Should inward of Foreign Direct Investment lead to Economic Growth in Algeria?
An Empirical analysis during the period 1994 to 2017

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Abstract:

Theoretically, foreign direct investment (FDI) has been viewed as a power affecting economic growth (EG) directly and indirectly. However, practically, not all countries especially developing gets benefited from inflow of FDI, due its reverse impacts. Therefore, in this paper we employ econometric analysis to investigate the impact of FDI and the related externalities on economic growth in Algeria for the period 1994 to 2017, by using co-integration and Engel-Granger tests in data. The key findings indicate the inflow of FDI has positive both on GDP and Exports, while statistically insignificant relationship with Imports at the first difference, and conversely has negative effect on the unemployment rate. Hence, FDI has found to have a positive overall effect on economic growth. Finely, this paper ends with recommendations on how Algeria may improve their IFDI policies. by reviewing the Rule 51/49, improving overall business environment indicators.

Le résumé

L'investissement étranger direct (IDE) a été considéré théoriquement comme un pouvoir affectant la croissance économique directement et indirectement. Cependant, pratiquement tous les pays, en particulier en développement, ne bénéficient pas de l'afflux d'IDE, en raison de leurs effets inverses. Par conséquent, dans cet article, nous utilisons une analyse économétrique pour étudier l'impact des IDE et des externalités connexes sur la croissance économique en Algérie pour la période 1994 à 2017, en utilisant la cointégration et les tests d'Engel-Granger. Les principales constatations indiquent que l'afflux d'IDE a un effet positif à la fois sur le PIB et les exportations, tout en étant statistiquement non significatif avec les importations à la première différence, et l'IED a un effet négatif sur le taux de chômage. Par conséquent, l'IED s'est avéré avoir un effet global positif sur la croissance économique. Enfin nous recommandons de réviser la règle 51/49, et surtout d'améliorer les indicateurs généraux de l'environnement des affaires.

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1- The introduction:

In the 50s and 60s, Foreign Direct Investment (FDI) was regarded with great suspicion by most developing countries. It was considered a threat to national sovereignty and multinational companies were suspected of reducing social welfare by manipulating transfer prices and the formation of enclaves. Faced with the current globalization of markets, globalization and internalization of production and monetary policies, there has been a radical change in the attitude of developing countries that are forced today to seek source of non-traditional and non-generating investment in debt.

In this regard, the role of FDI in economic development has been the subject of long debate. Many policy makers and academics have argued that FDI can have a positive impact on the development efforts of the host country and as such, developing countries should encourage FDI as a means of promoting economic growth. It is therefore not surprising that the attitude towards the inward FDI is considerably changed over the past decades.

Algeria as most of the developing countries has liberalized its policies and most importantly removed of barriers to attract all kinds of foreign direct investment, in order to bridge the gap of domestic savings and foreign exchange gap since the reform and opening-up last century. Additionally, and quantitatively Algeria in recent years has been seen a sizeable increase in FDI inflows, primarily in the sectors of enhanced oil recovery and production.

Albeit, and qualitatively the impact of inflows FDI to the economic performance still unclear in case of Algeria. It is therefore imperative to further conduct research to understand the issues by addressing this main question:

> *Whether and how FDI inflows can promote economic growth in Algeria?*

The overall purpose of this study is to investigate the exogenous impact of FDI on economic growth, as well as to study its impact on relevant macroeconomic indicators, not previously investigated. We embark from previous literature by using more quality data on FDI.

The paper is organized as follows. Section 2 provides a theoretical basis of investigation and briefly discusses the empirical literature. Section 4 presents the model and the methodology used in the empirical analysis of co-integration method in the period of (1994 to 2017). Section 4 discusses the results and policy implications, while section 5 concludes

2- Review of literature and theoretical framework

Foreign Direct Investment (FDI) defines as a package of capital, technology, management, and entrepreneurship, which allows a firm to operate and provide goods and services in a foreign market. Further, it is

regarded as the ownership or control of 10 percent or more of an enterprise's voting securities, or the equivalent interest in an unincorporated business (Mohammad & Mahmoud, 2013).

