The impact of Foreign Direct Investment on Employment: Empirical Evidence from Algeria

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Abstract:
This study aims to analyse the impact of foreign direct investment on employment in the Algerian economy, using annual data covering the period 1986 to 2016. We use the autoregressive distributed lag (ARDL) and bounds test approach for analysis. Our results confirm the presence of a significant negative impact of foreign direct investment and real exchange rate on employment in Algeria. Whereas, the effect of gross domestic product is positive in long run. These results represent new insights into Algeria's openness policy for promoting employment.
Keywords: Foreign direct investment, Employment, Economic growth, ARDL model.
Jel Classification Codes: E24; F21.

ملخص:
تهدف هذه الدراسة إلى تحليل أثر الاستثمار الأجنبي المباشر على العمالة في الاقتصاد الجزائري، وذلك من خلال أخذ بيانات ســنوية تغطــي الفترة من 1986 إلى 2016. نعتمد الدراسة الحالية نموذج الانحدار الذاتي للفجوات الزمنية الموزعة (ARDL) ومنهج اختبار الحدود. تؤكد الناتج المتوصل إليها أن هناك تأثير سلبي كبير للاستثمار الأجنبي المباشر وسعر الصرف الحقيقي على العمالة في الجزائر. في حين أن تأثير الناتج المحلي الإجمالي جاء إيجابيا على المدى الطويل. تمثل هذه النتائج رؤى جديدة حول سياسة الانفتاح في الجزائر لتشجيع التوظيف.
الكلمات المفتاحية: الاستثمار الأجنبي المباشر، العمالة، النمو الاقتصادي، نموذج ARDL
تصنيف JEL: E24; F21

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I- Introduction :

Over the past decades, there was a growing interest among researchers about the role of foreign direct investment in enhancing the effectiveness of economic activities between countries. Economic literature indicates that foreign direct investment dominated the world's level in the past three decades, especially the developmental areas of economics due to the highly receivable potential benefits including an impact on the dynamics of the labor market.

In Algeria like many other developing countries, unemployment represents one of the major problems and one of the biggest concerns that authorities must solve, due to the lack of weak absorptive capacity for labor market against a large number of new entrants annually. In this regard, Algeria is striving to employment training and expanding the creation of jobs to reduce this difficulty in view of the Algeria government's recognition of the importance of foreign direct investment on the labor market. Where several economic reforms have been undertaken, such as the reduction of the role of the state and the privatization of part of the public sector, which is a clear and encouraging sign of the inflow of foreign capital. In addition, the Algerian government continues to put efforts in attracting more foreign direct investment inflows.

The objective of this study is to find out whether foreign investment flows have a role in creating jobs, through the empirical analysis to identify the impact of FDI on labor demand in Algeria. Such understanding or finding help policy makers to establish better policy framework in terms of foreign direct investment in the developing or emerging economy.

I.1. Theoretical Background and Literature Review:

Theoretical Background: Foreign Direct Investment (FDI), as a key element of globalization where the world economy is still generating a dramatic wave among researchers and economic law makers regarding whether FDI plays the acclaimed role of stimulating the local economies. Where, it seems that two schools of thought are considering the e matter. There are the pro-foreign international schools, who suggest that foreign direct investment provides technology transfer services, managerial skill, technical know-how and capital, which are considered gains for the host country. On the other side, the oppositional dependency school stands and consider that FDI absorbs local financial resources without achieving the desired goals, since foreign investors see host economies as merely serving their own profits and the interest of their home countries[1]. This existing difference raises interest to study the effect of foreign direct investment on economic environment variables as a whole. In this article, we focus on the role of foreign direct investment in job creation.

The theoretical literature shows the absence of theory material, which relates Foreign Direct Investment to employment directly, Nevertheless, there seems to be growing consensus among scholars that FDI has a significant influence on employment creation. The effect of foreign direct investment on employment can be viewed through two scenarios, the direct effect and indirect effect on employment. Firstly, the directly effect: This scenario postulates that foreign direct investment inflow can increase employment directly through foreign investors when establishing new factories or expanding existing ones. This is expected to create new jobs in short-term and eventually lead to increased employment in the host country[2]. Except that it depends on the realization of several factors such as production technology, the nature of the target market, the size of the project and the location of the investment project.

Secondly, the indirectly effect: According to this scenario, foreign direct investment may increase the employment levels in local firms indirectly through, stimulating employment in the distribution stage of production[3]. However, the impact of foreign direct investment on the employment may not always be positive. Where, intense competition between foreign investors and domestic firms could lead to closure of domestic inefficient firms, which may eventually translate into a reduction in the demand for total employment. This situation is very common and could apply to the case of developing country such as Algeria.

