

# Determinants of Economic Growth in Afghanistan: A Time Series Approach

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## Abstract

*This research reviewed the determinants of economic growth in Afghanistan on the basis of endogenous and exogenous growth theories and empirical studies. The main objective of this research was to address the impact of domestic investment, export, official development assistance and import (independent variables) on the economic growth (dependent variable) in Afghanistan. This study adopted a quantitative method of Ordinary Least Square regression and Co-integration analysis to address the impact and long-run association among variables. The findings from OLS regression depicted that domestic investment, export, and imports are significantly correlated to economic growth, while foreign aid/official development assistance are insignificant. In addition to OLS regression, researcher also did Johansen Co-integration test to determine the long-run association of variables. It was found that long run relationship exists among the variables, which reaffirm that domestic investment and foreign aid are significant variables in bringing alteration in economic growth. This means that the Afghan government should emphasize on attraction of domestic capital to boost investment and achieve high economic growth as accordingly.*

**Keywords:** Economic Growth, Foreign aid, Domestic Investment, Imports, Exports and Afghanistan

**JEL Codes:** F35, F43, F1, P45

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## Introduction

During the course of history, social welfare and economic growth have been decisive needs of every society and its citizens. In order for governments to satisfy the needs of its citizens, some of them have been able to achieve tremendous victories and climbed far ahead over the economic ladder of success. However, majority of the remaining governments have been left behind and could not make it to converge (Aghion & Howitt, 2008). In order to understand that what causes economies to grow and why very few countries made it to uplift their economic conditions, while majority of the rest couldn't converge, it's necessary to know about the term economic growth, its patterns, determinants, and fundamental causes (Grossman & Helpman, 2004; Aghion and Howitt, 2008; Acemoglu and Guerrieri, 2008).

According to majority of growth theories; accumulation of human capital, physical capital, and increase in productivity as result of technological advancement are some of the fundamental determinants for long-run economic growth (Harrod, 1939; Domar, 1946; Solow, 1956; Swan, 1956; Cass & Koopmans, 1965; Lucas's 1988; Barro, 1990; Romer, 1990; Grossman & Helpmann, 1991; Rebelo, 1991; Aghion & Howitt, 1992; Ortigueira & Santos 1997). However, for underdeveloped countries which cannot generate adequate stock of capital from domestic source, economists proposed to fill that gap through foreign aid or also known as Official Development Assistance (Mercieca, 2010). Since ODA is inherently an exogenous determinant to economic growth, it thus, can create macroeconomic volatility as a result of decrease in the stock of foreign reserves, if aid giving country stop funding (Collier, 2007; Joya, 2011; Janjua et al., 2018). According to Denison (1962), economic growth is the inflation adjusted increase in the production of goods and services over a specific period of time. Given that, economist implies that economic growth usually leads to more employment, increase in consumption, poverty reduction, and overall social welfare (Aghion & Howitt, 2008). Majority of the neoclassical and endogenous growth theorists agree upon that an increase in economic growth is commonly measured through constant increase in GDP per capita (Aghion & Howitt, 2008). Contrarily to that, Afghanistan for the past four and a half decades has had an unstable and unparalleled economic growth due to so many reasons like macroeconomic volatility, major rely on foreign aid, civil wars, being landlocked, weak institutional framework, corruption, and some sociocultural barriers (Joya, 2011). According to the United Nations country-wide database facts and figures, since 1970's until 2014, Afghanistan's GDP had an unstable and unparalleled cyclic growth; sometimes from -0.3% to -16% (1970's), sometime from -22% to +49% (1990's), sometimes even from -5% to +56 (2000) and +14% to +5% (2013). However, since 2014 onward, Afghanistan maintained to have an average GDP growth rate of +2.2%, which is indeed, not as perfect as it should have been, but at least it shows that Afghanistan is on a constant track of growth. Considering unparalleled changes in the GDP growth rate of Afghanistan, it can be explicitly observed that due to some unprecedented events Afghanistan was not able to maintain a constant growth rate and this itself arises many questions in the mind of a researcher to study about the factors and causes of economic growth in Afghanistan.

### **1.1 Research Objectives**

With respect to problem statement and empirical literature review, lack of adequate statistical facts and figures pave the way for this research to fill

the gap of economic growth literature in Afghanistan and try to find some significant evidence about the factors which affect economic growth of Afghanistan. Thus, the following two research objectives are considered for the study.

