The effect of inward foreign direct investment on export growth in emerging economies, China case of study

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ملخص:

تحاول هذه الدراسة ابراز نموذج لاستقطاب الاستثمار الأجنبي المباشر كمحفز لنمو الصادرات في الدول النامية. حيث تمثل النموذج في 36 مشاهدة سنوية للفترة الممتدة من 1982 إلى غاية 2008 للاقتصاد الصيني كدراسة حالة. وقد توصلت النتائج التجريبية لان اختبار الوحدة مستقر عند التأخير بدرجة واحدة، فضلا عن وجود علاقة التكامل المشترك طويلة الأجل بين الاستثمار الأجنبي المباشر ونمو الصادرات. فيما اختتمت الدراسة بمجموعة من التوصيات أهمها: وجوب اتخاذ قرارات صائبة بتفعيل استقطاب أكبر كم من الاستثمارات الأجنبية من خلال خلق مناخ استثماري مناسب كتعجيل الإصلاحات الإدارية والعمل على استقرار السياسي والاجتماعي.

الكلمات المفتاحية: الاستثمار الأجنبي المباشر الوارد، نمو الصادرات، التكامل المشترك، الصين

Abstract:

This study presents evidence suggesting that attracting foreign direct investment (FDI) offers potential for raising the growth of exports in developing countries. The sample covers 36 years countries from 1982 to 2018 of Chinese economy as study case. The empirical findings revealed that the unit root is stationary after the first difference and presents a co-integration. After the confirmation of co-integration, there exists a long-run relationship between exports growth. Finely, the study recommends that policy makers shall take appropriate steps to increase the inflow of foreign direct investment in order to achieve the long run export growth, through creating a conductive environment and adopt more liberal policy frameworks to attract new FDI and maximize net benefits. This may include creating a good macroeconomic environment, accelerating administrative reform, sustaining social and political stability and reducing government bureaucracy.

Key words: *Inward FDI, Exports growth, ARDL Co-integration, China.*

1. INTRODUCTION

The first subtitle opens with an introduction that presents the specific problem under study and describes the research strategy. The first subtitle opens with an introduction that presents the specific problem under study and describes the research strategy. The first subtitle opens with an introduction that presents the specific problem under study and describes the research strategy.

Today, the inflows of foreign direct investment FDI were encouraged to expand exports of the country as FDI would bring along with additional capital, the attendant advantages of technology,

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managerial know-how, and marketing expertise with access to global, regional and expanding home country markets. Therefore, both developed and developing countries try to get biggest share of the pie by increasing their parts in global trade based on the inward of foreign direct investment. More specifically, as the East Asian experience has shown.

Notably, as the statistics highlighted foreign direct investment (FDI) has been one of the most significant features of China's economic reform and opening up to the outside world. By the end of 2016, China had attracted a total of US$1.35 trillion in FDI stock, making it the largest FDI recipient in the developing world on the hand. The large volumes of FDI inflows have contributed greatly to China's economy in terms of capital formation, employment creation, and specifically significant impacts on its export on the other hand.

However, due to the fragile recovery of the world economy and domestic security concern, the flows of foreign investment reduced to its regular patterns. Besides, imports also play a significant role in the growth process. Therefore, establishing a relationship between FDI and export may be useful for policy makers. Policy makers could initiate appropriate policy actions towards external determinants considering their importance for economic growth.

2. Research question:

In response, within this liberal framework to attract inflows of FDI, this paper examines the impact of foreign direct investment on export; it will also provide an empirical investigation to a pertinent research question:

Does foreign direct investment affect export growth of China?

In doing so, the paper used observation on foreign direct investment (FDI hereafter), and exports on China economy during the period of 1982-2018, by examine the short run and long run effect of FDI and export. Perhaps, more importantly while other researches utilize two step (Engle and Granger, 1987) method or the maximum likelihood technique of Johansen and Juselius (1990) which requires a large sample size for validity, this research employs a newly developed method bounds testing (ARDL) approach introduced by Pesaran et al. (2001) which operates more properly for a small sample size.

This paper is organized as follows. The next section reviews the related literature. Modeling and empirical strategy are explained in section two. Models are estimated and results are presented in section three. In the penultimate section, the long run integration relationship is discussed. Section four concludes the paper along with policy recommendations.

