GRADIVA

Volume 63 | Issue 03 | March 2024
DOI: 10.5281/zenodo.10991002

The Role of Flow Direct Investments (FDI) in Improving Security Food: Case of Algeria

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Abstract

This paper aims to examine the role of FDI in agriculture sector development in Algeria. The study is based on time series data from 1999 to 2022. We applied the multiple regression method to highlight the influence of FDI on agriculture value added in Algeria. The results suggest clearly that flow direct investments have no significant impact on the country's agriculture sector.

Keywords: *FDI, Security Food, Algeria, Agriculture Sector, OLS Method.*

1. INTRODUCTION

Foreign direct investment has been trending upward in developing courtiers. The agricultural industry is one of the sectors that benefit from foreign direct investment (FDI). Nevertheless, FDI is dispersed unevenly among the three major industrial sectors. Agriculture is the sector that benefits least from FDI, far behind manufacturing and services sectors, (Yanqing Jiang, Gaoyan Shi, 2014).

In addition to giving access to global markets and serving as a source of knowledge and training for the development of human capital, foreign direct investment (FDI) can be a crucial source of technology spillovers. FDI stimulates business innovation and competitiveness, thereby increasing productivity and enabling firms to survive on international markets. FDI supports the economic development of countries by generating jobs and ensuring an invaluable inflow of foreign currency. The proliferation of these positive spin-offs will reduce poverty in the long term, and ensure food security for the States.

There is only few studies treating the contribution of FDI to the development of the agricultural sector, and the empirical results are ambiguous and contradictory. Some studies confirm the existence of a positive impact of direct investment flows on agricultural sector; others confirm the existence of a negative impact, and some findings suggest no statistically significant impact. This research aims to understand these results, because understanding whether FDI influence or not agriculture sector is essential to reduce poverty and improve food security. There are very few studies on the impact of FDI on food safety in Algeria. Algeria is one of the countries that attract the least FDI in the MENA region. FDI inflows into the country have fallen drastically, and FDI is mainly directed towards the industrial sector. It would be interesting in this case, to know what would be the positive impact of FDI flows, if they are oriented to agricultural sector in Algeria.

This paper's major focus is on how foreign direct investment (FDI) affects agriculture sector and how to develop the sector through the proliferation of the benefits of FDI, and thus ensure food security in the country. The structure of the article will be as follows. First, we will present a review of the literature to understand the mechanisms and channels of influence of

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FDI on the agricultural sector. We will then present our theoretical model and the variables of the model, before discussing our empirical results

2. LITERATURE REVUE

Food security is essential for sustainable development. Agriculture's share of economic growth has been rising steadily in recent years. The sector has become increasingly strategic for all nations. Developed agriculture ensures sustainable food security. The primary sector is considered to be the sector that contributes most to reducing poverty, (UNCTAD (2018). This ensures a high recruitment rate among the poor. The rise of the agriculture has the potential to increase more effectively the incomes of the poorest, two to four times, (Townsend R, 2015). According to, the 2023 Food and Agricultural Organization (FAO) statistical yearbook, the agriculture value added went up 84 % between 2000 and 2021, to 3.7 trillion USD. The share of agriculture in global GDP has been stable to 4% since 2000. Agriculture employed 873 million people in 2021, corresponding to 27% of the global work force, (FAO, 2023).

There is several challenges ahead, including enhancing food security, maximizing growth and added value, and optimizing employment. These goals cannot be realized without significantly boosting primary sector investment. Between now and 2050, the demand for food is predicted to rise by 70% (Dumas P, et al., 2019). The World Bank (2020) estimates that the increased demand for food will require yearly investments of at least $80 billion, the majority of which will come from the private sector. Because of their significant financial imbalances, developing nations find it difficult to address the issues facing the industry. For this reason, foreign direct investment (FDI) presents an intriguing substitute for assuring food security and developing agriculture.