On the other hand, in economics, "economic growth" or "economic growth theory" typically refers to growth of potential output, i.e., production at "full employment", which is caused by growth in aggregate demand or observed output. It is conventionally measured as the percent rate of increase in real gross domestic product (GDP). GDP growth is an indication that businesses are hiring and investing Thus, growth is usually calculated in real terms, i.e. inflation-adjusted terms, in order to obviate the distorting effect of inflation on the price of the goods produced (Mohammad & Mahmoud, 2013).

In the theoretical literature, FDI is assumed to directly affect economic growth by contributing to gross fixed capital formation and indirectly by contributing to knowledge stock. More precisely, in the traditional framework FDI is expected to directly affect economic growth since FDI is assumed to complement domestic investments, and considered to be important supplement for capital and investment shortages. Moreover, FDI may also be assumed to indirectly contribute to economic growth by increasing the stock of knowledge and by fostering technological growth of a technologically inferior recipient economy, hence stimulating domestic investments (Sabina & Eldin , 2015).

In The empirical literature, the relationship between FDI and economic growth has grown enormously over the last few years. Due to the nature of this research we divide the literature into two broad categories;

2-1 Studies examining the direct effects of FDI

The authors in this group of studies generally argue that FDI should be considered as a major channel through which developing countries can get access to advanced technologies and enhance their economic growth (Zeb & Thanasis, 2014).

The first study in this group was done by Sahraoui et al (2015) where they analysed the relationship between foreign direct investment and economic growth in 65 developing countries, including Algeria. By used co-integration and panel Granger causality tests in panel data. They found a unidirectional causality from FDI to GDP, which could be a good tool to

prioritize the allocation of resources across sectors to promote foreign direct investment.

Another study that took Algerian case into group of countries Sidamor (2016), she used cross data regression and found that the FDI inflows has a positive effect impact on economic growth of North African countries.

Similarly, Zenasni & Benhabib (2014) suggested that FDI plays a positive role in boosting the economic growth of North African countries by using VAR model approach during the period 1980-2010.

In the contrast, Arshad (2018) found a positive and significant effect of FDI inflows on economic growth of the host country. However, the impact of FDI inflows on economic growth changes with the changes in the size of the natural resource sector. He applied Arellano and Bond's GMM estimation method for a large data set of 104 countries for the period 1996-2015.

2-2 Studies examining the spill-over effects of FDI

The earliest discussions of spill-overs in the literature on FDI date back to the 1960s. The first author to systematically include spill-overs (or external effects) among the possible consequences of FDI is MacDougall (1960), who analysed the general welfare effects of foreign investment. Another early contributor was Corden (1967), who looked at the effects of FDI on optimum tariff policy. Therefore, most of the studies in this group conducted sectorial, enterprise, or firm level analysis to examine the spill-over effects of FDI (Zeb & Thanasis, 2014).

Khouri (2008) estimated the impact of FDI on economic growth of 81 developing host countries including Algeria, over the period of 1995-2005. He used panel data with appropriate adjustment for clustering, and was concluded that FDI has a strong and positive impact on economic growth of developing economies, besides, there was no evidence for complementarity between FDI and host country's human capital.

Opposite to this view and by used the autoregressive distributed lag (ARDL) technique Oyakhilome & Kolawole (2019) have provided that flows of both FDI or portfolio investment crowd out domestic investment in all the OPEC countries considered, except for Angola and Kuwait over the period 1970 to 2015.

More recent study, Walid & Ali (2019) examined the effects of FDI on the domestic investment (DI) and economic growth of three developing

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countries (Tunisia, Algeria and Morocco) by using the GMM estimator technique. Their results were different and nuanced, since these effects were positive and significant only in the case of Morocco.

As previous literatures indicate that very little attention to FDI spill-over to the main macroeconomic indicators such as employment or balance trade or even inflation rate as well. Furthermore, no existing literature has specifically examined these indicators of case of Algeria. Hence our study differs from past research by fills these gaps, empirically examine the FDI impacts on main macroeconomic indicators. Contextually, paid attention to Algeria as case of study lonely. Finely, based on time-wise gap, our period of study begins from 1994, due to negative view of the Algerian policy forward 'foreign investments' for years prior to 1994.

3- Research Methods, tools and measures:

This section contains the description of the measures used for FDI, economic growth. Also, the sources of data as well as details of the econometric approach used in the empirical analysis are outlined.