Literature Review: In this section, review available literature has been conducted to understand this relationship between foreign direct investment and employment. In recent related study, **He** (2018)[4] analysis the relationship between foreign direct investment, economic growth and employment in China. This study applied the vector auto regression model using annual data

covering the period 1983 to 2016. It reveals that foreign direct investment has a positive effect on economic growth and employment in China.

Brincikova and Lubomir (2014)[5] Analyzed the impact of foreign direct investment inflow on employment in the visegrad group (Slovak Republic, Czech Republic, Republic of Hungary and Republic of Poland) during the period 1993-2012. This study use macroeconomic perspective by applying modified Okun´s law. The results suggest that the effect of foreign direct investment inflow on employment it was not clear in V4 countries.

Habib and Saima (2013)[6] examined the impact of foreign direct on employment levels in Pakistan from period 1970-2011. This study used the Johansen maximum likelihood technique and Granger causality test. The results show that the foreign direct investment and GDP per capita have a positively effects to employment level. While the exchange rate has a negative effect on employment level. As the granger causality test also confirms such nature of relationships among variables and rule out the chance of the existence of relationship in other way round.

Another important study presented by **Mpanju** (2012)[7]. This study adopted a case study design with a quantitative research approach and econometrics analysis using the statistical package for social sciences (SPSS) for tries to analyze the impact foreign direct investment inflows on employment generation of Tanzania for the period of 1990 to 2008. The empirical analysis suggests that there is strong positive relationship between foreign direct investment and employment in Tanzania. In addition, the study also found that Tanzania's employment creation especially does depend upon foreign direct investments. This result confirms fact that foreign direct investments have a big significant impact on the pattern of employment creation.

Diego (2011)[8] examined the role that foreign direct investment played in generating employment opportunities in twelve Latin American countries from 1980 to 2006, using a dynamic panel model. This study shows that foreign direct investment has a positive and significant effect on the employment generation in Latin American countries. Separately considering the effect of foreign direct investment for male and female labor force, the author found that foreign direct investment has only affected male labor force in a positive manner. Such beneficial impact is driven by its positive effect on male labor force, which experiences larger gains than those of the whole labor force almost 20 percent larger.

Rizvi and Muhammad (2009)[9] the objective of this study is to undertake an empirical study on creation of employment opportunities by foreign direct investment during 1985-2008 in Pakistan, India and China. The results of study showed, whatever other benefits may accrue from foreign direct investment it should not be expected to create employment opportunity in any of the three countries directly and foreign direct investment enhancement policies must be supplemented by the other measure to stimulate employment growth. In addition to, the results of estimation of the impulse response shows that the growth elasticity of employment on average in the three countries is extremely low and employment enhancing policies must be priorities. It is also employment growth will not occur in these three countries as a spontaneous consequence of growth in GDP. As rising formal sector, unemployment especially of technical and professional manpower is becoming and increasingly important problem in all three countries.

Peter and José (2007)[10] discussed the role of foreign direct investment in employment generation and in helping the Mexican economy to overcome its problem related to the labor market. The analysis was based on almost two hundred industries belonging to the Mexican manufacturing sector during the period from 1994 to 2006. The study used a panel data model and GMM method for estimation. The results suggested that foreign direct investment have positively but modestly affect employment in manufacturing industries sector in Mexico.

II– Trends of foreign direct investment and employment in the Algerian economy:

In this section, we will try to explore the trends of both the FDI and employment in the Algerian economy. Appendix 1 shows the FDI inflows to Algeria during the period 1986-2016. It reveals that the flows of foreign direct investment to Algeria has been fluctuated from year to years. According to this, FDI flows reached to the maximum level in 1991 with a total amount of 80 million dollars compared to 5 million dollars in 1986. After that, the FDI inflow has been declining to minimum level (nothing flows) between years 1993 to 1995. This lowers could be explained by the period of significant crisis that faced the country in the 1990s, as well as some other barriers. However, from the year 1996 Algeria succeeded in attracting FDIs worth 270

million dollars according to the World Bank estimations and FDI flow also remained remarkably high as it rose to 0.6 percent as a percentage of GDP in 1999.