Through their effects on the agricultural sector, Dhahri and Omri (2020) use foreign direct investments and other forms of foreign assistance (such as social infrastructure aid, investment aid, agriculture-forestry-fishing aid, and non-investment aid) to reduce poverty and improve food security. They conclude that foreign direct investment (FDI) boosts agricultural productivity, which lowers poverty and reduces food insecurity.

The first study to look at disaggregated FDI and its implications on food security was Mihalache-O'Keef and Li (2011). They specifically research three forms of foreign direct investment: manufacturing, service sector, and primary sector FDI. They confirm that food security is enhanced by FDI in the manufacturing sector using data from 56 developing and transitional economies. Nonetheless, they conclude that FDI in the primary sector lowers food security, but FDI in the service sector has inconsistent to negative effects on food security. Despite seeming contradictory, their findings about the impact of foreign direct investment (FDI) in the primary sector make sense, as the majority of FDI in this area is typically directed towards extractive industries rather than agricultural development and investment.

Linus Nyiwul and Niraj P. Koirala, (2022), studied Role of foreign direct investments in agriculture, forestry and fishing in developing countries, they used the panel vector autoregression approach that accounts for endogeneity. They show that there is a bidirectional causal relationship between value added in the agriculture, forestry, and fisheries industries and foreign direct investments. They used data from sixteen developing economies. These mutually beneficial relationships show a cyclical relationship between value added in forestry, fishery, and agriculture and foreign direct investment (FDI). According to their model, FDI has a beneficial impact on forestry, fishery, and agriculture added value for up to five years. This

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suggests that FDI positively affects added value in forestry, fishery, and agriculture over the medium to long term. This finding implies that by removing these barriers, nations with high FDI transaction costs and with less favorable overall investment environments can enhance agriculture.

In 2023, Zakia Sultana and Nazmus Sadekin examine the connection between Bangladesh's agriculture industry and foreign direct investment (FDI). They used time series data from 1972 to 2021 for their analysis. To investigate the relationship between the variables under investigation, the F-Bound test and the Auto Regressive Distributed Lag (ARDL) model are employed. According to the empirical data, foreign direct investment (FDI) has a long-term detrimental impact on Bangladesh's agriculture industry. Furthermore, the study concludes that FDI has no immediate impact on the nation's agriculture industry.

The figure 1 indicates the channels of the impact of FDI on food security. According to different studies the impact could be positive or negative under certain conditions. The studies that found mixed effects are also worth highlighting. For example, Mihalache-O'keef and Li (2011) found that FDI in the primary sector reduced food security, FDI in the secondary sector improved food security, and FDI in the tertiary sector produced ambiguous but sometimes adverse effects. The country of origin has been found to matter; for instance, Kessel (2022) found that for the African context, FDI originating from China, the EU, the US, and India affected food security positively, while FDI originating from Gulf States had a negative effect.

