

Foreign Direct Investment and Economic Growth in Algeria: An Application of Auto - Regressive Distributed LAG (ARDL) Bounds Testing Approach

الاستثمار الأجنبي المباشر والنمو الاقتصادي في الجزائر: تطبيق نموذج الانحدار الذاتي للفجوات الزمنية الموزعة المتباطئة (ARDL)

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Abstract: Recent empirical literature suggests that foreign direct investment (FDI) have positive impact on economic growth through the process of technological diffusion. This paper proposes a new approach to testing for the existence of a relationship between foreign direct investment (FDI) and economic growth in Algeria for the analysis of long-run relations over the period of 1980-2014. The empirical analysis in this study is based on the bounds testing approach of co-integration, is introduced originally by (Pesaran & Shin, 1999) and further extended by (Pesaran & al, 2001). In order to verify the relationship between Foreign Direct Investment and economic growth in Algeria. The results suggest that FDI have a positive impact on economic growth in the long-run. The results further suggest FDI can be deemed to be catalysts for economic growth in Algeria an increase in one unite in FDI leads to increase by 5% in GDP.

Keywords: Foreign Direct Investment, Economic Growth, Long Run, Bounds Testing Approach.

Jel Classification Codes : C51, F21, F43.

ملخص : تشير الدراسات التجريبية الأخيرة إلى أن الاستثمار الأجنبي المباشر له أثر إيجابي على النمو الاقتصادي من خلال عملية الانتشار التكنولوجي. نقترح في هذه الورقة نموذجاً جديداً لاختبار وجود علاقة بين الاستثمار الأجنبي المباشر والنمو الاقتصادي في الجزائر من أجل تحليل العلاقات الطويلة الأجل على مدى الفترة 1980-2014. يستند التحليل التجريبي في هذه الدراسة على اختبار التكامل المشترك باستخدام منهج test of bound، وقدم أصلاً من قبل (Pesaran & Shin, 1999) وطور من قبل (Pesaran & al, 2001). من أجل التحقق من العلاقة بين الاستثمار الأجنبي المباشر والنمو الاقتصادي في الجزائر. تشير النتائج إلى أن الاستثمار الأجنبي المباشر له أثر إيجابي على النمو الاقتصادي على المدى الطويل. كما تشير النتائج إلى أن الاستثمار الأجنبي المباشر يمكن اعتباره حافزاً للنمو الاقتصادي في الجزائر، حيث تؤدي زيادة واحد في الاستثمار الأجنبي المباشر إلى زيادة الناتج المحلي الإجمالي بنسبة 5%.

الكلمات المفتاح : استثمارات أجنبية مباشرة، نمو اقتصادي، مدى طويل، اختبار حدود.

تصنيف JEL: C51، F21، F43.

I- Introduction :

The Foreign direct investment in the early 1970s was considered as a new form of colonization. In fact, after 1980s the attitude about the FDI is perfectly change, FDI is now increasingly sought both by developed and developing countries and are no longer considered as a factor of dominance but as a major engine for technology transfer and innovation. Many countries compete to attract the maximum of FDI, including Algeria. The Algerian Government started liberalizing its economic system in 1990.

Due to the globalization, many fluctuations characterize the world. The FDI will be a crucial element to world growth because it is considered as power affecting directly or indirectly the economic growth (EG). Moreover, FDI plays an important role in economic, human and social improvements which are essential inputs to achieve (EG).

Economic theory has identified a number of channels through which FDI inflows may be beneficial to the host economy. (Lipsey, 1999) confirms that foreign direct investment is less susceptible to reversals than portfolio investment, making it a more reliable source of capital inflows to developing countries.

Numbers of studies focus on the causality interrelation between (FDI) and (EG), the impact of FDI is controversial, because the diffusion in the local economy is unfortunate in terms of productivity, and the country is tempted to commit itself to an expensive fiscal counterbid in order to remain attractive.

Foreign direct investment is distinguished to portfolio investment which is a passive investment in the securities of another country such as stocks and bonds. FDI is conventionally defined as a form of international inter-firm co-operation that involves significant justice stake and effective management decision power in, or ownership control of, foreign enterprises¹.

