Foreign Direct Investment and Domestic Investments in Algeria: Crowding-In Or Crowding-Out Effects?

الاستثمار الأجنبي المباشر والاستثمار المحلي في الجزائر أي آثر: تكامل أو مزاحمة؟

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Abstract:
Studies on the relationship between FDI and domestic investment find contradictory results, thus, the objective of this study is to explore whether Foreign Direct Investment (FDI) crowds-in or crowds-out domestic investment in Algeria by using ARDL cointegration technique from the period of 1990-2020. Empirical evidence shows that an inflow of FDI crowds-in domestic investment "DI" in Algeria. Moreover, the marginal effect of economic growth on the domestic investment is significant. In a more precise way, if growth grows by 1%, domestic investment improves by 1.23%. Furthermore, the coefficient of gross national saving is positive and significant, indicating that a 1% increase in savings leads to a 0.17% increase in domestic investment, meaning that domestic investment is financed by domestic resources. This causality is coherent with the neoclassical hypothesis that saving is the prerequisite to investing.

Keys words: **Foreign direct investment, Domestic investment, crowding-in effects, crowding-out effects, growth**, **Algeria**.

JEL classification codes: C32 ; E02 ; E22 ; F21 ;

ملخص:
الدراسات حول العلاقة بين الاستثمار الأجنبي المباشر والاستثمار المحلي توصلت إلى نتائج متناقضة. وبالتالي ، فإن الهدف من هذه الدراسة هو استكشاف ما إذا كان الاستثمار الأجنبي المباشر (FDI) يكمل أو يزاحم الاستثمار المحلي في الجزائر باستخدام تقنية لانحدار الذاتي للفجوات الزمنية الموزعة (ARDL) من الفترة 1990-2020. تظهر النتائج التجريبية أن تدفق الاستثمار الأجنبي المباشر يكمل الاستثمار المحلي "DI" في الجزائر. علاوة على ذلك ، فإن التأثير الهامشي للنمو الاقتصادي على الاستثمار المحلي كبير. وبمعنى ادق ، إذا زاد النمو بنسبة 1٪ ، فإن الاستثمار المحلي يتحسن بنسبة 1.23٪. ضف الى ذلك ، فإن معامل إجمالي المدخرات الوطنية إيجابي ومعنوي، مما يشير إلى أن زيادة الادخار بنسبة 1٪ تؤدي إلى زيادة بنسبة 0.17٪ في الاستثمار المحلي ، مما يعني أن الاستثمار المحلي يتم تمويله من الموارد المحلية. تتوافق هذه السببية مع الافتراض الكلاسيكي الجديد بأن الادخار هو شرط أساسي للاستثمار.

الكلمات المفتاحية: لاستثمار الأجنبي المباشر ، الاستثمار المحلي ، اثر تكامل ، اثر مزاحمة ، النمو. الجزائر .

تصنيف JEL: C32 ; E02 ; E22 ; F21 ;

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1-Introduction

Investment as a macroeconomic aggregate contributes directly to the creation of wealth, by measure there are two types of investment: domestic investment and foreign direct investment.

Developing countries in general and Algeria in particular, have multiplied measures to attract foreign investors. Indeed, it appeared as a key factor, as well as a solution to fill the gap in the national economy. Consequently, the FDI flows are particularly encouraged. Furthermore, many studies prove that FDI inflows are one of the main ways for technology transfer to developing countries. Therefore Foreign direct investment (FDI) is known to play a role in the economic development of developing and emerging countries and even in the growth of developed countries. The current debate focuses on identifying the channels through which FDI affects domestic investment. Important studies proved the relationship (Borensztein , De Gregorio , & Lee , 1998), suggest that a minimum of human capital is needed to benefit from the induced effects of foreign investment flows. In a more precise manner, human capital is an important determinant of FDI attractiveness. By the way, FDI leads to improving the quality of the workforce and working conditions, which in the long run would promote political and social stability. However, it is not necessary that FDI will always favorably influence the host economy (Brian & Ann , 1999); (Kokko, 1996); (Alfaro , 2003).