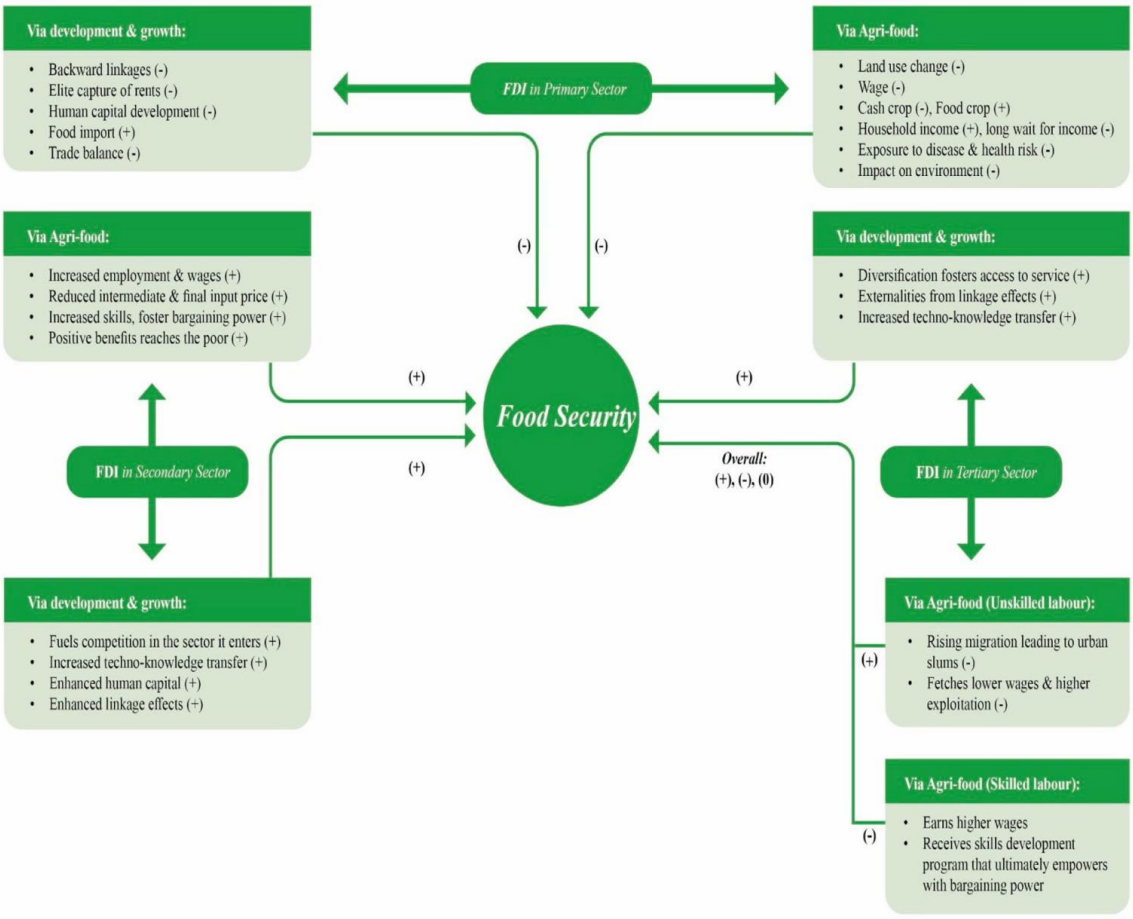

Figure 1: Channels of the Impact of FDI on Food Security

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Source: Tshering Samdrup and al (2023), Does FDI in agriculture in developing countries promote food security? Evidence from meta-regression analysis, Economic analysis and Policy, Volume 80.

3. THEORETICAL FRAMEWORK

This study aims to examine the role of FDI in reinforcing security food in Algeria. The analysis is based on time series data from 1999 to 2022. We applied the multiple regression method to highlight the influence of FDI on agriculture value added in Algeria. The materials for this study have been collected from WDI data base. The variables that have been used as the independent variables are Foreign Direct Investment, Employment in the Agriculture Sector, Consumer price index, and Real interest rate. The figure 2 indicates the theoretical framework used in this research.

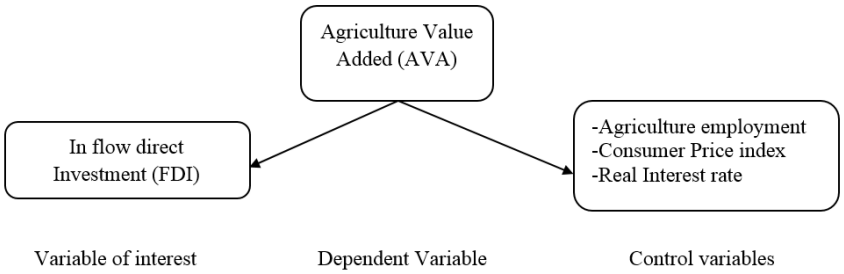

Figure 2: Research Framework

The table 1 shows the data and the variables of our model.