As well as, FDI is regarded as a factor to bring to the host country excessive benefits, such as new technology, accessibility to foreign markets and managerial know-how opportunities. **(Todaro, 1977)** believed that FDI encourages the inflow of technology and skills. The present paper tries to analyze and estimate the effect of FDI on economic growth in Algeria, using the ARDL model.

I-1-Problematic of the study:

The relationship between economic growth and foreign investment has been a subject of large academic research. Many policy makers and academics have argued that FDI can have a positive impact on economic growth. The question to be addressed in this research is this: Have FDI real effect on economic growth of Algeria during the period 1980-2014?

I-2-Importance of study:

Empirical literature finds mixed evidence on the existence of positive effect in the host country generated by foreign multinational companies, this paper mainly aims to test the causality between FDI inflows and economic growth in the case of Algeria that what we should know with detail in this present paper. Before moving to the empirical analyses, The research is organized as follows : part one consecrate to theory study (literature review), the second one is an empirical study presents data and methodology, estimation and the empirical results of the impact of FDI on economic growth, and finally we end our investigation by the conclusion.

I-3-Previous studies:

There are a number of studies that have explained the relationship between the inflows of foreign direct investment and economic growth. Most of them confirmed that FDI is often seen as an important catalyst for economic growth.

On the subject of the impact of FDI on economic growth many study are taken on consideration both theories and empirical, **(Blomström & Wolff, 1994)** found a positive impact of FDI on economic growth in Mexico. **(Balasubramanyam, Salisu, & Saps ford 1996)**, test the effectiveness of FDI in promoting economic growth in a sample of 46 developing countries furthermore finds that trade openness was important in the attraction of FDI².

(Borensztein & al, 1998) found that FDI positively influenced economic growth and that FDI and domestic investment were complementary³. In another term FDI inflows can stimulate growth for the host countries by increasing the capital stock, offering new job opportunities, moreover easing the transfer of technology **(Borensztein & al, 1998); (De Gregorio, 2003); (de Mello, 1997)**⁴.

Admittedly, with diminishing returns to capital in neoclassical growth models, the impact of FDI on growth is identical to that of domestic investment and FDI has only a "short-run" growth effect as countries move towards a new steady state⁵.

Theoretically, FDI has been shown to boost economic growth all the way through technology transfer **(Dimelis, 2005); (Schneider, 2005)**, spillover effects, productivity gains, and the introduction of new processes in the host countries **(Girma, Li & Liu, 2005)**. Adding up, FDI can create a worldwide network that can help domestic products move

across borders. Also, a number of studies as well as those by **(Barro & Salai-Martin, 1995)**, **(Grossman & Helpman, 1991)**, **(Hermes & Lensink, 2003)**, put forward that FDI plays central role in modernizing the economy and promoting economic growth in host countries, especially developing countries. At the same time others found that FDI inflow is positively associated with economic growth only when countries have beforehand achieved a certain level of prosperity **(Blomstrom et al, 1994)**, education **(Borenzstein & al, 1998)**, or financial development **(Alfaro & al, 2004)**; **(Hermes & Lensink, 2003)**⁶.

(Zhang, 2001): argued that Foreign Direct Investment has positive growth impact, **(Ricardo, Hwang & Rodrik, 2005)**: argued that Foreign Direct Investment (FDI) provide available a path for emerging nations to export the products developed economies. Many developing countries pursue FDI as a tool for export promotion.

(Abdul Khaliq & Ilan Noy, 2007), examined impact of foreign direct investment (FDI) on economic growth using detailed sectoral data for FDI in flows to Indonesia over the period 1997-2006. They find that FDI is observed to have a positive effect on economic growth. add to that **(Mary-Ann Juma , 2012)** using data from 43 countries over the period 1980-2009 her results indicate that FDI is associated with higher growth in Sub-Saharan Africa.