Following this perspective of view, Algeria has taken important measures during the last decade to improve the attractiveness of foreign investors who have a direct impact on the creation of jobs, as well as in the improvement of the competitiveness of national enterprises. While the recent increase in foreign direct investment flows (FDI) to Algeria country is a remarkable expansion. This paper addresses the question of whether FDI causes crowding-in or crowding-out of domestic investment in Algeria?

Basically, the attractiveness of FDI appears to be an essential factor for all countries, both developed and developing, particularly at a time when the latter are implementing policies of openness and reform under the multiple effects of international institutions and international competitiveness. The purpose of this study is to investigate whether foreign direct investment has a positive impact on domestic investment in the case of Algeria. The paper uses ARDL approach to find if FDI crowds-in or Crowds out domestic investment in Algeria.

2-Literature Review

(Askandar, Luc , & Isabelle, 2021) This study investigates the relationship between FDI and private investment in Sub-Saharan Africa (SSA), using panel data of 40 countries over 1980-2017. To estimate short term from long-term dynamics, the empirical analysis is based on Pooled Mean Group (PMG), Mean Group (MG) and Dynamic Full Effects (DFE). The estimation findings indicate that FDI has little effect on private investment in the short run but significant crowding-in effects in the long-run, meaning that, a one percentage point

increase of the share of FDI in GDP leads to a 0.29% rise in private investment, in the long run.

In addition, for analyzing the relation between FDI and domestic investment in Pakistan, (Syed , Hafsa , & Simon , 2020) used ARDL model over the period from 1980 to 2012. Empirical findings show that aggregate FDI crowd in domestic investment, however, the effects of aggregate FDI on domestic investment in Pakistan cannot be generalized. As a result, the impact of FDI on domestic investment varies across sectors. To summarize, the empirical findings in the study at the sectorial level suggest that FDI in the manufacturing and services sectors crowd in domestic investment while FDI in the primary sector asserts an insignificant impact on domestic investment in Pakistan.

A recent study by (Usman , Jian, Veronica , & Meng, 2019) explores the effects of inward and outward foreign direct investment (FDI) on domestic investment in China over the period from 1982 to 2016, using ARDL bounds testing procedure and fully modified OLS method. Overall results reveal that inward FDI substitutes domestic investment while outward FDI complements it. Moreover, the complementary effects of outward FDI on domestic investment are greater than those of inward FDI, implying that the former has the potential to offset the substitution effects of the latter on domestic investment.

(İsmet , Mehmet , & Osman , 2014) In this study, the effects of FDI on developing countries were examined through dynamic panel data analysis for 30 developing countries using 1992-2010 period data. According to the empirical evidence; FDI has crowding in effects in Asian, Latin American countries, although they have crowding out effects in the African country.

As well, (Leonce & Sher , 2008) postulates that a key channel of the impact of FDI on development is through its effects on domestic investment. The main findings suggest that, FDI crowds in domestic investment in Sub-Saharan Africa.

In addition, (Nigel & Dylan , 2003) prove that foreign direct investment inflows have a positive impact on domestic investment in the South East of England.

Furthermore, (Manuel & Ricardo , 2000) Used panel data for three developing regions (Africa, Asia and Latin America) over the period 1970 to 1996 and the two sub-periods 1976-1985 and 1986-1996. The estimation results indicate that in Asia, but less so in Africa, there has been strong crowding in of domestic investment by FDI, by contrast, strong crowding out has been the norm in Latin America.

In the same way, empirical studies on the induced positive effects of FDI produce mixed results (Magnus & Ari, 2002). Many empirical studies, (Magnus , Ari, & Steven , The determinants of host country spillovers from foreign direct investment: a review and synthesis of the literature, 2002) ; (Holger & David , 2003) suggest that induced effects vary according to the sector of activity and

the company. Even more so, in some cases, these effects do not occur or are negative. In other words, positive effects depend on the absorptive capacity of the host country, its capacity to take advantage of foreign firms to improve its growth. In effect, the internal conditions of the host countries may appear to be pre-determining both in terms of the ability to attract FDI with a chance of transforming the specialization of the host countries and in the implementation of positive effect local firms (mouhoud , 1998).