3. Literature review:

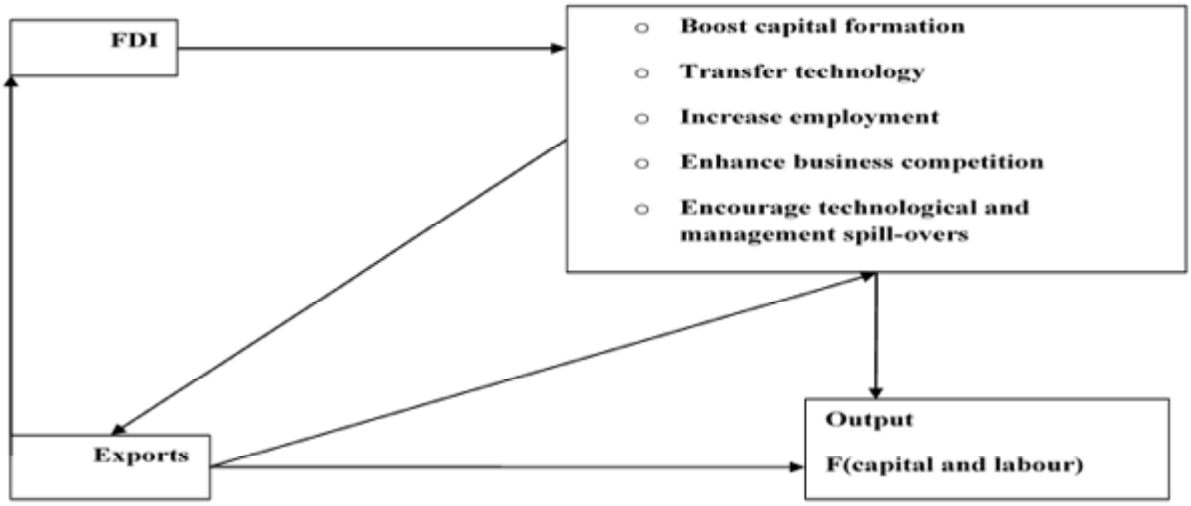
The relationship between export and economic growth has been a research interest in both the theoretical and empirical literature for some time now. Theoretically, the relationships of inward FDI and export growth of the host country may take place both directly & indirectly. The direct effects arise when multinational enterprises MNES, the chief vehicle to flow FDI, build up production affiliates in the host country and used them as export platform to make exports to the home country or third countries. This export oriented FDI seeks to exploit the comparative advantages of the host country due to differences in factor intensities between the host & home countries. The other way through which the FDI affects host country's export performance is its spillover effects referred to as indirect effects. The transmission mechanism through which spillover effects might boost the productivity of domestic firms are-adoption of technology and operation followed by the foreign

producer, knowledge transfer by the movement of skilled employees from MNES to domestic firms, increase in the efficiency of domestic firms due to competition faced from MNES and learning export from the export behavior of MNES (Chandrama Goswani & others, 2011).

Moreover, perspectives on FDI and multinationals have shifted towards a more accommodating stance. This shift is supported by findings on MNCs contribution to growth, exports and balance of payments of the host country. Indeed, the increasing MNC contribution to host country's exports is one of the major reasons for that shift in perspective. This contribution has gained more support with the rise of export led growth as an alternative, and successful, industrialization strategy as demonstrated by the South-East Asian experience (Mohamed Soliman, 2003).

Perhaps, more importantly, The literature on the links between FDI and export hypothesis postulates trade as the main engine of growth and therefore claims that outward-oriented policies and exports in particular, improve productivity growth through the following means: (a) enabling the adoption of foreign technologies; (b) resulting greater capital utilization and utilization of advantage of economies of scale and comparative advantage; and (c) helping create a conducive and stable macroeconomic environment through increasing employment, labor productivity and enhancement of the country's external earning power. Thus, the issue of which variable is driving the other and the nature of any link between FDI, exports is not clear-cut. Figure 1 illustrates some of the possible transmission mechanisms whereby these variables influence each other (Abdullahi Ahmed & others, 2007).

Fig.1. Possible links in FDI, exports and income



Source: (Abdullahi Ahmed & others, 2007)

4. RESULTS AND DISCUSSION

This section attempts to study dynamic relationship between FDI and exports with a time series framework of newly developed method bounds testing (ARDL) approach introduced by Pesaran et al. (2001) which operates more properly for a small sample size. The study involves a series of steps as described below.