Begin in 2000s; Algerian economy has been characterized by some political and macroeconomic stability than led to a rapid increase in FDI inflows. with the exception of 2015 Algeria has succeeded in attracting acceptable levels FDI, the aggregate foreign direct investment flows have reached record levels in the last 15 years, where jumping from 280 million dollars in 2000 to 1635 million dollars in 2016. According to the World Bank estimations, FDI flows increased from 1113 million dollars in 2001 to 1145 million dollars in 2005 and to a remarkable 2754 million dollars in 2009. While reaching FDI balances incoming to Algeria amounted to some 1507 million dollars by the end of 2014, which represent 0.7% as a percentage of total GDP for the same period. However, it can be said that the achievements of Algeria in attracting FDI are still low compared to its potentiality and its performance among other countries in the region.

On the other hand, appendix 2 shows the trends of employment and unemployment rates over years in Algeria. Where the official figures show that unemployment in Algeria ranged from 30% to 10% over the last 30 years. According to this, we can divide the employment developments in Algeria into two different periods:

-The period of reforms economics (1986-1999): Total of employment during this period has increased by 1.96 million people from 4.26 million in 1986 to 6.22 million in 1999. This implies that 150000 new people have been entering the labour market every year. Despite this, unemployment rates have been high where Algeria faced a growing problem of unemployment starting of 1986 where the rate of unemployment jump from 11.4% in 1986 to 21.4% in 1987 and then to 28.1% in 1995 reaching the highest level in 1999 to 30%. This large increase in unemployment rates can be traced back to the 1986 oil crisis and the period of reforms, when the country undergone major economic reforms from a state run economy to market oriented economy, a process that intensified in from 1990 onwards.

-The period of deepening reforms economics (2000-2016): During this period, the integration of Algerian economy into the global economy more increased. Where, there was an increasing openness of the Algeria economy to the policies that was introduced to liberalize trade and promote FDI. According to this, the total of employment has increased by 5.56 million people from 6.38 million in 2000 to 11.94 million in 2016. In addition, a remarkable lower in unemployment starting in 2005 characterized this period. Where declining to 17.7% Compared to 28.9% in 2000 and has been continued declining to minimum level 9.8% in 2013.

III- Methods and Materials:

III.1. Model Specification and Data: The comprehensive literature discussed in the previous section shows that the issue of contribution of foreign direct investment to employment creation in host country is still debated among economists and because Algeria is having trouble in creating employment opportunities. There is a need to analyze the role that foreign inflow can play in employment generation.

In this study, was the primary focus on the relationship between employment and foreign direct investment. However, gross domestic product and real exchange rate was added as control variables. The study estimates the relationship between foreign direct investment and employment level using model based on economic theory and some previous empirical studies **Sarwar et al** (2016)[11], Matthew and Atan (2014) …This model taking the following form:

$$EMP = f(FDI, GDP, TCR)\ldots\ldots\ldots\ldots\ldots 01$$

Where (EMP) represents employment Level (measured by number of persons engaged in millions), (FDI) foreign direct investment net flow (percentage of GDP), (GDP) gross domestic product (measured by constant US$ in 2010) and (TCR) real exchange rate. All these four variables were collected from the World Bank Database, ONS and The Database Penn World. It covers the period from 1986 to 2016.

III.2. Estimation Procedures: In achieving the objective of the study, this paper employed the autoregressive distributed lag (ARDL) approach and bound test. The studies that sequentially developed the ARDL bounds test approach include **Pesaran and Shin** (1998)[12] and **Pesaran, Shin and Smith** (2001)[13]. We use the ARDL bounds testing approach because there are various

reasons that make ARDL model more useful than other techniques. The major advantage of this approach is that it can be applied irrespective of whether the underlying variables are I (0), I (1) or a combination of both, **Emeka and Aham** (2016)[14]. In addition, ARDL approach is more suitable and produces more valid results for small sample size (like our study) **Paul** (2014)[15] .Generally, there are two stages in the estimation of the ARDL model. At the first stage, the existence of the long-run relation or not between the dependent and independent variables is tested by computing the bound F-statistic. The Wald test or joint significance test is performed by equating all the coefficients of the lag variables to zero, as shown in equation 02.

$$\Delta EMP_t = \alpha_0 + \sum_{i=1}^{p} B_i \Delta EMP_{t-i} + \sum_{i=0}^{q_1} B_i \Delta FDI_{t-i} + \sum_{i=0}^{q_2} B_i \Delta GDP_{t-i} + \sum_{i=0}^{q_3} B_i \Delta TCR_{t-i}$$
$$+ \delta_1 EMP_{t-i} + \delta_2 FDI_{t-i} + \delta_3 GDP_{t-i} + \delta_4 TCR_{t-i} + \varepsilon_t ....02$$