1. To determine the impact of official development assistances, domestic investment, imports and exports on economic growth of Afghanistan.
2. To determine the long run association among the economic growth, official development assistances, domestic investment, imports and exports of Afghanistan.

## **2. Literature Review**

One of the main questions that always remained a debating topic in the area of development economics is that why some of the countries are still poor and how they can converge towards the rest of advanced and rich countries. In order to find the answer, economists for the past one century developed numerous growth models such as Gustav Cassel model (1924), Harrod-Domar model (1939), Solo-Swan model (1956), AK model (1986), Product-Variety model (1990-1991), Schumpeterian model (1992-1998) and many more to know precisely about the mainstream causes, factors, and effects of the economic growth. However, the pattern of said models are different, but up to a certain level majority of theorists have agreed upon mainstream variables such as human capital, physical capital, export, import, and foreign aid and tried to incorporate them into their models differently, so that comprehensive and convincing results can be obtained.

Literature related to economic growth is discussed from a broader lens through theoretical and empirical review of the topic. However, there might be inadequate literature about economic growth in Afghanistan, but every effort is made to compile a number of research papers made by independent researchers, national organizations, and some international non-governmental organizations which are considering the issues of economic growth in Afghanistan and South Asian region.

### **2.1 Theoretical Review**

In many empirical studies and economic books it's expressed that the starting point for modern economic growth theorization is the neoclassical Solo-Swan's model (Petraikos & Arvanitidis, 2008; Aghion & Howitt, 2008), but historically it's the classical economists such Adam Smith (1776), David Ricardo (1817), Thomas Malthus (1798), Gustave Cassel (1924), Allyn Young (1928), Joseph Schumpeter (1934), and Frank Knight (1944) who has initially expressed their views about the basic ingredients of economic growth (Kurz and Salvadori, 2003; Barro and Sala-i-Martin, 2004; Hagemann and Scazzieri,

2009). Now in order to have a general, yet profound understanding about the historic development of growth theories, this paper considers describing the growth theories on the bases of exogenous growth models and endogenous growth models. However, for statistical analysis and development of this paper's model, Solo-Swan's exogenous growth model is considered as a base theory.

### **2.1.1 Solow-Swan Growth Model**

Solo-Swan model of growth was independently developed by Robert Solow and Trevor Swan in 1956 with the basic assumptions of constant returns to scale, diminishing marginal productivity of capital, exogenously determining the technological advancement, and substitutability between labor and capital (Petraikos & Arvanitidis, 2008). The Solow-Swan model principally sets within the framework of neoclassical economics which attempt to explain the long-run economic growth by looking into the technological progress in labor productivity and capital accumulation. However, for economic growth this model explicitly emphasizes on capital accumulation and inducement for saving, but still, it expresses that growth will not last indefinitely without technological progress which neoclassical theory takes as being impartial of economic forces, or exogenous (Aghion & Howitt, 2008).

The neoclassical Solow-Swan growth model is known as an exogenous growth model due to its profound philosophy unlike the precursor model of Harrod-Domar that for long-run economic growth increases in productivity (commonly referred to as technological progress in the exploitation of factors of production) is a key exogenous determinant. However, for short-run economic growth they have agreed with the Harrod-Domar model on investment and labor productivity as the principal determinants (Solow, 1956 & Swan, 1956).

### **2.1.2 Exogenous Growth Models**

Before emergence of exogenous growth theory or also known as Solow-Swan model, Roy F. Harrod (1939) and Evsey Domar (1946) tried to integrate Keynesian analysis with the economic growth elements to show that the capitalist system is inherently unstable and that it cannot adjust itself in the long-run between population growth and stock of capital. However, in principle, Harrod was stressing on saving as a determinant for long-run economic growth and investment along with labor productivity as the key determinants for short-run economic growth (Harrod, 1939). Nonetheless, Domar was agreeing on saving and investment (capital stock) as the key determinants of economic growth, but with a slight extension that investment in his view can play a dual role in the economy. Domar's

belief was that on the demand side, investment will increase the income through Keynesian multiplier principle and raises aggregate demand while on the supply side it will increase the production output (Domar, 1946).