On the other hand, **(Alfaro & al, 2003)** confirmed that the contribution of FDI to growth heavily depends on the sector of the economy where the FDI operates. He declared that FDI inflow to the primary sectors, tends to have a negative result on growth, conversely, as for the service sector, the effect of DFI inflow is not so obvious confirmed to Alfaro, **(Mohamed Abaid, 2013)** in his study by applying the OLS and the fixed effects estimation methods, the results indicate FDI has a significant positive effect on economic growth only in non-oil exporting MENA countries. The macro pragmatic literature finds fragile support for an exogenous positive effect of FDI on economic growth⁷, whereas the micro empirical literature finds unclear results for the outcome of FDI on firm's productivity⁸.

(Nair Reichert & Weinhold, 2001) indicated that the fundamental relationship between foreign and domestic investments and economic growth in the developing countries is mixed⁹.

Lack of development of the local financial markets can limit the economy's aptitude to take benefit of potential FDI spillovers in a theoretical framework¹⁰. **(Khathlan, 2012)** find a positive correlation between FDI and economic growth in the short -run as well as in the long -run in the context of Pakistan economy for the duration of 1976 -2010¹¹.

(Agrawal & Khan, 2011), used a linear multiple regression model covering the period from 1993 to 2009. This study examines the impact of foreign direct investment on the economic growth rate of India and China and found that the economic growth in India is less affected by FDI than in China¹².

(Aga, 2014), study employs time series techniques to analyze the effect of foreign direct investment on economic growth in Turkey over the period 1980–2012 and concluded that there is no long-term relationship between foreign direct investment and economic growth in Turkey; he indicated that there is no Granger causal relationship between FDI and economic growth by means of a Granger Causality (GC) test¹³.

According to **(Bengoa, Sanchez & Robles, 2003)** recipient economies have need of human capital, economic stability, and liberalized markets in order to benefit from long term FDI inflows¹⁴.

An econometric study by employing GMM method to re-evaluate the effect of FDI on the economic growth in China, during the period 1994-2010, based on dynamic panel data from 254 cities in China. Found that FDI brings a positive impact on the economic development¹⁵.

(Agrawal, 2015), examined the relationship between foreign direct investment (FDI) and economic growth in the BRICS countries over the period 1989–2012 and found that

foreign direct investment and economic growth are co-integrated at the panel level, indicating the presence of a long-term equilibrium relationship between them¹⁶.

In general, the literature shows that causality relations vary depending on the period studied, the econometric methods used, and the country. The results possibly will be bidirectional, unidirectional, or no causality relations may be present. Moreover, some studies find that there is an insignificant relation between FDI and economic growth, and a small number of studies find a negative link between FDI and economic growth. The greater part of studies, however, concludes that FDI and trade have a positive significant relation with economic growth. Therefore, from the mentioned above, it is essential to examine the relationship between foreign direct investment and economic growth.

II- Methods :

II-1- Sample and data:

The data employed in this paper are annual figures covering the period 1980 – 2014. The main types of data are taken from World Bank Development Indicators (World Bank), United Nations Conference on Trade and Development (UNCTAD Stat), annual reports of Council National for Statistics and Informatics (CNSI), and from the National Office of Statistics (NOS).

II-2-Variables of the study:

The most important goal of this empirical study is to investigate the nature of the relationship between foreign direct investment and economic growth. In this part, we decide to estimate an autoregressive distributed lag (ARDL) model for system of five serials of data about **FDI**, **GDP**, **NX**, **IVA**, and **M2**.

GDP: Gross Domestic Product, for many studies this macro-economic aggregate is taken as measure for economic growth, EG is defined as the augmentation of GDP (high value in GDP design high rate of growth) and this augmentation comes from several sources it can be generated by inflow in Foreign Direct Investment.

FDI: Foreign Direct Investment is a business by an investor from another country for which the foreign investor has control over the company purchased. The organization of economic cooperation and development (OECD) defines control as owning 10% or more of the business.

NX: Net Exports refer to the value of a country's total exports minus the value of its total imports ($NX = \text{Exports} - \text{Imports}$). It is used to calculate a country's aggregate as GDP, in an open economy. In other words, net exports equals the amount by which foreign spending on a home country's goods and services exceeds the home country's spending on foreign goods and services.

