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The impact of foreign direct investment on the unemployment rate in Algeria over period (1980 – 2020), Using cointegration and granger causality

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Abstract :

This study aims to test and analyses the impact of Foreign direct investment on the ***unemployment rate*** in Algeria over the period (1980 – 2020), using the Engel-Granger two step method to testing the long run relationships between variables, the main results show that there is no cointegration relationships between FDI and UNEMPLOYMENT, any causal relationships between variables is found according to the Granger causality test.

Keyword : Foreign direct Investment, the unemployment, cointegration, causality, Algeria.
Jel Classification Codes: F21; J 64; C22

Introduction:

Foreign investment is one of the most important forms of international financing today, making its attraction a major priority for the Algerian economy. This is due to the vital role it plays in boosting the productive capacity of national economies and creating jobs. The importance of foreign direct investment (FDI) has increased, particularly for developing countries, including Algeria, which is striving to create a suitable environment for attracting and receiving foreign investment. Understanding the impact of FDI on employment remains a subject of debate, and exploring the relationship between the two is crucial for improving macroeconomic indicators and reducing unemployment rates, which are among the most serious challenges facing the Algerian economy.

In light of the above, the following problem can be posed:

To what extent does foreign direct investment contribute to reducing unemployment rates in Algeria?

Study hypotheses

The study was adopted with the aim of answering the problem posed, based on a set of hypotheses which are:

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- There is a long-term equilibrium relationship between foreign direct investment flows and the unemployment rate in Algeria.
- There is a significant causal relationship between foreign direct investment flows and the unemployment rate in Algeria.

Importance of the study

The importance of the research lies in measuring the impact of foreign investment on unemployment rates in Algeria, which is one of the problems that the Algerian economy suffers from, due to the numerous negative effects it has on the economy, which results in an unstable environment that contributes to the loss of the opportunity to attract foreign investments necessary to provide job opportunities. In addition, the research studies the relationship between foreign direct investments and unemployment, based on analytical reading and econometric study using the cointegration method and Granger causality test.

Study objectives

- Exposure to the theoretical framework of both foreign direct investment and unemployment.
- Identifying the reality and causes of the unemployment problem in Algeria, the solutions that can reduce it, and its impact on foreign direct investments.
- Understanding the nature of the relationship between foreign direct investment flows and unemployment rates.
- Using cointegration to test the relationship between foreign direct investment and long-term unemployment rates, in addition to the causal relationship using Granger's test.

I / Theoretical background of the relationship between foreign direct investment and unemployment

This is limited to clarifying the theoretical basis of both foreign direct investment and unemployment by highlighting the role that the flow of foreign direct investment plays in changing unemployment rates.

1.General concepts about foreign direct investment

a. Definition of foreign direct investment

There are several definitions of foreign direct investment, which can be summarized as follows:

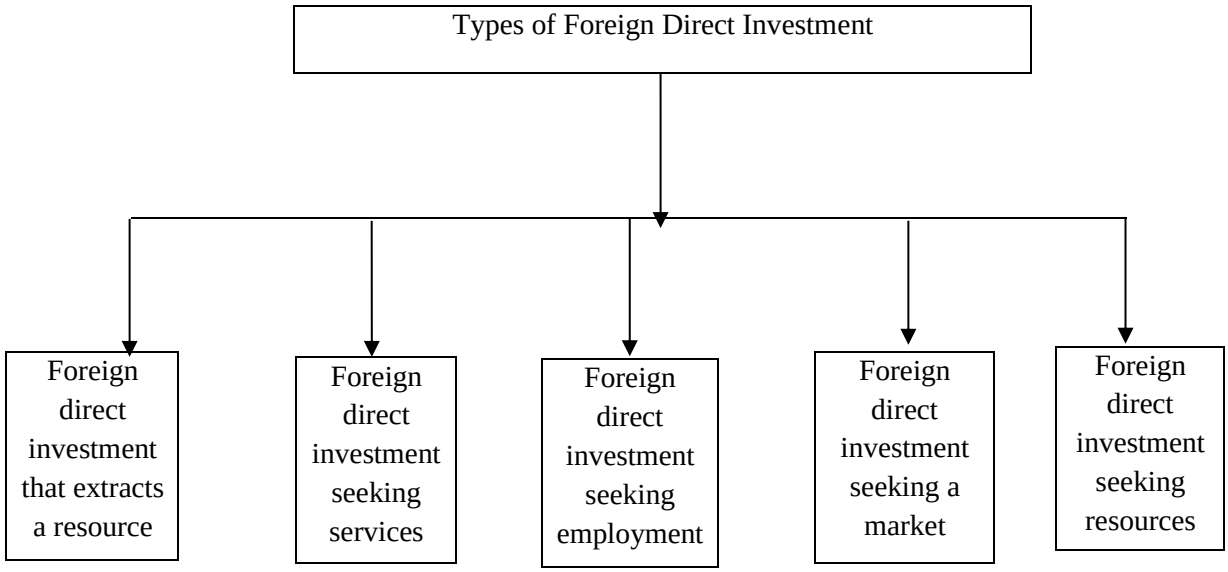
- ✓ First definition (International Monetary Fund): The International Monetary Fund considers foreign direct investment to be that which is directed to acquire or increase a permanent benefit in an enterprise which carries out its activity in the economic territory of another country (the host country) other than the investing country, and in which the direct investor enjoys a high degree of influence, control and effectiveness.
- ✓ The Organization for Economic Cooperation and Development (OECD) considers foreign direct investment to mean that the investor owns a share of no less than 10% of the total capital or voting power.
- ✓ It is also known as partial or absolute ownership by the foreign party of an investment project, whether it is a marketing, sales, production, or any other type of productive and service activity.