The null hypothesis to be tested: *Ho*: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$ If the F statistic from this test is greater than the critical values from Pesaran, Shin and Smith (2001) there exists a long run relationship among the variables **Nguyen** (2017)[16]. If a long-run relationship exists between the underlying variables, the next step of estimation procedure is possible. Where to estimate the elasticity of the long run relationship and short run relationship to determine their impact on the dependent variable, as shown in equations 03 and 04 respectively:

$$EMP_t = \alpha_{01} + \sum_{i-1}^{p} B_{1i} EMP_{t-i} + \sum_{i-0}^{q_1} B_{2i} FDI_{t-i} + \sum_{i-0}^{q_2} B_{3i} GDP_{t-i} + \sum_{i-0}^{q_3} B_{4i} TCR_{t-i} + \varepsilon_{1t} ....03$$

$$\Delta EMP_t = \alpha_{01} + \sum_{i=1}^{p} B_{1i} \Delta EMP_{t-i} + \sum_{i=0}^{q_1} B_{2i} \Delta FDI_{t-i} + \sum_{i=0}^{q_2} B_{3i} \Delta GDP_{t-i} + \sum_{i=0}^{q_3} B_{4i} \Delta TCR_{t-i} + \lambda ECM_{t-1} + \varepsilon_{2t} ...04$$

Where: Δ First difference operator. ECM_{t-1}: lagged error correction term, shows the speed of adjustment from short run towards long run equilibrium path. Negative and significant lagged error term helps to confirm a long run relationship among the variables **Hassan, Faridul and Muhammad** (2016)[17].

IV- Results and Discussion:

IV.1. Unit Root Test for Stationarity: The first step is to examine the time series properties of the variables under consideration. Although, this step is not important at the ARDL model because ARDL bounds testing can be applied to any series, irrespective of their order of cointegration. The regressors can be I (0), I (1) or mutually cointegrated. However, it is important none of the variables is I (2). In this regard **Enders** (1995)[18] suggested using both the augmented **Dickey and Fuller** (1981)[19] and **Phillips and Perron** (1988)[20] unit root tests. Therefore, we use the augmented Dickey Fuller (ADF) and Phillips-Perron (PP) tests to provide evidence whether that none of the variables is I (2). The unit root tests were estimated in both the level and first difference, with intercept and trend. The results appear in appendix 3 and 4. It reveals that all variables become stationary after first difference under the 5% significance level. Therefore, we conclude that none of the variables is I (2). Hence, the long run relationship can be predicted by using the bounds test.

IV.2. Bounds test of Co-integration: After confirmed that none of the variables is I (2), we would like to find a long run and stable relationship among variables using the bounds test proposed by Pesaran, Shin and Smith (2001). Based on Pesaran and Shin (1998) recommendation to use a maximum lag length of two for annual data. The results of the bound test show in appendix 5.

The results reveal that the computed F statistics value, which is compared with the F lower and F upper critical values, suggests that strongly the existence of the long-run relationship among the variables at 5% level of significance. This means that the employment, FDI, GDP and TCR have a long-run co-integration, where they all will be moving in the same direction in the long-run.

IV.3. The analysis of the long -run ARDL model: After the confirmation of the long-run relationship. ARDL model can be employed now. For the long run model, ARDL (2, 2, 0, 2) is chosen by AIC. The results of estimating shown in appendix 6 reveal that FDI has negative and

significant long run relation with employment level. Interestingly 1% increase in FDI will lead to approximately 4.08% decrease in employment in long run. The negative relation between FDI and employment level suggests can be explained that FDI crowds out the inefficient domestic firms. Due to this, domestic firms decrease their output levels and their labour force to become more competitive, there is eventually a reduction in the overall employment levels.

Conversely, GDP has positive and significant long-run relation with employment level. Should GDP increase by 1%, EMP will increase by 1.08 % in long run. This is consistent with economic theory and is meaningful statistically. In addition, the long-term impact of real exchange rate over employment is negative. Should TCR increase by 1%, EMP will decrease by 0.13% in long run. This can be explained by the fact that the Marshal Lerner condition is not present in developing countries such as Algeria.