IVA: The value added of an industry, also referred to as gross domestic product (GDP)-by-industry, is the participation of a private industry or government sector to overall GDP.

M2: M2 is a measure of the money supply that includes M1 and near money (M1 +near money). M2 is less liquid than M1 and not as suitable as exchange mediums, but they can be quickly converted into cash or checking deposits.

II-3-Model design:

The autoregressive distributed lag (ARDL) approach is a co-integration technique for determining long-run and short-run relationships among variables under study simultaneously and is introduced at first by (Pesaran & Shin, 1999) and further extended by (Pesaran & al, 2001)¹⁷. ARDL co-integration test is used because this method has a number of advantages when it is compared to other alternatives such as (Engle & Granger, 1987), (Johansen, 1988), and (Johansen& Juselius, 1990) procedures. First of

all, it has more power and therefore recommended when sample size is small (**Pesaran & al, 2001**); (**Ghatak & Siddiki, 2001**); (**Acaravci & Ozturk, 2012**). One other flexibility of the ARDL bounds F testing is its usability when not all variables have the same order of integration. Variables in the analysis may be $I(0)$, $I(1)$ or combination of both. The only basic condition for the integration order of the variables is order's being at most 1 (**Pesaran & al, 2001**); (**Acaravci & Ozturk, 2012**)¹⁸.

Assumption of ARDL model:

- ✓ All variables are stationary at level.
- ✓ All variables are stationary at first difference.
- ✓ All variables are stationary at level while few stationary at first difference.
- ✓ Data must be normally distributed.
- ✓ Data must be free from HSK.
- ✓ Data must be free from autocorrelation.

Model which specifies that Foreign Direct Investment (FDI) is significantly influenced the economic growth (GDP) is formulated as follows ;

$$GDP = f(FDI, NX, IVA, M2)$$

$$\Delta GDP_t = a_0 + \sum_{i=1}^n b_i \Delta GDP_{t-i} + \sum_{i=0}^n c_i \Delta FDI_{t-i} + \sum_{i=1}^n \beta_i \Delta NX_{t-i} + \sum_{i=0}^n \gamma_i \Delta IVA_{t-i} + \sum_{i=0}^n \theta_i \Delta M2_{t-i} + \phi_1 GDP_{t-1} + \phi_2 FDI_{t-1} + \phi_3 NX_{t-1} + \phi_4 IVA_{t-1} + \phi_5 M2_{t-1} + \varepsilon_{it}$$

Where:

GDP = Gross Domestic Product.

FDI = Foreign Direct Investment.

NX = Net Exports.

IVA = Industrial Value Added.

M2 = Money Supply.

a_0 = intercept.

Where Δ is the first-difference operator, a_0 stands for constant, t shows time, $b_i, c_i, \beta_i, \gamma_i$ are the coefficients of short-run dynamics and $\phi_1, \phi_2, \phi_3, \phi_4, \phi_5$ represent the long-run dynamic relationship, while μ is a stochastic error term. In the ARDL model, the bounds test is applied to determine whether the variables are co-integrated.

III-Results and Discussion :

III -1-Order of Integration and Stationary of Serial:

Non-stationary in data time series can include the spurious correlation error into the econometric methodology. For this explanation, the differencing and logarithmic transformation is needed to stabilize the time series. A chronological serial is stationary if not contain no trend and intercepts, so we must establish the order of variables integration, we say that variables are integrate in order p if her deference's in order p is stationary so we shall be checking are this variables got unit root or not. That means her deference's in order p is null growth.

There are many tests permit to put on evidence the stationary of serial. We put in this study test of Phillips Perrons (PP). We use this test for many reasons. PP is not parametric test, good for large samples but not for small samples (asymptotic assumption), and sensitive to structural break. On the contrary, to test ADF who take into consideration only present of autocorrelation in serial, the test of PP consider also the present of Heteroskedasticity on serial. For any econometric analyze model is more important to check if the data is stationary or not. Primarily, in order to ensure that the variables are not $I(2)$, we have examined the integrating properties of the series by using Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) unit root tests. The results of ADF and PP tests are detailed in table (1).