Table 1: Variables and Source of Data

Variable	Type	Abbreviation	Source	Time
Agriculture Added Value	Dependent variable	AVA	WDI	1999-2022
Flow Direct Investment	Independent variable	FDI	WDI	1999-2022
Consumer Price Index	Independent variable	CPI	WDI	1999-2022
Agriculture employment	Independent variable	EMP	WDI	1999-2022
Real Interest rate	Independent variable	RIR	WDI	1999-2022

The equation to estimate is then:

$$LogAVA_t = \alpha_t + \beta_1 FDI_t + \beta_2 CPI_t + \beta_3 EMP_t + \beta_4 RIR_t + \varepsilon$$

4. DESCRIPTIVE ANALYSIS

The descriptive analysis of our data shows that the minimum value of AVA in Algeria is 0.819 in 2008, the maximum value correspond to 1.15 in 2020. That means that, the agriculture added value increased in Algeria from 2008 to 2020. The minimum value of FDI corresponds to -1.144 in 2015; the maximum value is 0.308 in 2009. This indicates a drop in FDI inflow in Algeria.

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
logAVA	24	.992	.085	.819	1.15
LogFDI	24	-.056	.335	-1.414	.308
logCPI	24	2.024	.13	1.846	2.259
LogEMP	24	1.136	.147	.969	1.353
logRIR	24	.087	.97	-2.53	1.334

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The figure 3 shows the graphic evolution of the model data. The agriculture added value in Algeria has increased from 2009 to 2022. In 2020, the AVA in Algeria was the highest with 14.13% of GDP.