IV.4. The results of error correction model: As for the dynamics of the short-run, the error correction model estimated and the result is presented in appendix 7. According to the results obtained, the equilibrium correction coefficient (ECM t-1) estimated (-0.90) is highly significant (5% level) and has the correct sign. It shows that the system correct its last period disequilibrium (the speed of adjustment to restore equilibrium in the dynamic model) by approximately 90% a year. About 90% of disequilibria from the previous year's shock converge back to the long-run equilibrium in the current year. In addition, the results show that lagged FDI and lagged GDP has positive and significant short-term relation with employment level. While lagged of TRC is also negative and significant.

V.5. Diagnostic tests results: In order to ensure that the model used in the study is reliable and to verify that results are robust, residuals diagnostics tests were completed. Appendix 8 shows the consolidated diagnostic tests results of the study. The results show that the model is free from serial correlation, heteroskedasticity problems and is normally distributed (All p values are greater than critical values of 0.05).More than that, the CUSUM test and CUSUM of squares test proposed by **Brown, Durbin and Evans** (1975)[21] shows that the model is stable over the sample period as shown in appendix 9.

 V- Conclusion: This research represents an attempt to understand the impact of FDI on the employment level by taking annual data for the period 1986 to 2016. The study includes four variables, employment, foreign direct investment, gross domestic product and exchange rate. The autoregressive Distributed model (ARDL) is used to test the relationship both in the short and in the long run. The results suggest that FDI positively affects the level of employment in the economy in the short-run. Nevertheless, in the long run the impact of FDI is negative. While, the effect of GDP on employment is positive because through increasing GDP, investment in various sectors and employment level increase as well. The traction of employment over the exchange rate is meaningful and negative which suggests that by increasing the exchange rate, employment falls and by reducing the exchange rate, employment is enhanced. Based on these results, our recommendations suggest that policy makers in Algeria should not always expect that FDI is a source of creating new employment opportunities in the economy. Then focus of policymakers should not only focus on the attraction of FDI, but concentrate too on directing FDI flows appropriately. Specifically, at present Algerian government will have to undertake reforms with clear objectives and commitments for maximize the benefits from increased foreign direct investment.

- Appendices:

Appendix 01: Raw data

Years	Total employment (in millions)[1]	Foreign direct investment net flow (million dollars)[2]
1986	4.26	5
1987	4.40	4
1988	4.55	13
1989	4.71	12
1990	4.85	40

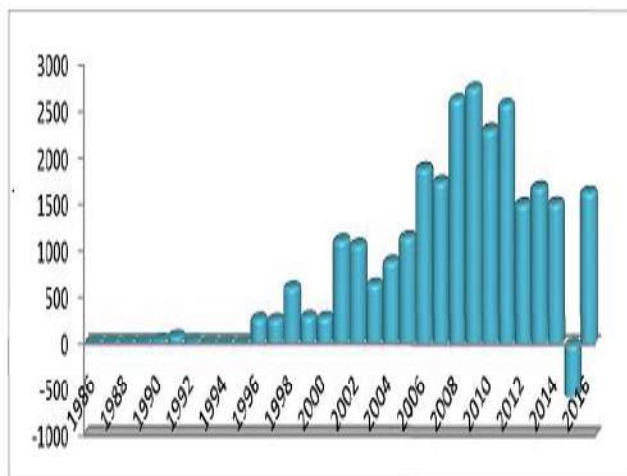| 1991 | 5.00 | 80 |
1992	5.12	30
1993	5.18	0
1994	5.29	0
1995	5.57	0
1996	5.76	270
1997	5.95	260
1998	6.13	607
1999	6.22	292
2000	6.38	280
2001	6.73	1113
2002	7.03	1065
2003	6.80	638
2004	7.92	882
2005	8.16	1145
2006	8.99	1888
2007	8.69	1743
2008	9.23	2632
2009	9.55	2754
2010	9.80	2301
2011	9.65	2580
2012	10.23	1499
2013	10.86	1684
2014	11.08	1507
2015	11.80	-584
2016	11.94	1635

Source:
[1]-Penn World Table, version 9.0 available on: www.ggdc.net/pwt
- Publications of (O.N.S) on the site: www.ons.dz
[2]- World Bank database available on: https://data.albankaldawli.org/country/algeria?view=chart

Appendix 02: Foreign investment inflows to Algeria from 1986 to 2016	Appendix 03: Trends of employment and unemployment rates from 1986 to 2016
Source: Drawn by the Authors from World Bank Data.	Source: Drawn by the Authors from Penn world data and ONS.