b. Distinguishing between direct and indirect foreign investment

The criterion for distinguishing between direct and indirect investment lies in the issue of effective control (effective oversight) of the company. Therefore, if the investor controls the company, they are considered a direct investor; otherwise, they are considered an indirect investor. Control (oversight) is determined by the amount of capital invested. This amount varies according to the laws of different countries. It may represent a majority share of the capital, or it may represent the largest share of the capital. This share gives its owner the ability to supervise (i.e., control) the company. However, some transactions may be considered direct investment even though they do not involve actual material contribution to the investment, such as granting a long-term loan or guarantee to the company if the importance of that loan or guarantee is significant, such that the lender is considered responsible for financing the (legal entity) of the investment in question. Indirect investment includes loans or subscriptions through fixed-interest bonds or shares without control over the investment projects. This is what is called portfolio investment.

c. Types of Foreign Direct Investment

Foreign direct investment (FDI) can take many forms, depending on the objectives and activities of the host country's government, which seeks to attract or utilize FDI within its borders. These types can be illustrated as follows:



d. The importance of foreign direct investment

The importance of foreign direct investment lies in its role in the growth and development of the host country, as well as the fact that it brings with it the characteristics of the economy from which it originates. The importance of foreign investment can be summarized in the following points: - Foreign investment is a source for compensating for the deficit in domestic savings and achieving an increase in GDP growth rates. One of the main objectives of attracting foreign

capital is to establish productive projects in all industrial, agricultural, and service sectors.

- Investment is the primary driver of exports, as evidenced by the experiences of countries like China, which attracts the equivalent of $40 million annually. This fosters a strong export sector, which in turn attracts further investment and increases foreign currency earnings.
- Foreign investment brings modern technology and new management and marketing expertise. Modern technology helps in product development and reduces production costs.
- Foreign direct investment increases job opportunities.

2. General concepts about unemployment

a. Definition of unemployment

Unemployment is defined as: "The lack of work for a person who wants it, is looking for it, and is able to perform a profession that matches his readiness, and this is due to the state of the country."

It is also defined as the individual's failure to engage in any activity, whether mental, physical, or otherwise, regardless of whether this inactivity stems from personal, voluntary, or involuntary reasons.

The International Labour Organization defines an unemployed person as anyone who is capable of working, willing to work, actively seeking work, and willing to accept it at the prevailing wage level, but without success.

b. Measuring unemployment

Unemployment is one of the most serious and significant problems threatening the stability of nations and states. To understand the magnitude of this problem, its rate must be calculated, as it is an important indicator, defined as the number of unemployed individuals per 100 members of the labor force, or more precisely, the ratio of the unemployed to the total labor force.

$$T.Ch = \frac{STR}{PA} * 100 = \frac{STR1 + STR2}{PA} * 100$$

STR : Unemployment rate

PA : workforce

c. Causes of unemployment

The spread of unemployment is a serious problem that threatens the stability of any country, due to a range of factors that vary from one society to another, and from one region to another, which can be summarized in the following points.

- Increased fertility and population growth.
- Low level of women's participation in economic activities.
- The population distribution is uneven, with most of the population geographically belonging to the north.
- Work was concentrated in one sector at the expense of another.
- A decrease in the economic growth rate.
- Replacing local workers with foreign workers.
- Work was concentrated in one sector at the expense of another.
- The instability of global currency markets and the volatility of exchange rates affect the balance of payments in these countries.

