coefficient of *ecm*(-1) is equal to -0.64 for short run models. This indicated that the deviation of the long-run economic growth is corrected by 64% over each year. Similarly, a full adjustment to long-run equilibrium takes approximately two and a half years.

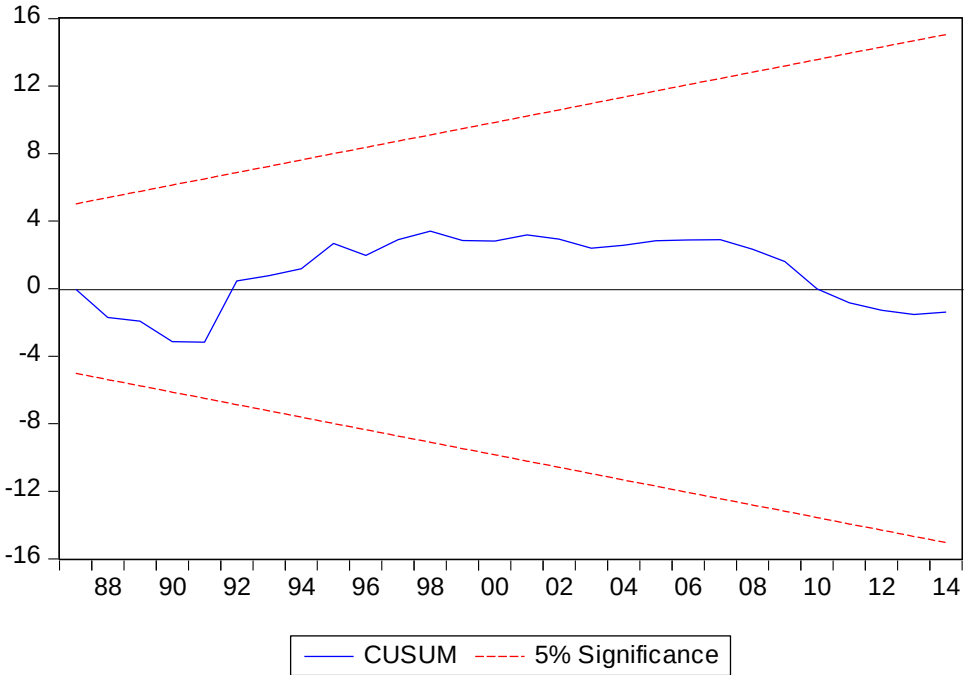


Figure 1 Cusum Test

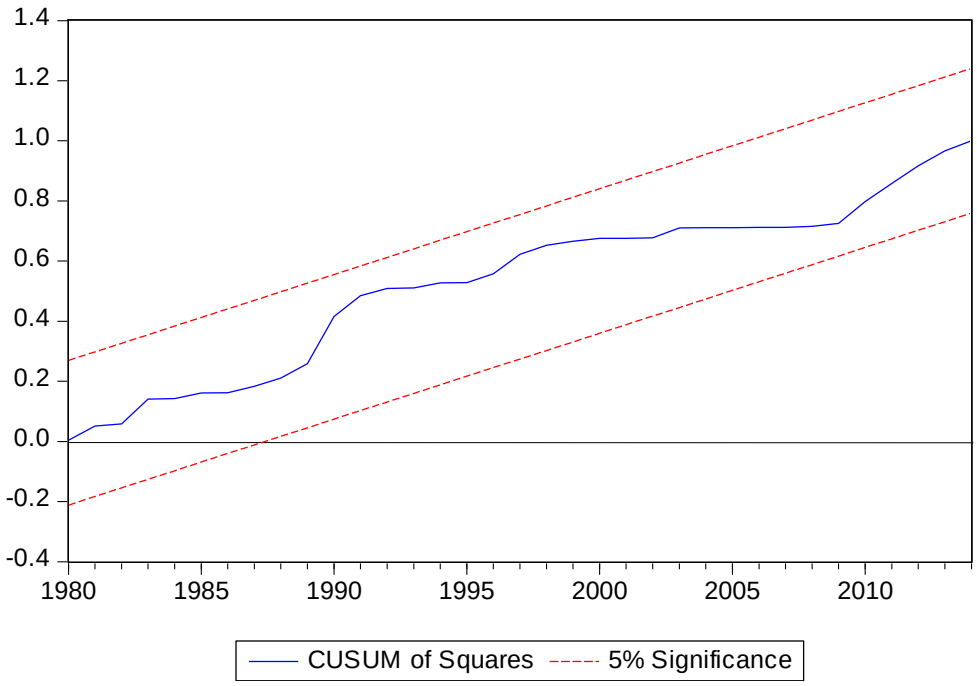


Figure 1 Cusum of Squares Test

**Conclusion and Policy Recommendations**

This paper presented new evidence on the impact of foreign aid, foreign direct investment and foreign aid foreign direct investment interaction on the Jordan economic growth and found find that foreign aid has a positive impact on economic growth. Increasing the foreign aid to economic growth ratio by 1% point from average foreign aid to economic growth ratio at the period of intersection increases the real GDP growth per capita rate by 0.11% points. The results also revealed that increasing the foreign direct investment to economic growth ratio by 1% point from average foreign direct investment to economic growth ratio at the period of connection decreases the real GDP growth per capita rate by 0.56% points. The increasing the foreign aid foreign direct investment to economic growth ratio by 1% point from average foreign aid to economic growth ratio at the period of intersection increases the real GDP growth per capita rate by 0.13% points. The results offered in this analysis have some clear and important policy implications. Jordan's policymakers would endeavor to quicken the country's economic growth which will result in higher foreign direct investment inflows. The negative influence of foreign direct investment suggested that measure will be taken to use the foreign aids in the appropriate mechanism and to increase the level of infrastructure it will pave the way to increase the economic growth. If the economies increase the production level and to increase the level of the economic activity of the country, it will overlay a way toward the achievement of investment, and it will increase the level of foreign direct investment in Jordan. It is also essential to increase the income of capital over the economy it will stimulus the foreign direct investment likewise. The investment authority would likewise confirm that the flow of foreign direct investment is stimulated into the country stability as it might affect the economic growth and steady the economic growth from the influence of substantial strikes. The policy on attracting foreign direct investment targets to improve Jordan economic growth in addition to decrease the instability of economic growth.

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