3-1 Data and variable measurement

All data were collected from the World Bank's World Development Annual Indicators, 2019 and the Appendix Table A summarises the definition and sources of the data used. The time period used is 1994-2017. Due to negative view of the Algerian policy forward 'foreign investments' for years prior to 1994.

The principal variables of interest in this analysis are; (FDI) denotes the inflow of FDI and the independent variables (GDP) denotes the real GDP, (EVI) denotes export, (IVI) denotes imports and (CHO) denotes rate of unemployment in Algeria.

It should be noted that the FDI and GDP data that were used in this analysis are presented in millions of US Dollar, Imports and exports are expressed in terms of percentage of GDP, as well as unemployment is percentage of total labour force.

3-2 Model specification

Based on previous studies, the choice of the appropriate technique is an important theoretical and empirical question. Co-integration is the most appropriate technique to study the long-term relationship between our FDI and independent variables.

The empirical strategy used in this paper can be divided into four main stages. First, unit root tests in panel series are undertaken. Second, if they are integrated of the same order, the Co-integration tests are used. Third, if the series are co-integrated, the vector of Co-integration in the long-term is estimated using the method of (E-G). Finally, the Granger causality test in panel will be undertaken.

4- Discussion of results

This section is preoccupied with the presentation and attendant discussion of the results of the unit root and co-integration tests conducted. It further explicates the intuition underlying the findings emerging from the estimated error correction models.

4-1 Stationarity Tests

To prove the existence of unit root test there are different tests, the most commonly used in the literature is the Augmented Dickey-Fuller test (ADF). This test tests the hypothesis (null) that we have a unit root, so the time series under study is not stationary. In the event that the series is not stationary se will have to transform it, taking second differences, and analysing it again. In the event that this series is stationary, and then we say that the original series is integrated of order 2, denoting it I (2). The results of the ADF test are represented in Table1. It contains of data showing the value of tested non-stationary time series at their values.

Table 1. The Augmented Dickey Fuller- Unit root Test Results

Variables	Constant without trend		Decision
	Calculated statistic $\lvert\tau_c\rvert$	Critical statistic $\lvert\tau_t\rvert$	
EVI	0.063	1.957**	accept H_0
FDI	3.466	3.690**	accept H_0
GDP	0.793	1.956**	accept H_0
IVI	2.119	3.632**	accept H_0
		**: significance at 10%	

The Source: Author's estimation in E-views 9

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It is shown from table 1 that the results confirmed that all variables have unit root at their levels as the null hypothesis of unit root cannot be rejected due to high p values. Therefore, ADF test at the 5% significance level is applied to intercept and trend simultaneously and also to intercept alone.

Table 2. The Augmented Dickey Fuller- Unit root Test Results at the first differences

Variables	Constant with trend		Decision
	Calculated statistic $\left|\tau_c\right|$	Critical statistic $\left|\tau_t\right|$	
D(EVI)	4.959	3.644*	accept H_1
D(FDI)	7.202	3.632*	accept H_1
D(GDP)	4.229	3.632*	accept H_1
D(IVI)	3.010	3.644*	accept H_0
D(CHO)	4.687	3.632*	accept H_1
*: significance at 5%			

The Source: Author's estimation in E-views 9

The results as shown in Table.2 confirmed stationary for all variables, at the first differences as p values are significant, expect the variable of Import D (IVI). Hence, both the series are integrated of order one, i.e, I (1).None of them is integrated of order higher than 1, which is required for the co-integration test.

4-2 Engle-Granger Cointegration Test

Co-integration is used to describe the long-term stable relationship of the level value of some economic variables. To conduct co-integration, all variables must be stationary with the same degree. Consequently, co-integration is typically in the offing when each variable is integrated of the same order. This necessary, but rarely sufficient, condition implies that the series share a common trend. Hence, as a preliminary step, we ascertain whether mean reversion is characteristic of each variable using ADF test. This is conducted, with intercept only and intercept and trend respectively, on the levels and first difference of the series. We find that all the variables are stationary on differencing once.

In this regard, this paper selected method of Engle-Granger cointegration test because of the number of variables. Cointegration analysis is completed in two steps. Firstly, regression model is established. Then, stability of the error terms is examined. If it is determined that the error term is stationary, we can say two variables are cointegrated (Sultan & Emrah, 2014). Through the analysis of stationarity, we have found that the series are not stationary, which

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comes as a problem when estimating the model or applying the Engle and Granger (1987) recommend a two-step procedure for cointegration analysis. Estimate the long-run (equilibrium) equation. This two-step procedures are quite straightforward. First, prior levels regression is performed which allows the hypothesis of cointegration to be tested. Then the residuals from this regression are entered into the error correction model in place of the level's terms.