With all the significant contributions made by Harrod-Domar model as a foundational theory towards economic growth theory, there were still some strong critics which undermined its stability. In late 1950s when academic dialogues by neoclassical economists started questioning the stability of Harrod-Domar model, it eventually led to the development of Solow-Swan' growth model. The profound criticism that neoclassical economist (Robert Solow) brought over the table of dialogue was that according to Harrod-Domar growth model "even for the long run the economic system is at best balanced on a knife-edge of equilibrium growth." which means that if an economy deviate slightly from its natural growth (i.e. full employment) and warranted growth (i.e. saving meets demand for investment) the results can be either increasing unemployment or prolonged inflation (Robert Solow, 1956). Robert Solow (1956) has also precisely criticized that Harrod-Domar model studies long-run economic problems with the usual short-run tools (excluding the impact of technological advancement in production output with possibility of substituting capital for labor).

### **2.1.3 Endogenous Growth Models**

Endogenous growth model concept emerged as a result of growth theorists' dissatisfaction with the profound philosophy of exogenous growth models which were emphasizing that for long-run growth, factors such as technological advancement are exogenously paramount, and that without technological changes, diminishing marginal productivity will cause stagnancy in an economy (Romer, 1994; Barro & Sala-i-Martin, 2004). Nevertheless, on the other hand endogenous growth models distinguish themselves in such a way that "economic growth is an endogenous outcome of an economic system, not the result of factors affecting from outside" (Romer, 1994). Given that, during mid-1980s some of the endogenous growth models were developed and they replaced the undefined exogenous factor of technological advancement with the defined types of endogenous technological progress. Some of the famous endogenous growth models which were developed by different economists can be named as human capital model (Lucas, 1988), government spending model (Barro, 1990), government policy model (King and Rebelo, 1990), new knowledge/R&D in process innovation through product-variety model (Romer, 1990), new knowledge/R&D in product innovation through invention of new goods model (Grossman and Helpmann, 1991), and new

knowledge/R&D in quality of product model through industrial innovation (Aghion and Howitt, 1992, 1996).

## **2.2 Empirical Review**

Empirical review of a topic is crucial part of every study. Given that, this study will also try to cover the explanatory variables under different combination and discuss them separately for better understanding. Moreover, to that, under empirical part efforts will also be made to cover some literature from developed countries in order to have a profound understanding of variables implication under different environments.

### **2.2.1 Investment and Economic Growth**

Several empirical studies have looked into investment as a key determinant of economic growth in different regions and strived to study its short and long run impact through different quantitative methods. Under this section of literature review, relationship between domestic investment and growth will be studied from different angles in order to have a profound understanding of its horizons and association with the economic growth. Despite the fact that majority of the growth models in general underlined the importance of investment over economic growth, but still the effectiveness of domestic investment remains unsettled (Ghani & Din, 2006).

Bakari and Mabrouki (2017) has studied the impact of domestic investment on economic growth in Algeria and found that in the short-run domestic investment causes economic growth through both public and private capital accumulation under the market driven economy, however, in the long-run due to some factors such as lack of competitive market, lack of transparency in transactions related to investment, and lack of sound economic policies the Algerian economy has failed to achieve its growth momentum through capital accumulation. Since Algeria's domestic economy is market driven and firmly rely on agricultural products and natural resources, thus, a productive private sector and government incentivized policies can help the country to achieve its long-run growth. More or less, Afghanistan's economic condition also demand an extensive private sector's engagement in the aggregate production and government's support through incentivized policies for promotion of export and prevention of substitute imported goods.

Since capital formation plays a vital role in the expansion of investment and growth momentum, Bal, Dash and Subhasish (2016) studied the importance of capital formation in India and used Autoregressive Distributed Lag (ARDL) testing approach. Their findings from Error Correction Model (ECM) shows that in the short-run variables like capital

formation, exchange rate, trade openness, and total factor of productivity positively affect the economic growth, nevertheless, inflation is negatively affecting economic growth. Given that, they suggest that government of India should enhance the capital formation in order to increase the aggregate productivity and for doing so they have emphasized on some of the fundamental determinants like cost functions, government intervention, direct credit program, and inflation to be continually monitored.