Table (1) indicates that at 5 percent significance level, all the F-statistic less than 0.05 which implies, The results of (PP) and ADF tests indicate that all variables are not stationary at level, but we assume that they become after the first differences so all variables are integrated at the same order, long-run equilibrium relationship will be now investigated by using the bounds test for co-integration with ARDL modeling approach (ARDL).

III -2-ARDL Model Estimation:

In recent times, an emerging body of work led by (Pesaran & Shin, 1999) and further extended by (Pesaran et al, 2001), has introduced an alternative co-integration technique recognized as the 'Autoregressive Distributed Lag' or ARDL bound test¹⁹. After testing the stationarity of the series, we apply ARDL (Autoregressive Distributed Lag) bounds testing approach to investigate co-integration for long run relationship between foreign direct investments, net exports, m2, and the growth of the Algeria economy. The advantage of the ARDL model is flexible and provides both short- and long-run relationship. Table (2) provides if there is a short run relationship among variables or not.

In macroeconomics study we are interested both short and long run relationship, but we give more importance for the long run term than the short run. For this reason, we give a huge value in our study to long run relationship. The empirical results reveal the existence of a short-run relationship among variables that are supported by the high value of F-statistics results. As it seems in table (2), the coefficient is significant in different lags which mean that there is a short run from the independent variables to the dependent variable. The adjusted R -squared is 0.99(see table (2) that implication 99% of variation in GDP is explained by independent variables. In addition, the lack of information in our model is estimated by 0, 01% which is statistically acceptable (there is no a large amount lost in information), furthermore computed probability F-statistics without a doubt reject the null hypothesis that all regressors have zero coefficients for all cases.

III -3-Optimum lag selection:

Too many lags could increase the error in the forecast whereas too few could leave out information in order to determine the number of lag needed there are many information criterion procedures to select proper lags, the three commonly used are: Schewartz's Bayesian Information (SBIC), the Akaike's Information Criterion (AIC) and the hannen and Quinn Information Criterion (HQIC). When all three agree is clear but what's happens getting conflicting results? A paper from the CPEPR suggests in the context of VAR models that AIC tends to be more accurate with monthly data. HQIC works better for quarterly data or samples over 120 and SBIC works fine with any sample size.

The ARDL procedure starts with determining of an appropriate lag order (p) in equation (1). For this purpose, the Akaike Information Criterion (AIC) and Schwartz Criteria (SC) were used to select the number of lags required in the co-integration test. Figure (N1) which representing optimal lag lengths, as results are out of EvIEWS 9 selected four lag for dependent variable (GDP), while, three and four for export, FDI, IVA, and M2 respectively. In the following step we tested for the presence of long run relationships among variables by using the bound test.

III -4-Bound test:

(Narayan, 2004) tabulated two sets of critical values, the upper bound critical values refers to the I(1) series, meaning that there is co-integration among the variables and the lower bound critical values to the I(0) series, meaning that there is no co-integration relationship between variables. For some significance level, if the F-statistics falls outside the critical bound, a conclusive inference can be made without considering the order of integration of the explanatory variables²⁰.

The ARDL bound test is based on the Wald test (F-statistic). When the computed F-statistic is greater than the upper bound critical value, we can reject the null hypothesis H_0

meaning that the variables are co-integrated. But If the F-statistic is less than the lower bound critical value, we cannot reject the null hypothesis H_0 meaning that there is no co-integration among the variables). When the computed F-statistics falls between the lower and upper bound, then the results are inconclusive.

table (3) provides results of f-statistic value where it tells about the co-integration among variables results in table (3) suggest that the application of the bounds F-test using ARDL modeling approach suggests the existence of a level relationship (long-run relationship) between real GDP and FDI inflows when GDP is dependent variable (if F value less than critical bound values, we can conclude that there is no co-integration among variables). There is different critical value of bound on different level of confidence here our F value is above from upper and lower bound test so we can say that there is co-integration among variables. Overall, the bounds test results support the presence of co-integration relationship among the variables running from the independent variables to dependent variable that what we assume by using bounds test to co-integration, we have gone in for examining the long-run relationship.