4.1. Data Collection.

The study uses the time series data relating to inflows of FDI, volume of exports and for 36 years period from 1982 to 2018.The data source is the online database of the World Bank. The values are found by taking the data in USD at current prices so that the effect of prices will be cancelled out making the data comparable. Foreign direct investment (FDI) defines net inflows (BoP, current US$), while exports (EX) represents goods, services and primary income (BoP, current US$).

4.2. Estimating methodology:

Usually, time series data requires special care before the analysis. They are usually non-stationary in nature. Therefore, it is necessary to check the potential non-stationary problem (unit-root) in the first instance and to check the order of integration of each variable. Ignoring unit root problem would lead to spurious regression. If time series variables are non-stationary, the recommended procedure is to use co-integration techniques or differentiate the data according to the order of integration and use the differenced data in the analysis instead of the original data. Akcay and Demirhan (2005) argued that stationary variables can be modelled in levels and granger causality tests can be used, while in the case of non-stationary variables, co-integration techniques can be used for detecting the long-run relationship.

Hence, the two variables are put to different diagnosis test to perform time series study. First, we test for the order of integration in the data by using the augmented Dicky Fuller (ADF) unit root test and if the unit root is present, then stationarity is achieved by the first differencing of the data. Having established the order of integration, next we test for co-integration by applying the Engle-Granger method. Finally, Autoregressive Distributed Lag (ARDL) has been used to assess both the long run as well as short run relationship between the variables.

5. Results and discussion:

5.1. Unit Root Test:

Usually, time series data requires special care before the analysis. They are usually non-stationary in nature. Therefore, it is necessary to check the potential non-stationary problem (unit-root) in the first instance and to check the order of integration of each variable. Ignoring unit root problem would lead to spurious regression. If time series variables are non-stationary, the recommended procedure is to use co-integration techniques or differentiate the data according to the order of integration and use the differenced data in the analysis instead of the original data. Akcay and Demirhan (2005) argued that stationary variables can be modelled in levels and granger causality tests can be used, while in the case of non-stationary variables, co-integration techniques can be used for detecting the long-run relationship.

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Many macroeconomic time series data contain unit root; thus, it is imperative to test the stationarity of a time series as the non-stationarity invalidate the empirical results and analysis. As a result, the unit root test is performed to test whether a time series is stationary or not. Here, we apply the Augmented Dicky Fuller (ADF) test, which is one of the most widely used tests to know the statinarity of the variables. By inspecting the plots of the variables, the ADF test is performed with a

constant as exogenous at their levels and first differences. The Philips Perron (1988) unit root test is developed as an alternative to ADF and has some superior properties than ADF. Philips Perron unit root test is recommended to be used in the presence of the high serial correlation. The Philips Perron (PP) test makes a correction in the t-statistics of the coefficient from the AR (1) regression to deal with the serial correlation in the error term. One of the methods that are used is the Newey-West hetero-scedasticty autocorrelation consistent estimate as given below.

The results of the ADF & PP test are represented in Table1. The first part of the table contains of data showing the value of tested non-stationary time series at their values, and the second part of the table records data indicating the stationary of time series at first differences. The assumption for further test and research of long-term relationships between specified variables is met since the time series stationary was proved in the first differences.

Table 1.: ADF Unit root tests

	Level			**1st differences**		
	Constant	Constant plus trend	Conclusion	Constant	Constant plus trend	Conclusion
EX	-1.255366	-3.540328	I(0)	-4.224101	-2.948404	I(1)
FDI	0.241553	-1.950394	I(0)	-5.779197	-1.950687	I(1)

Source: (Author's estimation in E-views 9)

5.2. Co- integration Test:

As the results from unit root tests clearly show that all variables are I (1), co-integration tests are employed to determine whether these non-stationary variables are co-integrated. Although, there are various econometric tools such as Engle Granger, Johansen multivariate co-integration test and the recently developed ARDL (Autoregressive Distributed Lag Models) for analyzing time series data. The ARDL approach to co integration approach is recently developed by Peseran et al., (2001) and has been considered very effective because of its ability to handle variables of different order of co-integration and working well in small and infinite sample sizes. Therefore, this study will prefer ARDL approach to co-integration for detecting the long-run relationship, if the chosen variables are non-stationary.