In effect, the empirical evidence varies from country to country because of different policies of host countries, responses and strength of domestic firms (Manuel & Roberto , Foreign Investment in Developing Countries: Does it Crowd in Domestic Investment?, 2005) and the data, variables and econometric techniques used in the empirical analysis.

3-Method and results

The data used for this study were retrieved from the World Bank's, United Nations Conference on Trade and Development (UNACTED) online database for the period 1990–2020. The main variables for which data was retrieved include domestic investment, growth rate, gross national saving, and foreign direct investment.

Several different methods are implemented in the literature on FDI crowding out or crowding in investment.

The current study extends the theoretical model developed by (Feldstein, 1995) to empirically estimate the impact of FDI on domestic investment in Algeria.

In order to investigate whether foreign direct investment inflows (FDI) crowding- in or crowding-out domestic investment (DI), the following equation is estimated:

$$DI_t = \beta_1 + \beta_2 FDI_t + \beta_3 GR_t + \beta_4 GNS_t + \mu_t \ldots\ldots\ldots\ldots\ldots Eq\ (1)$$

Where, DI and FDI represent domestic investments and foreign direct investments, respectively.

GR: Real growth rate

GNS : is gross national saving and εit the random error term.

Table 1. summarizes all the variables with their sources, while table 2 presents their descriptive statistics.

Table 1. Summary of variables

Variables	Sources	Expected sign
FDI inflows (FDI)	UNCTAD	+/-
Growth rate	WDI World Bank	+
Gross National Saving	WDI World Bank	+/-
Domestic Investment "DI"	Algeria Bank	+

Source: databases mentioned above and compilation by the authors.

This study investigates the long-term relationship between Domestic investment and foreign direct investment inflows in Algeria with an annual dataset spanning from 1990 to 2020.

Autoregressive distributed lag (ARDL) cointegration technique is implemented to estimate the long-run both the short run relationship between domestic investment (DI) and foreign direct investment (FDI), the following ARDL model is estimated:

$$\Delta lnDI_t = \alpha_0 + \sum_{i=1}^{p} \alpha_{1i} \Delta lnDI_{t-i} + \sum_{i=0}^{q} \alpha_{2i} \Delta lnFDI_{t-i} + \sum_{i=0}^{q} \alpha_{3i} \Delta lnGNS_{t-i} + \sum_{i=0}^{q} \alpha_{3i} \Delta lnGR_{t-i} + b_1 lnFDI_{t-1} + b_2 lnGNS_{t-1} + b_3 lnGR_{t-1} + e_t \dots\dots\dots (1)$$

Were:

DI: domestic investment

FDI: foreign direct investment

GNS: Gross National Saving

GR: Real Growth Rate

4. Empirical result:

The results of descriptive statistics that show the characteristics of the study variables in the model are presented in Table 2.

Table 2. presents the mean, median, maximum and minimum values and standard deviation for the variables used in this study.

Table 2. Descriptive Statistics findings

	DI	FDI	GNS	GR
Mean	30.46612	0.653725	38.25032	2.531942
Median	29.23244	0.704707	39.21002	3.000000
Maximum	43.07444	2.021743	57.06183	7.200000
Minimum	20.67725	-0.352176	20.19844	-5.480992
Std. Dev.	6.104386	0.643388	9.907396	2.539077

Source: Author's computation from E-View 10.

The result in Table 2. indicates that domestic investment in Algeria averaged 30.46% with a standard deviation of 6.20 while foreign direct investment, real economic growth and gross national saving averaged 0.65%, 2.53% and 38.25% respectively, with standard deviations of 0.64, 0.2.53 and 9.90 respectively. The high level of standard deviations implies that there is a high variation in the data. Algeria recorded maximum domestic investment and

foreign direct investment in 2009 and 2010 respectively. This was due to the boom in the energy export sector and the drive by the government to attract significant foreign investment through the applying of the rule 49/51.

5. Correlation Results

The result of the correlation analysis is presented in Table 3.

Table 3. correlation matrix

	DI	FDI	GNS	GR
DI	1	0.068	0.0256	0.261
FDI	0.068	1	0.617	0.308
GNS	0.0256	0.617	1	0.348
GR	0.261	0.308	0.348	1

Source: Author's computation from E-View 10.