III -5-Co-integration of long run relationship;

The two popular co-integration tests in applied time series modeling are the (Engel & Granger, 1987) co-integration test and the (Johansen & Juselius, 1990) co-integration test. The (Engel & Granger) co-integration test is adopted in cases of single equation models, while, the (Johansen & Juselius) co-integration test is used for system equation models. The autoregressive distributed lag (ARDL) model is based on single equation modeling (Pesaran & al, 2001)²¹. For the purpose of our study we chose the Autoregressive Distributed Lag (ARDL). The co-integration test result for the research model is presented in table (4).

The error (equilibrium) correction term (ECT) measures the speed at which previous deviations from the equilibrium are corrected in the current period. In other term, the error correction term indicates the speed of the adjustment which restores equilibrium in the dynamic model is correct the disequilibrium of the system. The ECM coefficient gives an idea about how quickly variables return to equilibrium and it should have a statistically significant coefficient with a negative sign. Here we can see long run relationship .note CointEq (-1) must be negative and significant.

The equilibrium correction coefficient (The coefficient of ECM (-1)) is estimated as (-0.93) (0, 0003) for the model which is reasonably large and highly significant at 5% level. And imply that deviations from the long-term growth rate in GDP are corrected by 0.93 percent over the following year (that mean the speed of adjustment is 93%) meaning that 93% of the disequilibrium due to the previous year's shocks is adjusted back to the long-run equilibrium in the current year. This means that the adjustment takes place relatively quickly, i.e. the speed of adjustment is relatively high. Moreover, we have a Granger causality for long-run period, because the probability association for t-statistics for ECT (error correction term) is statistically significant at 10% levels.

As presented, the long-term coefficients for the model (results in table (4) show that in the long-run the foreign direct investment has a very significant effect on GDP and a one percent increase in this variable leads to 5.59% increase in GDP. Alternatively, a one percent increase in industrial value added leads to a 0.0027% increase on GDP. This indicates that industrial sector in Algeria does have not an important effect on GDP. In addition, the coefficients of M2 in the model are not statistically significant so there is no long-run relationship between money supply and GDP. The results also show that a one percent increase in total imports leads to a -0.08% decrease on GDP. If we consider the effect of total exports to GDP, a one percent increase in total exports leads to a 0.39% increase in GDP for model. This means that total export has a very significant and sizable effect on GDP. But when our independent variables are equal to zero our minimal value of

GDP is (-24434) that means we are in period of recession and we are heavily dependent in exterior we import a most need of population.

III -6-Test of parameters stability:

The existence of co-integration does not necessarily imply that the estimated coefficients are stable. This is why **(Brown & al, 1975)** introduced CUSUM (cumulative sum) and CUSUM of squares. It is important to test whether the short- and long-term relationships found previously are stable over the entire period of the study. To do this, we must test for the stability of the model parameters.

- Null hypothesis: parameters are stable.
- Alt hypothesis: parameters are not stable.

If we find blue line between /within redline we accept null hypothesis and reject the alt one as it represent Figure (2). But if blue line cross redlines we reject null hypothesis. So we can do that by test of cumulative sum, test help to show if coefficients of regression are changing systematically or not. In addition cumulative sum square test is helpful to show if the coefficients of regression changes suddenly or not.

The relative graphical representations of these tests are illustrated in Figure (2).

Note: The red lines represent critical bounds at 5% significance level.

As the below figures show (see figure (2)), all the plots of statistics CUSUM and CUSUMSQ are inside the critical bounds at 5% level of significance (the blue line is within two red lines) mean that all the coefficients in the error correction model are constant. So our ARDL model is stable which means that the coefficients of regression are changing systematically.

IV- Conclusion:

This paper has analyzed the relationship between FDI inflows and economic growth by using Algeria data and statistics cover the period (1980–2014). The empirical findings have clearly proved that Algeria's inward FDI and economic growth have a long run relationship.