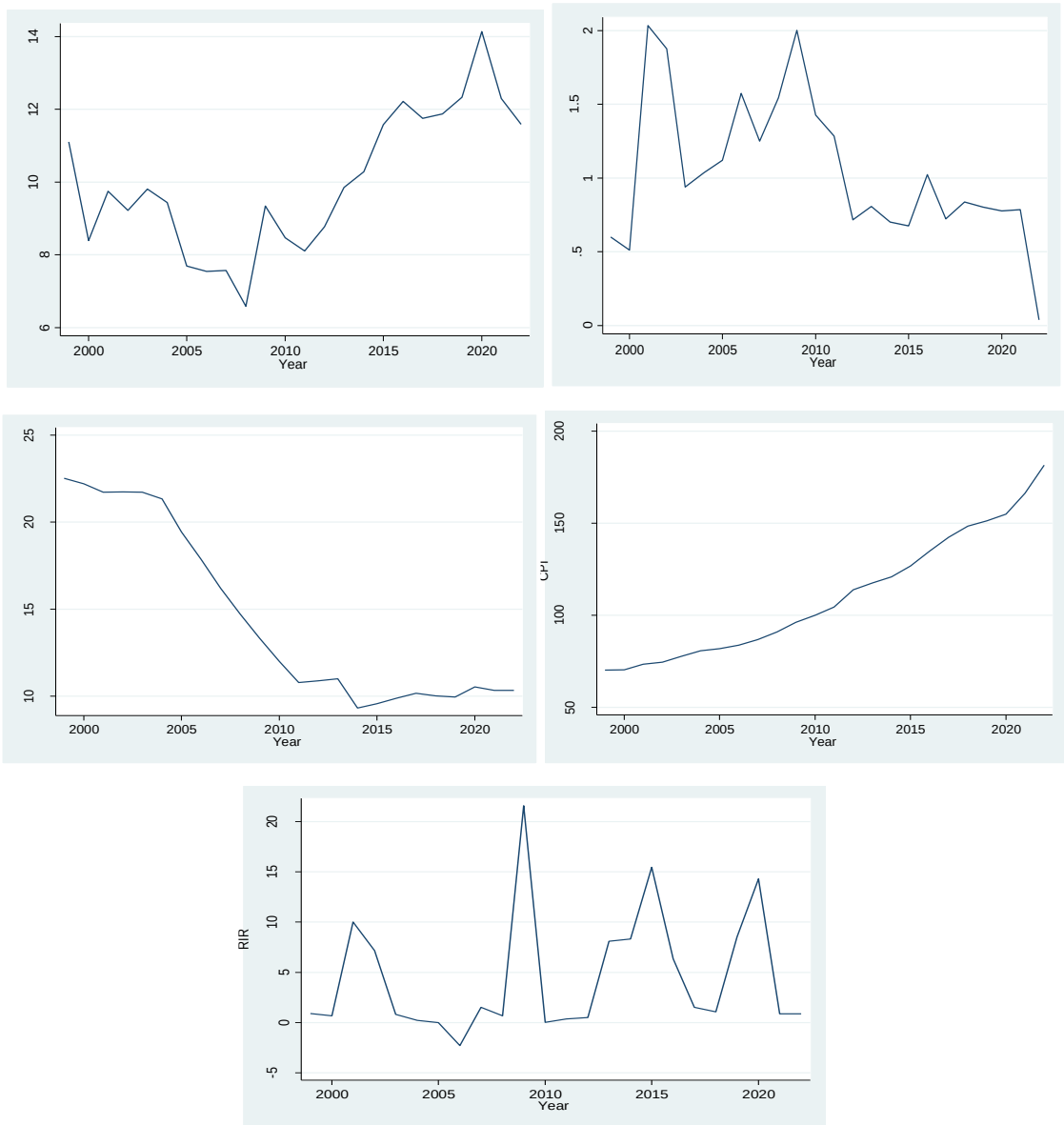

Figure 3: The Model's Variables Evolution (1999-2022)

Source: Stata outcomes

The graphical representation of the variables shows that value added in agriculture has gone through two main phases, the first from 1999 to 2008 when the sector's value added fell to 6.5% of GDP, and then in 2009 it began to rise until 2020, reaching over 14% of GDP, before falling again to 11.58% in 2022. The value of FDI as a percentage of GDP remains very low in Algeria, since throughout the study period, FDI did not exceed 2.1% of GDP. The attraction of FDI to the country remains very low and has been falling steadily, reaching 0.03% of GDP in 2022. Employment in the primary sector has fallen phenomenally, from 22.59% in 1999 to 10.32% in 2022. This decline can be explained by several factors, the most important of which is the rejection by young people to work in the agricultural sector. Young Algerians are

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deserting the sector in favor of other, more modern and more profitable occupations.

5. EMPIRICAL RESULTS AND DISCUSSION

The results of the correlation matrix (Table 3), show that there is no multi-co linearity, which is desirable. FDI seems to be negatively and weakly correlated with the AVA variable. The same result is observed for the agriculture employment in Algeria. The correlation is weak and negative. The correlation between CPI and AVA is positive and moderate, the same for the RIR variable.

Table 3: Matrix of Correlations

Variables	(1)	(2)	(3)	(4)	(5)
(1) logAVA	1.000				
(2) LogFDI	-0.398	1.000			
(3) logCPI	0.676	-0.506	1.000		
(4) LogEMP	-0.487	0.299	-0.906	1.000	
(5) logRIR	0.516	-0.011	0.274	-0.278	1.000

Source: Stata outcomes

Before discussing the empirical results it is important to analyze the stationarity of all model variables. Table 4 indicates Augmented Dickey-Fuller test for unit root. As we can observe, the test shows that, all variables are stationary at level, only RIR variable is stationary at first difference.

Tableau 4: Augmented Dickey-Fuller test for unit root

Variables	At level	First difference	Results
LogAVA	-1.463 (0.7234)	-2..622 (0.7941)	**I(0)**
LogFDI	-0.7999 (0.8196)	-0.673 (0.8537)	**I(0)**
LogCPI	2.304 (0.9990)	1.436 (0.9973)	**I(0)**
LogEMP	-1.375 (0.5941)	-1.440 (0.5631)	**I(0)**
LogRIR	-3.513 (0.0077)	-2.666 (0.0801)	**I(1)**

Source: Stata outcomes

To validate the regression result it is important to check the absence of heteroskedasticity, the non existence of serial correlation and the normal distribution of residuals. The table 5 resumes le results of robustness tests.