- The central bank's resort to a tight monetary policy by liberalizing interest rates has affected investment levels, especially for establishments that rely primarily on borrowing, thus hindering the creation of more job opportunities.

II / Previous studies

A study by Boukhors Abdelhamid, Belabidi Aida Abir (2011). In this study, the researchers measured the extent of the impact of foreign direct investment on employment in Algeria. This was based on an analysis of the reality of the labor market and knowing the percentage of the foreign investor's contribution to creating job opportunities during the period (2002-2010). The study concluded that there was a great reliance and interest on projects related to the oil sectors and a neglect of other sectors, and consequently a weak percentage of the contribution of foreign investment to employment.

The study by Ben Aichi Ammar, Ben Ibrahim Al-Ghali (2011) aimed to identify the features of foreign direct investment and the reality of the unemployment problem in Algeria, in addition to highlighting the extent of the contribution of foreign investment to reducing unemployment rates by studying the relationship between them based on statistical analysis and the use of Pearson's correlation coefficient for the period (1990-2010). The study revealed a strong inverse relationship between foreign direct investment as a percentage of GDP and unemployment, which may exceed 70%.

The study by Hamidah Muhd Irpan et al (2016): In this study, researchers examined the effects of foreign direct investment on unemployment in Malaysia using ARDL technology and annual data. The study concluded that changes in unemployment rates in Malaysia are greatly affected by foreign direct investment and GDP.

The study by Omer Ahmed Sayed Mohamed (2018) focused on the mutual influence between foreign direct investment and the unemployment rate and the relationship between them. The results of the study indicate that there is no relationship between these two variables, as changes in unemployment rates do not contribute to attracting foreign direct investment, and the flows of the latter do not play a role in improving unemployment rates.

III .Econometric study

Based on the research problem, the following standard model can be formulated:

$$TCH = f\ (IDE)$$

$$TCH\ t\ = \beta_0\ \ +\ \ \beta_1 * IDE\ t\ \ +\ \ \varepsilon\ T\ .....Eq(1)$$

IDE (Foreign Direct Investment) flows as a percentage of GDP

TCH (Unemployment Rate)

Figure1 : IDE 1980 - 2020

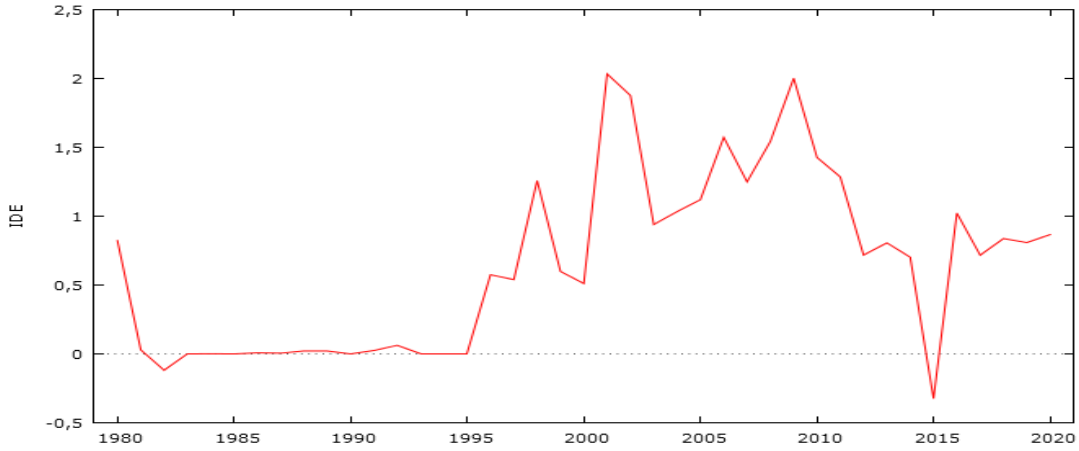


Figure 2 : TCH – (1980 -2019)