There are various reasons which make ARDL model more useful than other techniques for the case of relationship between FDI and export. Firstly, it can be applied irrespective of whether the series are I(0) or I(1). Meanwhile, other approaches to co-integration tests such as Engle and Granger (1987) and Johansen and Juselius (1990) require the variables to be integrated of the same order. Also, ARDL approach is more suitable and produces more valid results for small sample size (Nhung Thi Kim NGUYEN, 2017).

ARDL approach is consists of four steps. The first step is to check the stationarity of the variables to ensure that no variable is integrated of order two. In the second step, the order of lags of ARDL will be chosen automatically by E-views 9.5 by using AIC then the co-integration relationship among the variables is examined by conducting F-statistics. Next, if there is a co-integration relationship among the variables, the long run and short run models are derived. Finally, the stability and diagnostic test will be conducted to ensure goodness of fit of the chosen model

(Nhung Thi Kim NGUYEN, 2017).

5.3. Lags selection:

In order to check the long-run co-integrating relationship, we apply the co-integration test to the VAR model, the number of lags shall be determined by using; sequential modified (LR) test statistic (each test at 5% level) Akaike (AIC) and Schwarz Criteria (SC), Hannan-Quinn information criterion (HQ). Then, the AIC and SC, LR and HQ values of the models with different number of lags shall be compared. The results for the co-integration test are presented in Table 2.

Table. 2: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1365.098	NA	1.08e+45	109.3678	109.4654	109.3949
1	-1306.638	102.8896	1.39e+43	105.0110	105.3036	105.0922
2	-1303.983	4.247852	1.56e+43	105.1187	105.6062	105.2539
3	-1301.249	3.936559	1.76e+43	105.2200	105.9025	105.4093
4	-1297.018	5.416231	1.79e+43	105.2014	106.0790	105.4448
5	-1295.043	2.212002	2.24e+43	105.3634	106.4360	105.6609
6	-1273.810	20.38330	6.21e+42	103.9848	105.2525	104.3364
7	-1256.931	13.50337*	2.57e+42	102.9545	104.4171	103.3602
8	-1248.622	5.317774	2.27e+42	102.6098	104.2674	103.0695
9	-1233.171	7.416536	1.29e+42	101.6937	103.5464	102.2075
10	-1213.419	6.320593	6.53e+41	100.4335	102.4812	101.0015
11	-1183.833	4.733821	2.67e+41*	98.38662	100.6294	99.00866
12	66.49272	0.000000	NA	-1.319418*	1.118334*	-0.643289*

Source: (Author's estimation in E-views 9)

It can be seen from Table 2 that AIC, SC and HQ values are lowest at lag 11 (n-1=12-1=11). However, there is an evidence of serial correlation at lag 6 based on LM test (n-1=7-1=6) . Therefore, we use LR to estimate ARDL.

5.4. ARDL estimation:

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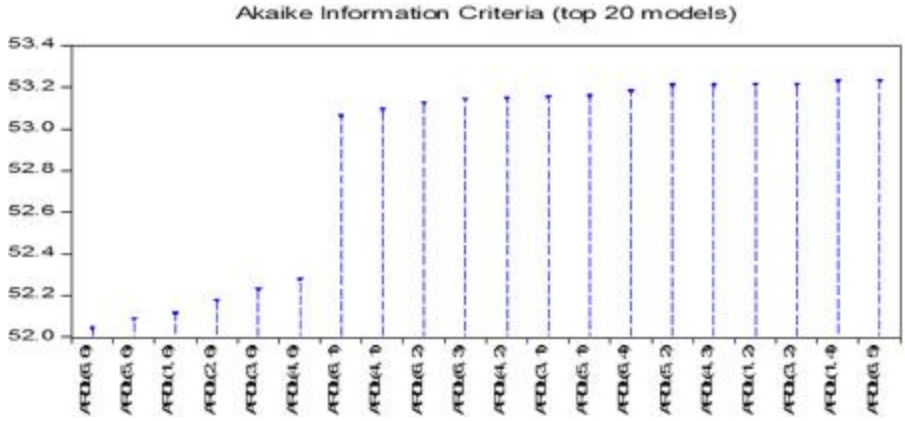
It is necessary to define appropriate time lag length within this test. Here, an Akaike criterion

was used while determining the appropriate lag length was proved. Then, we chose the best model from 49 of possible models. The graph shows that the best model form 20 models is ARDL (6, 6) as the figure 2 shown.