Table 5: Robustness Tests

	P- Value	Result
Breusch-Pagan test for heteroskedasticity	0.1573	Absence of heteroskedasticity
Breusch-Godfrey LM test for autocorrelation	0.0548	no serial correlation
Normality test	0.2563	Residual are normally distributed

Source: Stata outcomes

As we can notice, the p-value of the heteroskedasticity is 0.1537 greater than 5%, this indicates the absence of heteroskedasticity. The Breusch-Godfrey LM test is greater than 0.05, so there no serial correlation. The residuals are normally distributed with a p-value equivalent

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to 0.2563. All condition seems to be validated; we can then discuss the regression results of the model.

According to the results of the table 6 which indicates the linear regression results, the FDI variable does not influence AVA in Algeria. There is no significant impact of FDI on agriculture added value in Algeria. The association between the two variables is positive but not significant. This result was expected. The consumer price index is highly significant and influence AVA at 1% threshold. EMP and RIR are also significant at 5% level.

There are several reasons for the non-significant relationship between agriculture and FDI in Algeria:

- FDI directed towards the agricultural sector is still derisory. The government considers this sector to be strategic, and it is reticent to open it up to foreign investment.
- FDI in the country remains low, several factors explain this fact: the country is not yet attractive.
- Productivity and profitability in the sector are not very high.
- Local producers do not have access to the technologies they need to develop their production and improve their profitability.

Table 6: Linear Regression

logAVA	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
LogFDI	.007	.043	0.16	.871	-.083	.097	
logCPI	.855	.249	3.44	.003	.334	1.376	***
LogEMP	.459	.198	2.32	.031	.046	.872	**
logRIR	.033	.012	2.78	.012	.008	.058	**
Constant	-1.263	.713	-1.77	.092	-2.754	.228	*

Mean dependent var	0.992	SD dependent var	0.085
R-squared	0.681	Number of obs	24
F-test	10.137	Prob > F	0.000
Akaike crit. (AIC)	-68.582	Bayesian crit. (BIC)	-62.692
*** $p<.01$, ** $p<.05$, * $p<.1$			

- Government interventions and the overregulation of agriculture have increased transaction costs, price risks and uncertainty.
- The lack of institutional quality and adequate infrastructure makes the country unattractive, thereby losing the opportunity to promote the agricultural sector through foreign investment. - Lack of transparency and consistency in foreign direct investment (FDI) policies,

Because of this situation, Algeria is missing out on the opportunity to develop the primary sector and benefit from the advantages offered by the proliferation of FDI in the country.

Foreign investors do not find the agriculture sector of Algeria an attractive one. Hence, the share of agriculture in the total FDI in Algeria is negligible. FDI can help fill the investment gap in agriculture in developing countries, which is crucial for increasing production capacity and output.

Le Algerian government should open up the sector gradually to foreign investments. Even the country with currently high FDI transaction costs or a generally less conducive investment environment, Algeria can improve agriculture by eliminating these obstacles. This

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is because FDIs can lead to improved technologies and technical expertise, practices, management and other systems that benefit the host countries.

6. CONCLUSION

Food chains across the world are highly uncertain due of the COVID-19 pandemic and current geopolitical developments, and this issue will bring the agricultural sector more attention from governments and international organizations. The importance of technology and investment in the agriculture industry is probably going to be one of the main topics of discussion. FDI is a crucial determinant of agricultural production via technology transfer and skills that benefit host country's farmers. Empirical analyses on this topic, especially in the context of the global pandemic and geopolitical conflict, remain limited, (Linus Nyiwul and Niraj P. Koirala, (2022). The goal of this paper is to contribute to the discourse. Specifically, we aim to examine the role of FDI and performance in agriculture. We applied a regression method to analyses the impact of FDI on security food in Algeria, on time series from 1999 to 2022. The results suggest clearly the non-significant relationship between the two variables. This suggests that Algeria would benefit from eliminating policies that increase transaction costs for foreign investments. This includes improving institutional mechanisms that deter foreign investments. Algeria must consider developing agriculture sector via the FDI, and put forward a clear strategy, backed up by regulations that make it attractive to foreign investors.

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