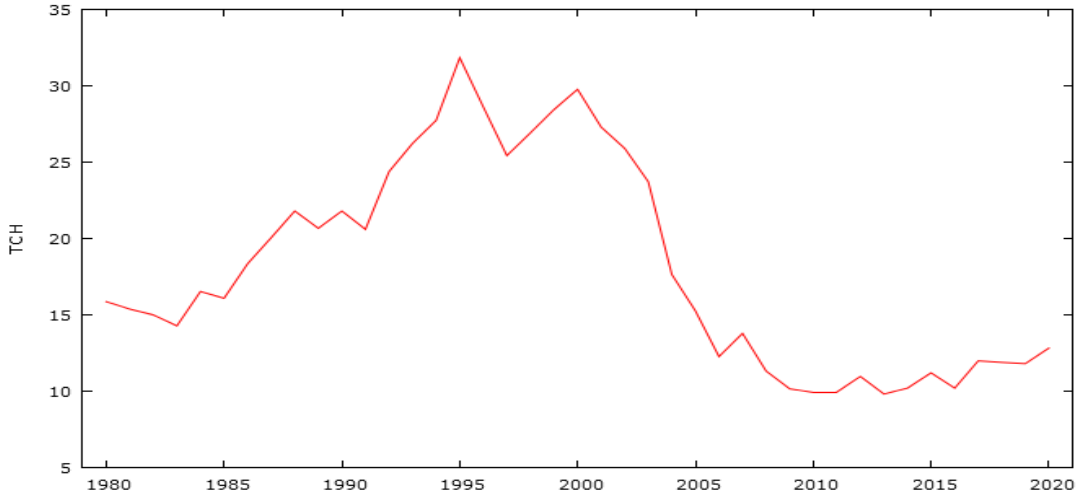


Table1 : Correlation matrix

Correlation		
	IDE	**TCH**
IDE	**1.000000**	

TCH	**-0.222639**	**1.000000**
	(0.1618)	**-----**

Source : Authors based on Eviews 12

table2 : Variables statistics

	IDE	*TCH*
Mean	0.648987	18.14722
Median	0.702589	16.09000
Maximum	2.033266	31.84000
Minimum	-0.324012	9.820000
Std. Dev.	0.645479	6.844228
Skewness	0.464290	0.402513
Kurtosis	2.230516	1.776110
Jarque-Bera	2.484544	3.666035
Probability	**0.288727**	**0.159930**
Sum	26.60847	744.0360
Sum Sq. Dev.	16.66574	1873.738
Observations	41	41

Source : Authors based on Eviews 12

Relying on time series data for the study variables leads us to determine the degree of integrity of these series using the unit root test. We will use the enhanced Dickey-Fuller test (ADF) and the Philippe Perron test (PP) to confirm the results of the first test.

The enhanced Dickey-Fuller test is based on the following regression formulas:

$$\Delta xt = \rho x_{t-1} + \sum_{j=2}^{p} \phi j \Delta x_{t-j+2} + bt + c + \varepsilon t$$

Where P: Number of delays in the model
Δ: First differential of the variable
εt: Random estimation error
After estimating the three models, the statistic t_ij is obtained, which follows the Student distribution. The unit root test tests the following two hypotheses:
Null hypothesis = 1_i: H_0
Alternative hypothesis < 1 |Δ|: H_1
If the null hypothesis is accepted, this implies the existence of unit roots and therefore the non-stationarity of the time series.
Using the ordinary least squares method to estimate the statistic Δ, we obtain the statistic t_ij, which follows the Student distribution.

To perform the enhanced Dickey-Fuller test, the following regression formulas are used:

$$\Delta IDE\ t = \rho IDE_{t-1} - \sum_{j=2}^{p} \phi_j \Delta IDE_{t-j+1} + \varepsilon\ t$$

$$\Delta IDE\ t = \rho Fdi_{t-1} - \sum_{j=2}^{p} \phi_j \Delta IDE_{t-j+2} + c + \varepsilon\ t$$

$$\Delta IDE\ t = \rho IDE_{t-1} - \sum_{j=2}^{p} \phi_j \Delta IDE_{t-j+2} + bt + c + \varepsilon\ t$$

$$\Delta TCH\ t = \rho TCH_{t-1} - \sum_{j=2}^{p} \phi_j \Delta TCH_{t-j+1} + \varepsilon\ t$$

$$\Delta TCH\ t = \rho TCH_{t-1} - \sum_{j=2}^{p} \phi_j \Delta TCH_{t-j+2} + c + \varepsilon\ t$$

$$\Delta TCH\ t = \rho TCH_{t-1} - \sum_{j=2}^{p} \phi_j \Delta TCH_{t-j+2} + bt + c + \varepsilon\ t$$

table 3 : ADF Unit root test

Variable	First diff		Level	
	t Statistic	prob	t Statistic	prob
IDE	-3,217	0,08093	-2,09017	0,5508
TCH	-8,8546	**0,0000**	-6,8967	**0,0000**

Source : Authors based on Eviews 12

From the results of the stationarity test at the level, we observe that the absolute values of the statistic |tΦj| are less than the critical values, leading us to accept the null hypothesis, i.e., the existence of unit roots and consequently, the instability of the time series. However, the results of the stationarity test at the first differences show that the absolute values of the statistic |tΦj| exceed the critical values, leading us to reject the null hypothesis, i.e., the stationarity of the time series at the first differences. This indicates that all variables are integrals of the first degree, i.e., of form I(1).