Similarly, in another paper Bredino, Fiderikumo, & Adesuji (2018) have also studied the impact of capital outflow on economic growth in Nigeria through time series data analysis and using Co-integration/Error Correction Model (ECM). In order to find the short-run nexus between growth and investment, they have used a simple statistical test of correlation cointegration and found that the explanatory variable of capital flight, exchange rate, and external debts are significantly correlated with an  $R^2$  value of 0.929. However, for the long-run association, they have used Error Correction Method (ECM) and found that capital flight has a negative impact on economic growth and therefore proposed that government should strictly control the outflow of capital in order to maintain a steady growth rate.

### **2.2.2 Export, Import, and Economic Growth**

From both the theory and empirical studies point of view, export is perceived as an integral variable which define the changes in gross domestic production. Given that, a number of economists and empirical studies have stressed on increasing the level of investment, aggregate productivity, and trade—which will in return enhance the economic growth (Harrod, 1939; Domar, 1946; Solow & Swan, 1956; Cass & Koopmans, 1965; Lucas's 1988; Barro, 1990; Romer, 1990; Grossman & Helpmann, 1991; Rebelo, 1991; Aghion & Howitt, 1992; Ortigueira & Santos 1997). Tyler (1981), has studied the contribution of export toward economic growth in developing country by employing data from 55 middle income developing countries for the period 1960-1977 and found that GDP has a positive and significant correlation with the factors like gross domestic investment ( $R^2=0.77$ ,  $P=0.001$ ), manufacturing output ( $R^2=0.82$ ,  $P=0.001$ ), and exports ( $R^2=0.49$ ,  $P=0.001$ ). With that, he has further added that some of the countries like South Korea, Taiwan, Singapore, and Hong Kong which used export-oriented strategies were able to achieve tremendous improvements in terms of economic growth, while those countries which used autocratic polices against trade were not able to gain enough in terms of economic growth. In a similar study, Balassa (1978) has also found a significant positive

relationship between export and economic growth as a result of export expansion policy adopted by some developing countries like South Korea, Taiwan, and Singapore.

Bakari and Mabrouki (2017) conducted a research in the neighboring country of Egypt by using Johansen co-integration analysis of Vector Error Correction Model (VECM) and found that in the long-run domestic investment and export are having no impact on economic growth, however, import in the short-run leads to economic growth. Some of the main reasons which Bakari explained were noticed to be security related issues, scarcity of land, poor infrastructure, lack of electricity, lack of industrial drainage networks, and bureaucracy in extraction of project licenses.

Since Afghanistan is an import-oriented country and its total import as of 2018 stood at 7.8 billion U.S. dollars against its exports of 831 million U.S. dollars, thus, it's important to address the impact of import on economic growth and have a general understanding of its contribution towards the GDP in Afghanistan. While comparative study of consumer imported goods and capital imported goods is not the intension of this study, hence, author of this paper welcome other researchers to consider studying this area in the future if availability of adequate data allows to do so.

### **2.2.3 Foreign Aid and Economic Growth**

During the course of history, underdeveloped countries were often struggling with the capital formation from domestic sources and this often left them with no other option, but billing International Monetary Fund (IMF), attracting foreign direct investment (FDI), or seeking foreign aid (Mercieca, 2010). However, to achieve a long-term steady growth, capital formation from domestic sources is paramount and this often became a challenge for the underdeveloped countries due to some factors which Paul Collier (2007) from a broader picture referred to them as conflict trap, natural resource trap, landlocked with bad neighbors, and bad governance in a small country. Since every country is having its unique kind of socioeconomic and sociopolitical environment, therefore, foreign aid's impact over economic growth will also be different. Ekanayake & Chatrna (2010), conducted an empirical study on aid effectiveness over 85 developing countries covering Asia, Africa, Latin America, and the Caribbean for the period 1980-2007 and found that aid was having a negative correlation with the economic growth in Asian, Latin American, and Caribbean nations. However, it was only in Africa region, where aid had a positive relation with economic growth and it can be due to huge inflow of foreign aid into these countries.



Xayavong (2007) in his PhD dissertation did a macroeconomic analysis of foreign aid and economic growth on Lao Republic and concluded that stable and moderate flow of aid will boost economic growth, however, failure to meet policy conditionality by aid recipient country will triggers an unstable aid flow. Similarly, Collier and Hoeffler, (2007) and Mercieca (2010) has also emphasized that effective implementation of conditional policies by aid recipient country and harmonization between aid giving countries are the two major issues which can result in aid effectiveness towards steady growth.