The previous literature, in general, found a positive effect of inward FDI on economic growth. In this study, we confirm what is found, FDI appears as a positive influence on economic growth. For The reason the government of Algeria has encouraged Foreign Investors to enhance economic growth. Whether FDI can be deemed to be a catalyst for economic growth in Algeria an increase in one unite in FDI leads to increase by 5% in GDP. Algeria as one of the developing countries depends heavily on petrol. It implies that to attract more FDI inflows to Algeria, the government should continue its efforts to create promising economic and investment environment, the policymakers must facilitate the process to encourage investors to do their business.

Finally, we can say that the Empirical evidence on the relationship between FDI and economic growth is still inconclusive.

-Appendices :

Table (1) : Results of Tests Integration and Stationary of Variables.

<i>Test of stationary (Au seuil de 5%)</i>									
Variables	Phillips-perron (PP)		Stationary			ADF		Stationary	
	Statistical value	Critical value	yes/no	Order of integration		Statistical value	Critical value	YES/NO	Order of integration
FDI	0,0000	0,05	Yes	I(1)		0.0000	0.05	Yes	I(1)
GDP	0.0373	0.05	Yes	I(1)		0.0432	0.05	Yes	I(1)
NX	0.0046	0.05	Yes	I(1)		0.0007	0.05	Yes	I(1)
IVA	0.0027	0.05	Yes	I(1)		0.0131	0.05	Yes	I(1)
M2	0,0000	0,05	Yes	I(1)		0,0003	0,05	Yes	I(1)

Source: Author's computation from E-View 9.0

Table (2): ARDL model estimation

Dependent Variable: GDP				
Method: ARDL				
Date: 02/14/17 Time: 20:15				
Sample (adjusted): 1984 2014				
Included observations: 31 after adjustments				
Maximum dependent lags: 4 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (4 lags, automatic): FDI IVA M2 NX				
Fixed regressors: C				
Number of models evaluated: 2500				
Selected Model: ARDL(1, 4, 4, 3, 4)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
GDP(-1)	0.067245	0.170838	0.393619	0.7021
FDI	4.035613	1.145812	3.522054	0.0055
FDI(-1)	4.427513	1.309797	3.380305	0.0070
FDI(-2)	-2.024531	1.028732	-1.967986	0.0774
FDI(-3)	3.267330	1.558378	2.096623	0.0624
FDI(-4)	-4.488449	1.093691	-4.103946	0.0021
IVA	0.000917	0.000188	4.876309	0.0006
IVA(-1)	0.000416	0.000241	1.725141	0.1152
IVA(-2)	1.06E-05	0.000278	0.038116	0.9703
IVA(-3)	0.000629	0.000215	2.920275	0.0153
IVA(-4)	0.000588	0.000180	3.275895	0.0083
M2	0.000675	0.000628	1.075942	0.3072
M2(-1)	0.000673	0.001173	0.573532	0.5790
M2(-2)	0.000398	0.001173	0.338924	0.7417
M2(-3)	-0.001535	0.000661	-2.322814	0.0426
NX	-0.242485	0.073269	-3.309515	0.0079
NX(-1)	-0.476290	0.077673	-6.132029	0.0001
NX(-2)	-0.165310	0.087819	-1.882397	0.0892
NX(-3)	-0.632027	0.107187	-5.896512	0.0002
NX(-4)	-0.540660	0.114385	-4.726656	0.0008
C	-22791.65	5897.732	-3.864477	0.0031
R-squared	0.999626	Mean dependent var		86292.25
Adjusted R-squared	0.998879	S.D. dependent var		23016.88
S.E. of regression	770.5037	Akaike info criterion		16.35540
Sum squared resid	5936759.	Schwarz criterion		17.32681
Log likelihood	-232.5087	Hannan-Quinn criter.		16.67206
F-statistic	1338.050	Durbin-Watson stat		2.691489
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent tests do not account for model selection.

Source: Author's computation from E-View 9.0

Table (3) : Bound TEST

ARDL Bounds Test		
Date: 02/14/17 Time: 20:18		
Sample: 1984 2014		
Included observations: 31		
Null Hypothesis: No long-run relationships exist		
Test Statistic	Value	K
F-statistic	9.880287	4
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Author's computation from E-View 9.0

Note: k is the number of regressor for dependent variable in ARDL model.