Figure.2. Akaike Information Criteria (top 20 models)



Source: (Author's estimation in E-views 9)

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The best ARDL (6,6) estimation equation has the following presented:

EX = 1.08714158236*EX(-1) - 0.604726689441*EX(-2) + 0.418148109433*EX(-3) + 0.508447263419*EX(-4) - 0.905302241921*EX(-5) + 0.286455448727*EX(-6) + 4.44639121281*FDI - 3.19199113192*FDI(-1) + 2.04350426359*FDI(-2) - 2.53537339195*FDI (-3) - 1.97542903374*FDI(-4) + 0.390500398539*FDI(-5) + 3.95003693387*FDI(-6) - 17561156858.

To make the results more robust, the F-statistic is compared with the critical values provided by Bounds (2005) for sample size (36 observations). The result shows in table 3 that F-statistic is greater than both the upper bound critical values at 10% and 5% level of significance using unrestricted intercept and no trend. This confirms the existence of a long run relationship among export, FDI.

Table.3: ARDL bound text

F-Bounds Test		**Null Hypothesis: No levels relationship**		
Test Statistic	**Value**	**Signif.**	**I(0)**	**I(1)**
F-statistic	10.18803	10%	3.02	3.51
k	1	5%	3.62	4.16
		2.5%	4.18	4.79
		1%	4.94	5.58

Source: (Author's estimation in E-views 9)

For the long run model, ARDL (6,6) is chosen by AIC. Estimation of the long run coefficients for the ARDL (6,6) model is presented in table 4. The coefficients on FDI and c are statistically significant at 1% and 5% respectively. The coefficient on FDI is 0.1490512 which means a 1% increase in FDI is associated with approximately 0.15% increase in Export growth.

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
FDI	14.90512	3.866885	3.854556	0.0013
C	-8.37E+10	5.63E+10	-1.485697	0.1557

Source: (Author's estimation in E-views 9)

The error correction model is estimated and the result is presented in table 5. FDI has positive impact on export in China, while FDI one period lagged is, confirming the results of the bound test for co-integration relationship. Approximately, 91.63% of disequilibria from the previous year's shock converge back to the long run equilibrium in the current year.

Table.5: ARDL Error Correction Regression

ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EX(-1))	0.296978	0.113599	2.614260	0.0181
D(EX(-2))	-0.307749	0.181101	-1.699322	0.1075
D(EX(-3))	0.110400	0.170486	0.647559	0.5259
D(EX(-4))	0.618847	0.203482	3.041291	0.0074
D(EX(-5))	-0.286455	0.173134	-1.654529	0.1164
D(FDI)	4.446391	0.253505	17.53965	0.0000
D(FDI(-1))	-1.873239	0.637117	-2.940180	0.0091
D(FDI(-2))	0.170265	0.673158	0.252935	0.8034
D(FDI(-3))	2.365108	1.060637	-2.229895	0.0395
D(FDI(-4))	-4.340537	0.993244	-4.370061	0.0004
D(FDI(-5))	-3.950037	0.517562	-7.632008	0.0000
CointEq(-1)*	**-0.209837**	**0.035902**	**-5.844644**	**0.0000**

Source: (Author's estimation in E-views 9)

Various diagnostic tests were conducted to confirm the efficiency of the model, as shown in table 6. The results show that the model is free from serial correlation, functional form, hetero-skedasticity problems and is normally distributed (All p values are greater than critical values of 0.05).

Table.6. Heteroskedasticity Test Breusch-Pagan-Godfrey

F-statistic	**1.624659**	**Prob. F(13,17)**	**0.1724**
Obs*R-squared	17.17544	Prob. Chi-Square(13)	0.1914
Scaled explained SS	6.501962	Prob. Chi-Square(13)	0.9260

Source: (Author's estimation in E-views 9.5)

In addition, based on table 7 cumulative sum of recursive residuals and cumulative sum of squares of recursive residuals, the model is stable over the sample period as the statistics is within the critical bounds (represented by a pair of straight lines).