Nasery (2014) has studied the economic shocks of aid reduction in Afghanistan and found that GDP of Afghanistan will be significantly affected if the international community reduces foreign aid without finding an alternative for it. For statistical analysis, he used Ordinary Least Square (OLS) regression method and found that the coefficient of ODA to GDP is 0.66 and this means that a one-unit reduction in ODA will decreases the GDP by 0.66 unit. These findings show a significant impact of ODA over GDP in Afghanistan. Since he was following Solow-Swan's theory as a base model for his study, he also found the coefficient of gross capital formation (GCF) to GDP -0.76 and this means that saving and investment are negatively affecting the economic growth in Afghanistan, which can be probably because of the high share of illicit investments in GCF. Nevertheless, due to low number of observations he proposed that this area should be further studied and explored.

### **3. Research Methodology**

#### **3.1 Research Design**

Since main intension of this paper is to determine the determinants of economic growth and to find long-run relationship of variables. At the same time study will contribute to Nasery (2014) findings, thus, an explanatory and quantitative research method was used to analyze time series data. Foreign aid, Domestic Investment, Imports and Exports in this study are similar to the one's adopted by other empirical studies (i.e. Ekanayake & Chatrna, 2010; Khan et al., 2012; Nasery, 2014; Alhowaish, 2014; Bakari and Mabrouki, 2016; Albiman & Suleiman, 2016; Bakari, 2017), however, with the addition of foreign aid as an exogenous variable to the econometric model.

#### **3.2 Data Collection and Data Sources**

Secondary source time series data for this study was mainly collected from United Nations statistical database of national accounts and cross verified with other sources such as World Development Indicators, Central Statistics Organization of Afghanistan, and Organization for Economic Cooperation and Development. Since main intension of this study is to find

the long-run association of variable and conduct a time series analysis, hence, forty-six annual data points (1970-2018) were collected for variables such as gross domestic production per capita (GDP per capita), domestic investment (aggregate capital formation), foreign aid (official development assistance), export and import. All of the collected data were in U.S. dollars constant value and transformed into logarithm (log) form.

### 3.3 Econometrics Model and Analysis

The econometric model of this study is derived from and in line with previously adopted empirical studies (i.e. Ekanayake & Chatrna, 2010; Khan et al., 2012; Nasery, 2014; Alhowaish, 2014; Albiman & Suleiman, 2016; Bakari and Mabrouki, 2017), where the economic growth (also referred to as growth in GDP) is defined through explanatory variables such as domestic investment, foreign aid, export, and import. However, what differentiate this paper's model from other similar studies is the addition of foreign aid as an exogenous independent variable alongside the rest of mainstream variables and consideration of more than thirty annual time series data points.

The basic form of this paper's model is expressed as:

$$Y (\text{GDP}) = F (\text{INV}, \text{ODA}, \text{XP}, \text{MP}) \quad (1)$$

Where  $Y$  is aggregate output,  $INV$  is the aggregate domestic investment,  $ODA$  is the official development assistance or foreign aid,  $XP$  is aggregate exports, and  $MP$  is the aggregate imports.

The above given function can also be represented in a log-linear econometric format as:

$$\log (Y)_t = \beta_0 + \beta_1 \log (\text{INV})_t + \beta_2 \log (\text{ODA})_t + \beta_3 \log (\text{XP})_t + \beta_4 \log (\text{MP})_t + \varepsilon_t \quad (2)$$

Where:

- $\beta_0$ : The constant term
- $\beta_1$ : Coefficient of variable (Domestic Investment)
- $\beta_2$ : Coefficient of variables (Official Development Assistance or Foreign Aid)
- $\beta_3$ : Coefficient of variable (Exports)
- $\beta_4$ : Coefficient of variable (Imports)
- $t$ : The time trend
- $\varepsilon$ : The random error term assumed to be normally, identically and independently distributed.