Since all the time series are integrals of the same degree, we can proceed to the cointegration test using the Engel-Granger method.

This test is based on estimating the long-run regression and obtaining the residuals ε_t, which are the linear combinations generated from the regression of the long-run equilibrium relationship. The test focuses on verifying that these linear combinations are stationary, i.e., integrals of degree zero.

$$\varepsilon\ T = TCH\ t - \beta_0 - \beta 1 * IDE\ \ t$$

$$\Delta\,\hat{\varepsilon}_t = \alpha_0 + \delta\widehat{\varepsilon}_{t-1} + \Delta\,\varepsilon_t + e\,t$$

Table 4 : Engel Granger cointegration test

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Étape 3 : cointegration

Régression de cointégration -
MCO, utilisant les observations 1980-2020 (T = 41)
Variable dépendante: TCH

             coefficient   erreur std.   t de Student   p. critique
  ------------------------------------------------------------------
  const       19,6793        1,50591        13,07        7,90e-016  ***
  IDE         -2,36072       1,65528        -1,426       0,1618

Moy. var. dép.          18,14722   Éc. type var. dép.      6,844228
Somme carrés résidus    1780,861   Éc. type de régression  6,757447
R2                      0,049568   R2 ajusté               0,025198
Log de vraisemblance   -135,4877   Critère d'Akaike        274,9754
Critère de Schwarz      278,4026   Hannan-Quinn            276,2234
rho                     0,956645   Durbin-Watson           0,096585

Étape 4 : test d'une racine unitaire dans uhat

Test de Dickey-Fuller augmenté pour uhat
avec un retard de (1-L)uhat
taille de l'échantillon 39
hypothèse nulle de racine unitaire : a = 1

   modèle: (1-L)y = (a-1)*y(-1) + ... + e
   Coeff. d'autocorrélation du 1er ordre pour e: -0,070
   valeur estimée de (a - 1): -0,0641588
   statistique de test: tau_c(2) = -1,32781
   p. critique asymptotique 0,8228
```

Source : Gretl

The results of the residual rest test reveal that the absolute value of the statistic | 〖 tΦj〗 _| is less than the critical values, leading us to accept the null hypothesis. This means that the residuals of the regression are not stationary at the 5 level, indicating no cointegration relationship between the unemployment rate and foreign direct investment inflows in Algeria at a significance level of 5. Consequently, we cannot estimate the error correction model.

The coefficient of determination (R^2) is estimated at 0.047, which indicates that the model can explain only slightly more than 4% of the variations in the unemployment rate (IDE). This demonstrates the weak relationship between the two variables.

Table 5: ANOVA Test

Analyse de la variance:

	Somme des carrés	df	Moyenne des carrés
Régression	92,8779	1	92,8779
Résidu	1780,86	39	45,6631
Total	1873,74	40	46,8435

R^2 = 92,8779 / 1873,74 = 0,049568
F(1, 39) = 92,8779 / 45,6631 = 2,03398 [p. critique 0,1618]

Source :Gretl

From the ANOVA analysis table, we observe that the F-statistic for testing the overall significance of the model is 2.03 with a probability of 0.161. This leads us to accept the null hypothesis, meaning that the model's regression coefficients are zero at a significance level of 5%.

Granger causality test

Table 6: Granger Causality Tests

Pairwise Granger Causality Tests

Null Hypothesis:	Obs	F-Statistic	Prob.
D(IDE) does not Granger Cause D(TCH)	38	1.16701	0.3238
D(TCH) does not Granger Cause D(IDE)		0.19485	0.8239

Source : Authors based on Eviews 12

Based on the results of the Granger test for short-term causal relationships, it is clear that there is no bidirectional causal relationship between the unemployment rate and foreign direct investment (FDI) inflows in the Algerian economy.

Conclusion

Through our applied study of the impact of FDI inflows on the unemployment rate in the Algerian economy for the period from 1980 to 2020, we arrived at the following results:

There is no long-term equilibrium relationship between FDI and the unemployment rate. Consequently, it can be concluded that this type of investment contributes little to reducing unemployment rates. This is mainly due to the fact that the majority of these investments are located in the hydrocarbons sector and

not in other productive sectors, which prevents an increase in the overall employment rate in the economy.

The absence of a negative relationship between FDI and the unemployment rate in the Algerian economy. These results do not support the hypotheses of economic theory, which states that FDI inflows increase the employment rate in the host economy.

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