Table (4) : long run association ship

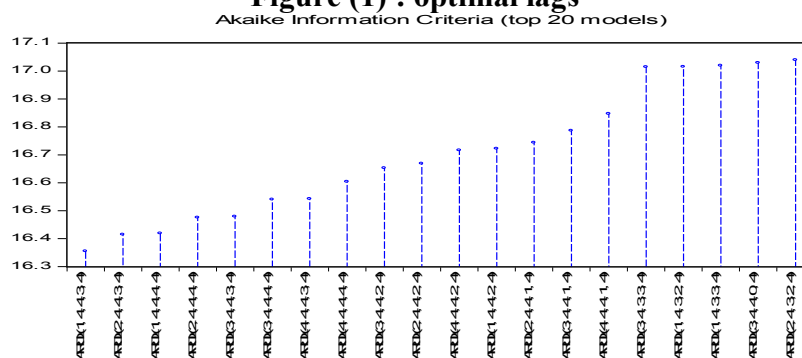
ARDL Cointegrating And Long Run Form				
Dependent Variable: GDP				
Selected Model: ARDL(1, 4, 4, 3, 4)				
Date: 02/14/17 Time: 23:08				
Sample: 1980 2014				
Included observations: 31				
Cointegrating Form				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI)	4.035613	1.145812	3.522054	0.0055
D(FDI(-1))	2.024531	1.028732	1.967986	0.0774
D(FDI(-2))	-3.267330	1.558378	-2.096623	0.0624
D(FDI(-3))	4.488449	1.093691	4.103946	0.0021
D(IVA)	0.000917	0.000188	4.876309	0.0006
D(IVA(-1))	-0.000011	0.000278	-0.038116	0.9703
D(IVA(-2))	-0.000629	0.000215	-2.920275	0.0153
D(IVA(-3))	-0.000588	0.000180	-3.275895	0.0083
D(M2)	0.000675	0.000628	1.075942	0.3072
D(M2(-1))	-0.000398	0.001173	-0.338924	0.7417
D(M2(-2))	0.001535	0.000661	2.322814	0.0426
D(NX)	-0.242485	0.073269	-3.309515	0.0079
D(NX(-1))	0.165310	0.087819	1.882397	0.0892
D(NX(-2))	0.632027	0.107187	5.896512	0.0002
D(NX(-3))	0.540660	0.114385	4.726656	0.0008
CointEq(-1)	-0.932755	0.170838	-5.459881	0.0003
Cointeq = GDP - (5.5936*FDI + 0.0027*IVA + 0.0002*M2 -2.2051*NX -24434.7683)				

Source: Author's computation from E-View 9.0.

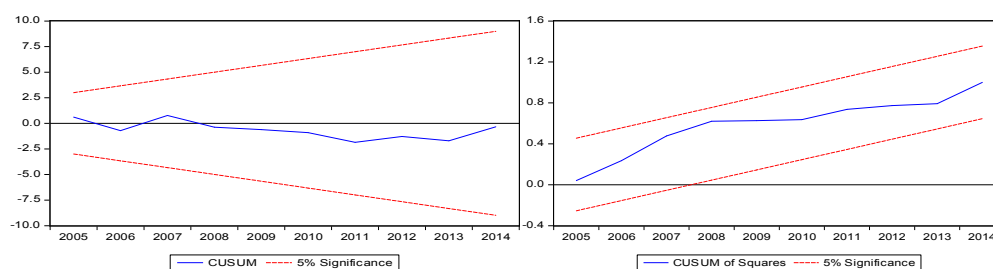
Table (5) : long run coefficients

Long Run Coefficients				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI	5.593620	1.726907	3.239098	0.0089
IVA	0.002745	0.000181	15.142657	0.0000
M2	0.000226	0.000261	0.866585	0.4065
NX	-2.205052	0.171536	-12.854711	0.0000
C	-24434.768269	5659.029458	-4.317837	0.0015

Source: Author's computation from E-View 9.0.

Figure (1) : optimal lags

Source: Author's computation from E-View 9.0

Figure (2) : Plots of CUSUM and CUSUMQ statistics for coefficient stability tests.

Source: Author's computation from E-View 9.0

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