Table.7. Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.572954	Prob. F	0.2398
Obs*R-squared	5.374389	Prob. Chi-Square (2)	0.0681

Source: (Author's estimation in E-views 9)

The results of the ARDL model are shown Table 8, provides different diagnostic tests in order to check the reliability of the model. The diagnostic tests show that the estimated ARDL model is free from any serious econometric issues. The LM test shows that the model is free from serial correlation problem. Also, there is no evidence of heteroscedasticity at 5 percent level. Therefore, the estimated ARDL model is reliable. In the next step, the long-run coefficients of the independent variables can be calculated from the estimated ARDL model. The procedure is to divide the coefficient value of each independent variable on the first lag value of the dependent variable and multiply it by a negative sign. The long-run coefficients are reported in Table 8.

Table.8. Summary of results regressions

R-squared	**0.950243**
Adjusted R-squared	0.921437
S.E. of regression	3.93E+10
Sum squared resid	2.94E+22
Log likelihood	-792.6503
Durbin-Watson stat	2.247708
Mean dependent var	8.46E+10
S.D. dependent var	1.40E+11
Akaike info criterion	51.91292
Schwarz criterion	52.46802
Hannan-Quinn criter.	52.09387

Source: (Author's estimation in E-views 9)

The long-run results for the co-integrating relationship between the independent variable and the dependent variable are shown in Table 5. The results show that the economy of China benefited

significantly from the inflow of FDI. The coefficient of FDI is 0.92 which is different from zero at 1 per cent level. The volume of FDI in China through official channels has significantly increased during period of study. The results also show that there is a positive and significant relationship between FDI and export in the context of China economy. The point estimate suggests that an increase of one per cent in FDI would influence the export by 0.42.

6. CONCLUSION

The main purpose of this study was to see whether or not inward FDI positively affected export growth in China over the period 1982 to 2018, the empirical analyses are carried out using the recently developed ARDL approach to co-integration. Subsequently, they were used for initial testing and testing for stationarity. Test results showed that both times series are stationary up to its first difference. This result enabled a continuance with further research and after finding the time lag the lag variables. Co-integration equation had shown a positive relationship between foreign direct investment and export. This fact demonstrated the generally accepted argument that foreign direct investment is a positive force for the export growth of the country and in open economy, export encourages economic growth. As a last step of research vector error correction model was carried out. This explains the approximate 15% rate of convergence to long-term equilibrium relation to formation of short-term shocks. The result is that the rate of convergence towards the balance condition is very satisfying in this case.

Above empirical findings provide some important implications for the openness policy in developing countries. Firstly, as FDI has a significant positive impact on long run economic growth. Since inflows of FDI make a developing country's export structure more similar to that of high-income countries, as these economies are integrated into the global economy particularly for low- and middle-income countries. It is important for policy makers to design policies aimed at attracting FDI. Therefore, policy makers could take appropriate policy actions to attract FDI and increase the outflow of workers. Doing this will eventually help the developing countries to achieve the long-run economic growth.

Consequently, developing countries should create a conductive environment and adopt more liberal policy frameworks to attract new FDI and maximize net benefits. This may include creating a good macroeconomic environment, accelerating administrative reform, sustaining social and political stability and reducing government bureaucracy.

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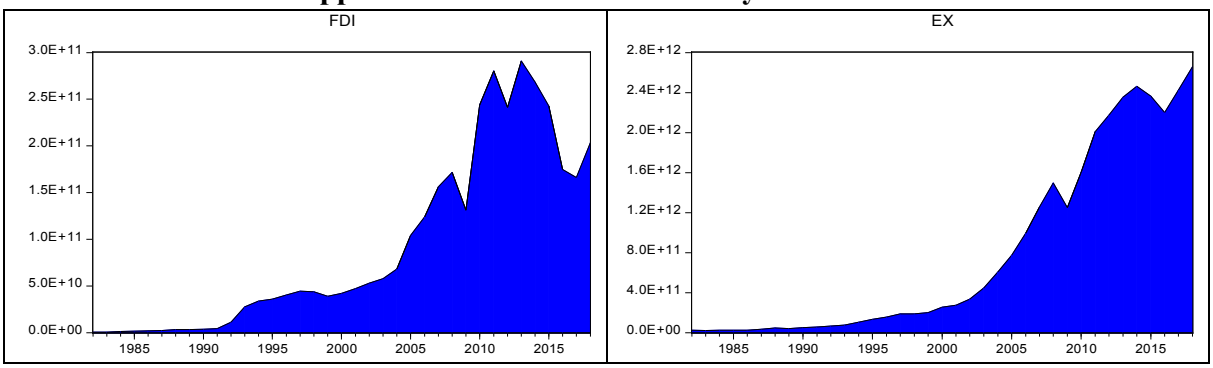
6. Appendices