This intuitively has the effect of imposing a set of parameter values on the levels terms which give minimum least squares errors in this part of the equation. Imposing this restriction is the intuitive explanation of the increased convergence speed of the two stage estimates (Hall, 1986).

To analyse the possibility that series are co-integrated, i.e. that there is a long-term relationship between the variables, by estimating the regression among the variables (Joint integration regression equation) $Y_t = \alpha_0 + \alpha_1 X_1 + \varepsilon_t$ (OLS) in the first step, then estimating the residual $\varepsilon_t = Y_t - (\alpha_0 + \alpha_1 X_1)$ in second step, as follow;

The results of estimation for relationship between FDI and other relevant variables are as follow;

The regression equation1: the estimation of FDI and GDP;
$$FDI = 0.009GDP + 90.098$$

The regression equation2: the estimation of FDI and export;
$$FDI = 10.54EVI - 366.10$$

The regression equation3: the estimation of FDI and Unemployment rate;
$$FDI = -76.986CHO + 2546.325$$

The next step is to formally test for Engle-Granger co-integration among the relevant variables using ADF test. As Table 3

Table N 3. Engle-Granger cointegration test using ADF test

Residual	Constant with trend		Decision
	Calculated statistic $\lvert \tau_c \rvert$	Critical statistic $\lvert \tau_t \rvert$	
$t1\varepsilon$	3.174	1.959	H_1
$t2\varepsilon$	3.408	1.957	H_1
$t3\varepsilon$	3.174	1.959	H_1
The null hypothesis of "no cointegration" is rejected if the test statistic exceeds the 5% critical value.			

The Source: Author's estimation in E-views 9

In the above table we found the results the results of the Engle-Granger cointegration test using ADF unit root test for the stationarity of residuals from each regression equation. For cointegrating regression with FDI as dependent variable, it is observed that the test statistic for the ADF version of

the Augmented Engle-Granger (AEG) test at different optimal lag lengths suggested by conventional lag selection criteria and GDP, export and unemployment rate criterion exceed the critical value at 5% level of significance. Consequently, we reject the null hypotheses of "no cointegration" at these various optimal lags.

This finding indicates that the inflow of FDI has a positive effect on economic growth, export in the country in the long term. Conversely, and more important the results imply that an increase in the inflow of FDI to Algeria will significantly decrease the rate of unemployment. Therefore, the paper considers that FDI are very important for Algerian economy.

5- Conclusion

There has been a long debate among policy makers and economists at the national and international levels about whether FDI enhances growth in the host countries. As a result, this study, we examined the relationships between the inflow of foreign direct investment (FDI) and main macroeconomic indicators, mainly; economic growth represented by GDP, export, import and unemployment rate as well in Algeria during the 1994–2017 periods. The Engle-Granger Cointegration Test was applied to assess co-integration, and an increase in the inflow of FDI was found to have a positive effect on economic growth in Algeria. Since the results show that FDI has positive both on GDP and Export, while it has negative effect on the unemployment rate. However, there is a statistically insignificant relationship between FDI and Import.

In summary, we can say that this research provides evidence supporting the view that FDI attractiveness policies play an important role during the development process. Initially, by increasing GDP values and exports level and subsequently by reducing unemployment rate. Finally, these results are of great importance for policy makers and academics. Therefore, these results may help a government to establish priorities regarding to continue its efforts to create promising economic and investment environment that leads to increase the attractiveness of FDI. By doing so, it should review the Rule 51/49, and above all, improving overall business environment indicators.