This study is having two objectives for conducting statistical analysis. Hence, two econometrics models were applied in order to analyze the data and address research objectives. At the very first stage, an Ordinary Least Square (OLS) regression was applied in order to see if findings of this paper

will endorse Nasery (2014) findings or provide some different results. Later on in the second stage, a long-run co-integration test was applied in order to ensure that OLS regression output is not spurious, because of its limitation in capturing the data sparsity. As a usual practice, in long-run time series econometrics analysis the starting point is to study the level of stationarity of variables. In order to do so, Augmented Dickey–Fuller test (Dickey & Fuller, 1979) was applied to determine the level of data stationarity and then based on driven results further action was taken to go for Johansen co-integration test (Johansen, 1988; Johansen & Juselius, 1990).

#### 4. Results and Discussion

Before applying any kind of econometrics tests to find the long-run associations of GDP and domestic investment, researcher sought to apply some basic OLS regression analysis in order to know about the basic correlation and association of variables such as domestic investment, official development assistance, export, and import.

##### 4.1 Ordinary Least Square (OLS) Regression

As it can be seen in the table 1, irrespective of Nasery (2014) findings, this paper’s finding illustrated that domestic investment (INV) as an endogenous determinant of economic growth is having a positive coefficient of ( $\beta = 0.61, P = 0.00$ ). Contrariwise to investment, export (XP) which represents a high percentage volume of aggregate production output is having a negative coefficient of ( $\beta = -0.50, P = 0.00$ ) and the reason behind this could be either due to illegal cross border trade or corruption in the customs of Afghanistan, but researcher still proposes an in-depth study of this part in the future. Foreign aid/Official development assistance (ODA) indicated to have a weak positive and yet insignificant coefficient of ( $\beta = 0.01, P = 0.30$ ), while, import (MP) has shown to have a relatively strong positive coefficient of ( $\beta = 0.35, P = 0.00$ ).

**Table 1: Ordinary Least Square (OLS) Regression Output**

Variables	Coefficients	Std. Error	T statistics	Prob.
Const	12.32044	0.816454	15.0885	0.0000
INV	0.617259	0.037113	16.6319	0.0000
ODA	0.017915	0.017225	1.04014	0.3042
EXP	-0.50723	0.076633	-6.61903	0.0000
IMP	0.351670	0.064566	5.44668	0.0000
R Square	0.9798		F- Statistics	510.00
Adjusted R Square	0.9779		Prob ( F- Statistics)	0.0000

Source: Eviews 8.1 output

Based on OLS regression results, the econometric model can be depicted as:

$$GDP = 12.32 + 0.61 * \log(INV) + 0.01 * \log(ODA) - 0.50 * \log(XP) + 0.35 * \log(MP) \quad (4)$$

The overall finding from OLS regression reaffirm that domestic investment is an endogenous and important determinant of economic growth and this finding is in line with majority of the neoclassical growth theories and empirical studies. Yet, a weak positive coefficient of ODA is depicting that foreign aid contributing towards Afghanistan GDP was ineffective and as a trend of empirical studies proposed, this could be due to disharmony between aid giving countries or misallocation of the funds by the Afghan government. However, export which represent the trade volume of Afghanistan is also having a coefficient of -0.42 which is irrespective of mainstream growth theories and this needs to be further analyzed with in-depth study in the future in order to find some significant reasons for its negative coefficient sign.

#### 4.2 Unit Root Test

In order to determine the level of stationarity of variables and to make sure that the series of variables are moving in a similar trend, an Augmented Dickey- Fuller (ADF) test is initially used in order to measure the stationarity of data and upon driven results a proper technique for long-run analysis is carried out.

Table 2 presents results of Augmented Dickey and Fuller (ADF) test. Result indicate that all variables have unit root problem at level. However, these variable become stationary at the first difference indicating that all variables are integrated at order I(1). Hence, the Johansen co-integration test can be used to check the long run association among the variables under consideration.