The estimation results of the correlation test in Table 3, it implies that all the regressors variables are not linearly dependent on one another or exact. Hence, there is an absence of multicollinearity in the model.

6. Unit root test

This section is provided to explain the empirical finding and discuss our main results. It was important to perform unit-root test in order to avoid spurious regression.

Table 4. unit root test results

Level			1st Differences			I (d)
Variable	ADF stat	P.Perron stat	Variable	ADF stat	PPerron stat	
lnDI	-0.0208 (0.6698)	0.0356 (0.6883)	ΔlnDI	-5.0634 (0.0000)	-4.9519 (0.0000)	I (1)
lnFDI	-2.5480 (0.1122)	-2.4419 (0.1372)	ΔlnFDI	-8.5493 (0.0000)	-9.9985 (0.0000)	I (1)
lnGNS	-0.6731 (0.4192)	-0.677 (0.4174)	ΔlnGNS	-5.2140 (0.0000)	-5.1270 (0.0000)	I (1)
lnGR	--2.065 (0.0387)	-1.9562 (0.0493)				I (0)

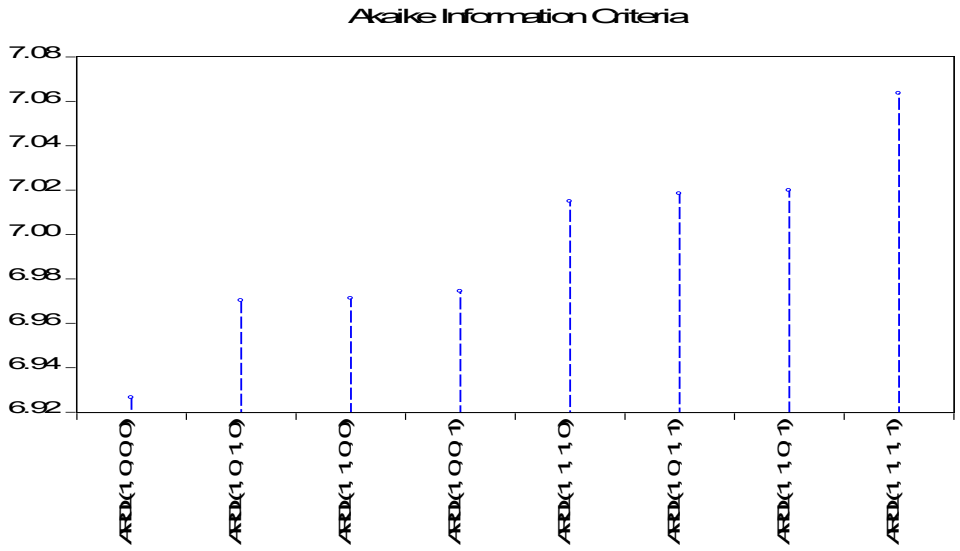
Source: Author's computation from E-View 10.

According to the results of ADF and PP unit root test in Table 4., it is understood that "DI"; "FDI" and "GNS" are I(1) and "GR" is I(0). Variables were found to be stationary at different levels. The fact that the stationary levels

of the variables are different is vital in terms of determining the method to be applied in the analysis. Since the series are stationary at the I(0) and I(1) levels, the Autoregressive Distributed Lag (ARDL) cointegration technique will be used to demonstrate whether exist a long-run and short run relationships between foreign direct investment (FDI) flows and domestic investment in Algeria.

The ARDL (1,0,0,0) model, which has the lowest criterion value (AIC=6.926544) among the 8 different models estimated in the light of the evaluations made under the Schwarz Information Criteria (AIC), has been found to be the model with the most appropriate delay.

Fig.1. Akaike information Criteria



Source: Author's computation from E-View 10.

7. Cointegration test result

The estimation results of the ARDL bounds test to investigate the existence of co-integration between the variables are shown in Table (5) Accordingly, since F-statistic =5.224648 value is greater than the upper-limit values determined for the 5% significance level, it indicates that there is a cointegration relationship between the variables and therefore the null hypothesis should be rejected. These results indicate that there is a co-integration (a long-term relationship) between variables.