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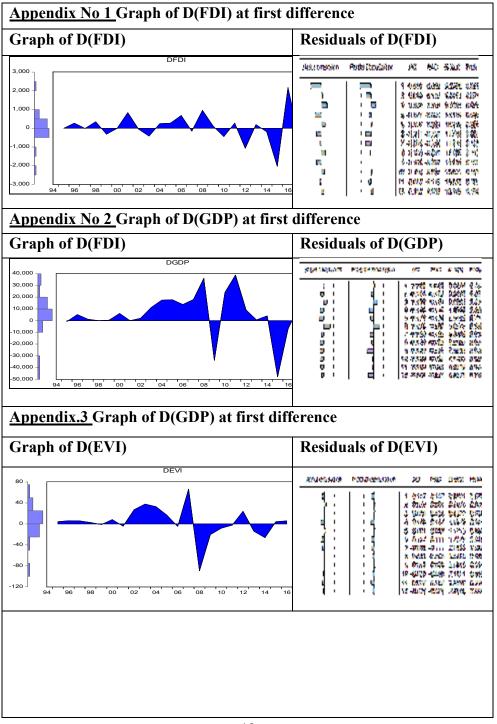
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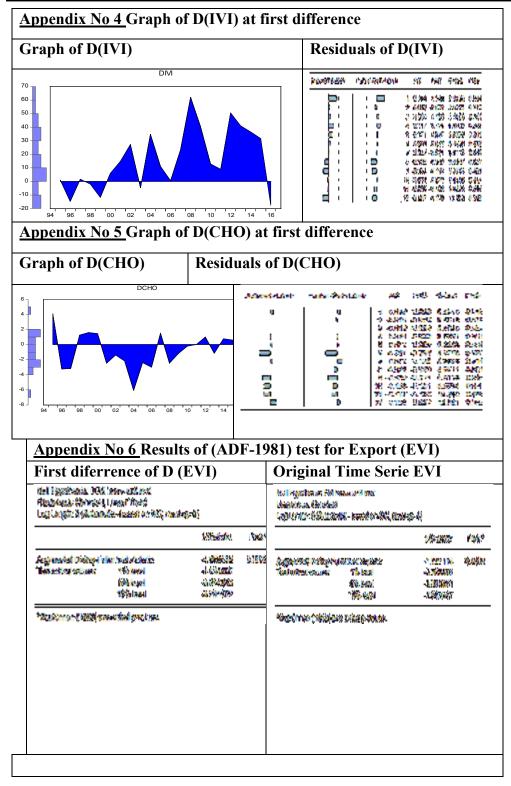
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7. Appendices:

Appendix No 1 Graph of D(FDI) at first difference	
Graph of D(FDI)	**Residuals of D(FDI)**

Appendix No 2 Graph of D(GDP) at first difference	
Graph of D(FDI)	**Residuals of D(GDP)**

Appendix.3 Graph of D(GDP) at first difference	
Graph of D(EVI)	**Residuals of D(EVI)**

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Appendix No 4 Graph of D(IVI) at first difference

Graph of D(IVI)	**Residuals of D(IVI)**

Appendix No 5 Graph of D(CHO) at first difference

Graph of D(CHO)	**Residuals of D(CHO)**

Appendix No 6 Results of (ADF-1981) test for Export (EVI)

First diferrence of D (EVI)	**Original Time Serie EVI**

Appendix No 7 Results of (ADF-1981) test for FDI (FDI)	
First difference of D (FDI)	**Original Time Serie FDI**

First difference of D (FDI):

Null Hypothesis: DFDI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-7.202771	0.0000
Test critical values: 1% level	-4.440739	
5% level	-3.632896	
10% level	-3.254671	

*MacKinnon (1996) one-sided p-values.

Original Time Serie FDI:

Null Hypothesis: FDI has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 5 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Pro
Augmented Dickey-Fuller test statistic	-3.466312	0.07
Test critical values: 1% level	-4.571559	
5% level	-3.690814	
10% level	-3.286909	

*MacKinnon (1996) one-sided p-values

Appendix.8 Results of (ADF-1981) test for GDP (GDP)	
First diferrence of D (GDP)	**Original Time Serie GDP**

First diferrence of D (GDP):

Null Hypothesis: DGDP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=4)

	t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.229405	0.0154
Test critical values: 1% level	-4.440739	
5% level	-3.632896	
10% level	-3.254671	

*MacKinnon (1996) one-sided p-values.

Original Time Serie GDP:

Null Hypothesis: GDP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=5)

	t-Statistic	Prob
Augmented Dickey-Fuller test statistic	-0.884483	0.774
Test critical values: 1% level	-3.752946	
5% level	-2.998064	
10% level	-2.638752	

*MacKinnon (1996) one-sided p-values.

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