Appendix.1. Variables Stationarity Tests



Source: (Author's estimation in E-views 9)

Appendix.2 Residuals of Variables

Residuals of (FDI)

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.922	0.922	34.047	0.000
		2	0.857	0.053	64.355	0.000
		3	0.799	0.010	91.430	0.000
		4	0.693	-0.341	112.41	0.000
		5	0.584	-0.144	127.80	0.000
		6	0.461	-0.221	137.71	0.000
		7	0.373	0.241	144.39	0.000
		8	0.263	-0.155	147.83	0.000
		9	0.152	0.002	149.03	0.000
		10	0.092	0.117	149.48	0.000
		11	0.023	-0.000	149.51	0.000
		12	-0.032	0.010	149.57	0.000
		13	-0.075	-0.056	149.91	0.000
		14	-0.117	-0.130	150.76	0.000
		15	-0.148	-0.077	152.19	0.000
		16	-0.175	0.078	154.28	0.000

Residuals of (Ex)

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.921	0.921	34.015	0.000
		2	0.845	-0.024	63.451	0.000
		3	0.778	0.018	89.121	0.000
		4	0.691	-0.162	110.03	0.000
		5	0.590	-0.152	125.73	0.000
		6	0.489	-0.085	136.86	0.000
		7	0.388	-0.070	144.09	0.000
		8	0.283	-0.076	148.09	0.000
		9	0.199	0.070	150.13	0.000
		10	0.135	0.083	151.10	0.000
		11	0.051	-0.168	151.24	0.000
		12	-0.023	-0.030	151.27	0.000
		13	-0.083	-0.048	151.69	0.000
		14	-0.133	0.010	152.79	0.000
		15	-0.174	0.007	154.79	0.000
		16	-0.207	-0.008	157.74	0.000

Source: (Author's estimation in E-views 9)

Appendix.3 Residuals of Variables at first difference

Residuals of D(FDI)

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	-0.046	-0.046	0.0835	0.773
		2	-0.129	-0.132	0.7562	0.685
		3	0.221	0.212	2.7729	0.428
		4	-0.126	-0.135	3.4472	0.486
		5	0.012	0.069	3.4539	0.630
		6	-0.239	-0.351	6.0651	0.416
		7	0.023	0.133	6.0911	0.529
		8	0.100	-0.059	6.5765	0.583
		9	-0.165	0.029	7.9619	0.538
		10	-0.075	-0.242	8.2559	0.604
		11	-0.085	-0.074	8.6526	0.654
		12	-0.026	-0.143	8.6916	0.729
		13	0.045	0.140	8.8108	0.787
		14	0.008	-0.012	8.8152	0.843
		15	-0.010	-0.041	8.8212	0.887
		16	-0.005	-0.169	8.8232	0.921

Residuals of D(Ex)

Autocorrelation	Partial Correlation		AC	PAC	Q-Stat	Prob
		1	0.274	0.274	2.9290	0.087
		2	-0.044	-0.129	3.0084	0.222
		3	0.162	0.232	4.1023	0.251
		4	0.119	-0.010	4.7064	0.319
		5	0.022	0.032	4.7280	0.450
		6	0.252	0.256	7.6157	0.268
		7	0.364	0.231	13.875	0.053
		8	-0.033	-0.186	13.928	0.084
		9	-0.156	-0.127	15.164	0.087
		10	0.005	-0.076	15.165	0.126
		11	0.003	-0.022	15.166	0.175
		12	-0.063	-0.069	15.390	0.221
		13	-0.043	-0.158	15.500	0.277
		14	-0.033	-0.059	15.566	0.341
		15	-0.066	0.116	15.846	0.392
		16	-0.080	0.049	16.283	0.433

Source: (Author's estimation in E-views 9)