Table 5. Results of ARDL Bounds Test

ARDL Bounds Test		
Test Statistic	Value	K
F-statistic	5.224648	3

Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.37	3.2
5%	2.79	3.67
2.5%	3.15	4.08
1%	3.65	4.66

Source: Author's computation from E-View 10.

8. Short term analysis:

Table 6. presents the error correction estimation for the ARDL model. The coefficient of the ECM variable is found to be negative and statistically significant at 1% level confirming the speed of convergence to equilibrium once the equation is shocked. The coefficient of ECM for the cointegrating equation with"DI" as the dependent variable shows a high speed adjustment back to the equilibrium position, with about 73.89% of disequilibrium in the short-run variations are being modified and integrated into the long run relationship.

Table 6. Short term coefficients

Short term analysis				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(lnFDI)	1.220324	2.476196	0.492822	0.0252
D(lnGNS)	0.031429	0.250834	0.125297	0.0010
D(lnGR)	0.979869	0.458508	-2.137082	0.9397
CointEq(-1)	-0.738933	0.145996	-5.061337	0.0000
Cointeq = lnDI - (2.6099*lnFDI + 0.1750*lnGNS +1.2323*lnGR + 29.2486)				

Source: Author's computation from E-View 10.

Foreign direct investment, is an important vector of globalization, as a result, the flow of FDI is growing rapidly. Its growth reflects, on the one hand, the intensification by a growing number of multinational companies of their activities on a global scale under the effect of the liberalization of new investment sectors and, on the other hand, the existence of a surplus of international savings seeking better investments.

Over the past two decades, many countries have initiated favorable policies that tend to attract foreign direct investment inflows (FDI) and encourage the establishment of new projects by foreign companies. In particular, Algeria has made its legislation more flexible in order to improve the operating environment for multinationals by offering them certain advantages including subventions, tax incentives and exemptions from import duties.

One of the reasons for these preferential policies, therefore, we are all persuaded that inward FDI has a considerable positive influence on host economies, including demand creation effects, increasing employment opportunities, as a means of complementing the level of domestic investment, as well access to foreign markets.

9. Long term analysis

Policymakers in both developed and developing countries are encouraging FDI inflows by putting in place attractive policies, as a result, FDI inflows have a positive impact on domestic economic activity, particularly on the local productive system. However, the impact of FDI inflows on host economies remains mixed.

Besides, foreign direct investment is a means for increasing domestic capital stocks, which makes it possible to avoid external debt, OECD (2002). Indeed, the participation of foreign investors in the development of physical infrastructure and financial markets can help improve the efficiency of domestic investment.

The estimation of the domestic investment equation aims to test the existence of the crowding in or the crowding out effects between foreign and domestic capital. FDI has a positive sign, which means that in the case of Algeria, direct investment inflows stimulate domestic investment through technological and organizational spillovers to local firms.

Table 7. long term coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
lnFDI	2.609941	3.268359	0.798548	0.0299
lnGNS	0.174980	0.219081	0.798700	0.0099
lnGR	1.232285	0.667631	1.845756	0.0434
C	29.248594	7.004063	4.175947	0.0002

Source: Author's computation from E-View 10.

The variables foreign direct investment, gross national saving and growth rate explain local investment at the 1% level. Thus, when we look at the long term results of the estimation, it can be observed that 1% increase in FDI inflows leads to 2.60% increase in domestic investment "DI", 1 % increase in GNS results in 0.17% variation in DI and finally 1% increase in GR variable cause 1.23% increase in DI. Thus, the results prove that foreign direct investment and domestic investment run both ways implying that foreign direct investment crowds-in domestic investment. Furthermore, the inflows of foreign direct investment are seen as an important source of capital injection and additional investment due to inadequate savings and liquidity constraints in

developing countries (Matthias & José , 2008). In addition, investment is an important factor that improves the living standards of its citizens and pushes growth. In simple terms, there must be constant advances in technological knowledge in form of new goods, markets or processes to spur growth which may come in form of foreign and/or domestic investment (Robert , 1956).