**Table 2: Result of Augmented Dickey Fuller Test**

Variables	Augmented Dickey Fuller statistic:				Remark
	At level		At first difference		
	Critical Value at 5 %	Trace-Statistic Value	Critical Value at 5 %	Trace-Statistic Value	
GDP	-2.920	-0.413	-1.332	-5.721*	I(1)
ODA	-2.316	-0.677	-2.266	-8.724*	I(1)
NV	-2.621	-0.555	-1.824	-9.433*	I(1)
IMP	-2.849	-0.722	-2.393	-5.871*	I(1)
EXP	-3.931	-0.675	-3.778	-8.538*	I(1)

Source: Eviews 8.1 output

##### 4.2.1 Johansen Cointegration Test:

As the results of stationarity indicated above, that all of the variables (i.e. GDP, INV, ODA, IMP and EXP) are stationary at first level difference and this means that the statistical properties of such as variance, mean, autocorrelation, and etc. are all constant over the time and this reduces the

chances of data sparsity which cannot be captured through OLS regression analysis.

Co-integration analysis is the econometric technique often used to find the long-run association between variables by adopting time series data. In order to conduct this kind of analysis, the commonly used method is Johansen co-integration test which was introduced by Soren Johansen (1991). In order to run this test and find the cointegration of variables, the researcher initially assumes the following hypothesis:

**H<sub>0</sub>:** Co-integrating equation does not exist

**H<sub>1</sub>:** Greater than zero co-integration equation exists

**Table 3: Result of multivariate Johansen co-integration test**

No. of Hypothesized CE(s)	Trace Stat.	Critical Value	Prob.**	Max-Eigen Stat.	Critical Value	P-value.**
None *	17.6636	0.00032	0.0232	0.32443	17.6491	0.0140
At most 1	15.5297	49.9996	0.2120	12.3626	23.1880	0.3452
At most 2	12.6154	26.8116	0.8810	16.2314	21.1018	0.0844
At most 3	18.8188	21.1491	0.7622	23.8768	33.6984	0.2533
At most 4	13.6745	19.7373	0.0923	21.3425	29.6209	0.4529

Source: Eviews 8.1 output

Table 3 presents results of Johansen co-integration test. The Johansen co-integration is applied to evaluate the long run relationship among economic growth, official development assistances, investment, import and export. The Trace statistics and the Maximum-Eigen values indicate that there is only one (01) co- integrating equation, indicating that the variables are co-integrated. Consequently, based on the results it is concluded that long-run relationship exists among economics growth, official development assistances, investment, import and export. These results are consistent with the findings of (Tyler, 1981; Ghani & Din, 2006; Bakari, 2011; Hussain & Yousaf, 2016; Bal, Dash and Subhasish, 2016; Riaz & Riaz, 2018)

## 5. Conclusion

As the main objectives of this research was to determine the determinant of economic growth in Afghanistan and to determine the long-run association between domestic investment and economic growth, thus, two different statistical tests (i.e. OLS regression and Johansen cointegration) were applied in order to examine the hypothesis and to achieve both aforementioned objectives. Conclusion and discussion regarding explanatory variables of domestic investment, export, import, and foreign aid are covered in the following paragraph.

As this paper's regression model was built on the basis of neoclassical Solow-Swan growth theory, hence, foreign aid and import were principally considered as exogenous determinant for economic growth, while investment and export were considered as endogenous determinants for growth. From the OLS regression output in Table 4.1, it can be seen that irrespective of Nasery (2014) findings, where he found a negative coefficient for domestic investment defining GDP growth in Afghanistan ( $\beta = -0.76$ ,  $P = 0.05$ ), this paper's result indicated that domestic investment (INV) as an endogenous determinant for economic growth is having a positive and significant coefficient of ( $\beta = 0.61$ ,  $P = 0.00$ ) which is defining 61% change in the GDP of Afghanistan and this shows that the correlation between domestic investment and economic growth in Afghanistan is in line with the Solow-Swan's growth theory and empirical findings of other researchers such as (Tyler, 1981; Ghani & Din, 2006; Bakari, 2011; Hussain & Yousaf, 2016; Bal, Dash and Subhasish, 2016; Bredino, Fiderikumo & Adesuji, 2018; Riaz & Riaz, 2018). Yet, the Johansen cointegration test result in the table 4.3 has also shown that a cointegration equation at 0.05 level exists and it explains that a long-run relationship exists between exogenous, endogenous variables and economic growth. Both findings from OLS regression and Johansen cointegration concluded that domestic investment, foreign aid, import and exports is playing a key role in the long-run GDP growth of Afghanistan and this calls on the government of Afghanistan to encourage the households for further saving and banks for issuing more loans which will eventually leads to more investment and growth in the GDP.

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