Appendix 04: Results of (ADF) test at level and first difference

Variables	Level		First difference	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
EMP	0,53	3,10	-8,55*	-8,51*
FDI	-2,40	-2,76	-5,79*	-5,88*
GDP	1,05	-2,26	-3,68*	-4,09*
TCR	-2,73	-2,75	-4,16*	-5,30*
Critical Values				
1%	-3,67	-4,29	-3,67	-4,3
5%	-2,96	-3,56	-2,96	-3,57
10%	-2,62	-3,21	-2,62	-3,22

Note: (*, **) represents significance level at 1% and 5% level respectively.

Appendix 05: Results of (PP) test at level and first difference

Variables	Level		First difference	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
EMP	1,17	-2,97	-8,98*	-11,04*
FDI	-2,22	-2,69	-6,97*	-7,76*
GDP	1,43	-2,49	-3,74*	-4,17*
TCR	-11,87	-6,07	-4,18*	
Critical Values				
1%	-3,67	-4,29	-3,67	-4,3
5%	-2,96	-3,56	-2,96	-3,57
10%	-2,62	-3,21	-2,62	-3,22

Note: (*, **) represents significance level at 1% and 5% level respectively.

Appendix 06: Results of Bounds test of Co-integration

Null Hypothesis: No long-run relationships exist.		
Test Statistic	Value	K
F-Statistic	6.6409*	3
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.77	3.77
5%	3.23	4.35
2.5%	3.69	4.89
1%	4.29	5.61

Note: (*, **) represents significance level at 1% and 5% level respectively.

Appendix 07: ARDL Long run result

Dependent Variable: EMP			
Variables	Coefficient	Srandard Error	T-Values
FDI	-4,818209	(1,166311)	[-4.131154] 0.0006*
GDP	1,082250	(0,030128)	[-35.92184] 0.0000*
TCR	-0,135395	(0,023515)	[-5.757828] 0.0000*
Constant	-2,761068	(5,164282)	[0.534574] 0.5991

Note: (*, **) represents significance level at 1% and 5% level respectively.

Appendix 08: ARDL short-run results

Dependant Variable:EMP			
Variables	coefficient	SE	T-Values
DEMP	-0,475540	0,133665	[-3.557692] 0.0021*
DFDI	1,91854	0,887858	[1.567654] 0.0133*
DFDI$_{t-1}$	4,902162	1,406037	[3.486509] 0.0025*
DGDP	0,980879	0,167028	[5.872537] 0.0000*
DTCR	-0,055651	0,04885	[-1.26810] 0.2201
DRCR$_{t-1}$	0,107337	0,043071	[2.492086] 0.0221**
ECT$_{t-1}$	-0,906333	0,158514	[-5.71770] 0.0000*

Note: (*, **) represents significance level at 1% and 5% level respectively.

Appendix 09: Diagnostic tests results

Test	Hypothesis	Prob
Breusch Godfrey test	No serial correlation	0.8437
ARCH- LM test	No heteroscedasticity	0.5939
Jarque Bera test	Residuals are normally distributed	0.7505

Appendix 10: CUSUM and CUSUMSQ Test of Stability
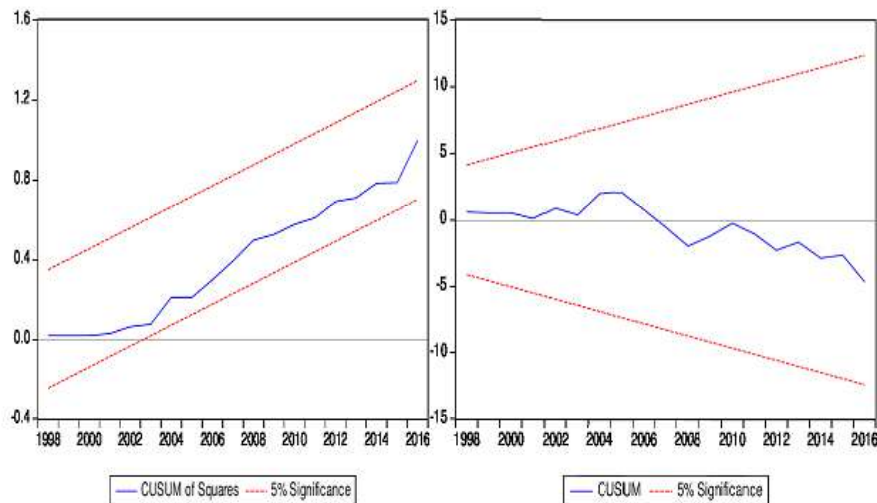
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