The foreign direct investment inflows to Algeria have also increased during the last four years. But recently, statistics have shown that FDI inflows to Algeria declined from 1 466 million dollars to 1 382 million dollars in 2019 (UNCTAD, 2018).

The marginal effect of economic growth on the domestic investment is significant. Moreover, if growth grows by 1%, domestic investment improves by 1.23%. The coefficient of gross national saving is positive and significant, indicating that a 1% increase in savings leads to a 0.17% increase in domestic investment. This means that domestic investment is financed by domestic resources. This causality is consistent with the neoclassical thesis that savings are a prerequisite for investment.

10. Diagnostic tests:

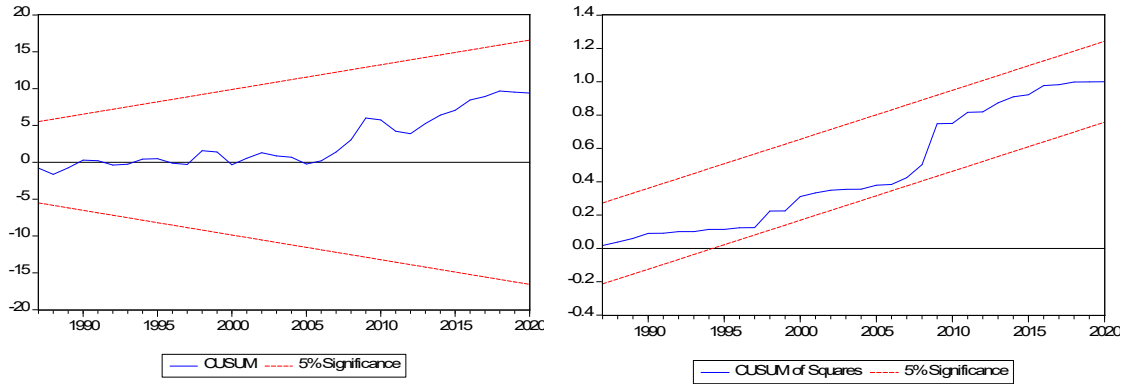
The table below indicates that the values of the diagnostic tests take the expected values and that there are no problems in terms of forming the model.

Table 8. Diagnostic tests results

Tests	Test Value (Prob.)
Breusch- Godfrey Serial Correlation LM	0.9311 (0.4042)
ARCH Heteroskedasticity Test	2.3258 (0.1756)
Ramsey RESET Test	5.0195 (0.1508)
Jarque- Bera Test	0.7872 (0.6746)

Source: Author's computation from E-View 10.

Fig.2. Test de stabilité de CUSUM et CUSUMQ



Source: Author's computation from E-View 10.

The results of the diagnostic tests are shown in Table (8). The estimated value of F-statistics is highly significant, which indicates that our model is

goodness of fit. Moreover, Breusch-Godfrey LM test results indicate the absence of autocorrelation in the model. Ramsey RESET test results show that there is no omitted variable in the model. ARCH Heteroskedasticity test results confirm that there is no heteroskedasticity in the data. Furthermore, the test of the cumulative sum of recursive residuals (CUSUM) and the CUSUM of square (CUSUMQ) tests show that the model is stable.

11-Conclusion

Openness, through trade or foreign investment, has become a catalyst for growth recognized by many studies, particularly empirical ones. In order to attract foreign investors most governments around the world are implementing specific strategies to encourage multinationals to locate their innovative projects, particularly in developing and transitional economies. Algeria through various mechanisms wants to create a favorable and conducive climate for investors. For the reason that foreign companies are more productive, pay higher wages and export more than their Algerian counterparts. The current study, check two hypotheses in this regard: FDI crowds in DI; otherwise FDI crowds out DI.

In a more precise way, crowding out of DI might occur in several ways. Domestic firms may not be as competitive as foreign investors since foreign companies may be more efficient or may form oligopolies and sell at cheaper prices than domestic firms (Agosin & Ricardo , 2000).

The main conclusion that emerges from this analysis is that the positive impacts of FDI on domestic investment are assured. In addition, the estimation results imply that foreign direct investment inflows (FDI) crowds-in domestic investment “DI” in both the short and long run in Algeria.

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