

Foreign Direct Investment as an Instrument to Promote Entrepreneurship in Algeria: Structural Analysis Using MICMAC Method

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Abstract This study aims to identify key variables controlling the evolution of Foreign Direct Investment inflows to Algeria using MICMAC method. After the listing of variables (both external and internal) and the analysis of the direct and indirect influence matrices, the key variables are Openness, access to free trade areas, general governance, regulation quality and lobbying.

Keywords: FDI, structural analysis, MICMAC, Algeria

Cite This Article: Lazhar CHINE, Tarek DJEDDI, and Achour HAIDOUCHI, "Foreign Direct Investment as an Instrument to Promote Entrepreneurship in Algeria: Structural Analysis Using MICMAC Method." *Journal of Business and Management Sciences*, vol. 5, no. 4 (2017): 120-124. doi: 10.12691/jbms-5-4-2.

1. Introduction

All countries in the world including Algeria race to attract Foreign Direct Investment, and be close as possible from Multinational Corporations and international investors. These countries offer a collection of stimulus in order to attract FDI inflows.

The World Investment Report (2002) indicates that the role of multinational corporations during the last two decades is growing in the globalizing world economy. The report said that the number of multinational corporations achieved 65 thousand companies with 850 thousand affiliated company, 54 billion worker and 19 trillion dollars [1].

2. Literature Review

2.1. Foreign Direct Investment (FDI)

For many countries, Foreign Direct Investment (FDI) represents one of the solutions to finance their investments. The weakness of their foreign exchange reserves is the main important reason. FDI is far from any risk related to the debt [2].

2.1.1. Definitions of Foreign Direct Investment

Foreign Direct Investment (FDI) is an investment with particular characteristics: a long-term relationship and durable interest [3]. The foreign investor controls FDI. The International Monetary Fund (IMF) define FDI as an investment made in order to realize an enduring interest in an enterprise that working in an economy other than that

of the investor. The investors have the effective voice in the management of the investment [4]. The Organization for Economic Co-operation and Development (OECD) define FDI as a type of international investment that reflect the objective of a resident entity in one economy to achieve a durable interest in an enterprise resident in another economy [5]. FDI can also defined as the process whereby residents of one country (the source country) acquire ownership of assets for the purpose of controlling the production, distribution and other activities of a firm in another country which is the host country [6].

Generally, FDI is an activity realized by Multinational Corporations (MNCs), which consider FDI as the main motivation of their activity [7].

2.1.2. Classification of Foreign Direct Investment

There are three categories of FDI: horizontal, vertical and conglomerate [6]:

- *Horizontal FDI*: is an investment refers to the decision of the investor to produce abroad the same or a similar type of product he producers in the source country.
- *Vertical FDI*: is an investment that allows the investor to be close as possible to the market of raw materials acquisitions and/or to final consumers.
- *Conglomerate FDI*: represents a mix of the previous two categories.

2.1.3. The measure of Foreign Direct Investment

Generally, FDI is expressed either in terms of flows or in terms of stock

- *FDI flows*: include the capital invested by a foreign investor in an enterprise, or the capital received from the enterprise by a foreign investor.

- *FDI stocks*: refers to the value of the share of capital and resources of the enterprise attributed to the parent enterprise.

2.1.4. The measure of Foreign Direct Investment

A large number of variables (determinants) that explain FDI are mentioned in formal hypothesis of FDI. In the literature, there are many determinants mentioned in the econometric studies:

- *Market size*: According to Artigo and Nicolini [8], the market size measured by GDP or GDP per capita is the most robust FDI determinants in econometric studies.
- *Openness*: Country's openness measured by the ratio of exports + imports to GDP should be a main factor in the decision of investing in the country [9].
- *Labor cost and productivity*: Wages as an indicator of labor cost has been the most contentious of all the potential determinants of FDI [9].
- *Political risk*: Foreign investor is confident of being able to operate profitably without excessive risk to its capital and personnel. Schneider and Frey [10] confirm the negative relationship between FDI and political instability.
- *Infrastructure*: such as roads, ports and telecommunication systems can be seen as both an obstacle and an opportunity for the foreign investor [11].
- *Growth*: Economic growth measured by the annual increase of GDP has a positive effect on FDI [10].
- *Tax*: Country corporate taxes have a significant negative effect on FDI flows [12].

2.2. World FDI flows

According to the World Bank database, a Foreign Direct Investments flow around the world was very weak until the year 2000. This period is known many international crises (Cold war, the first Gulf war and the second Gulf war) which led to the weakness of world foreign direct investments. After this period, FDI has known an increase where it peaked in 2007.

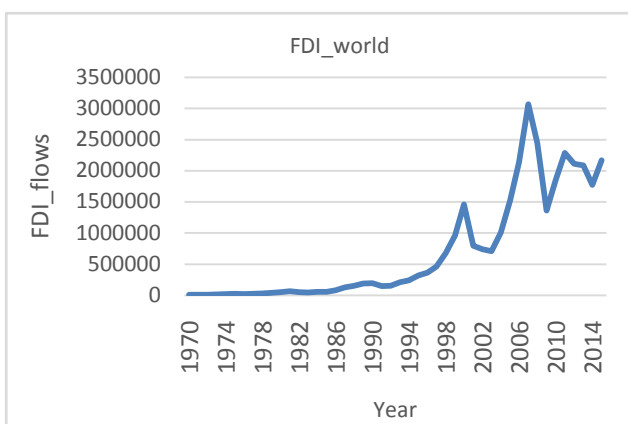


Figure 1. World Foreign Direct Investment flows

2.2. FDI flows in Algeria

Before 1999, FDI flows were very weak especially in the period of transition to market economy. The black

decimal has a negative effect on FDI inflows. After 1999, FDI flows known an increase but generally it are not enough*.

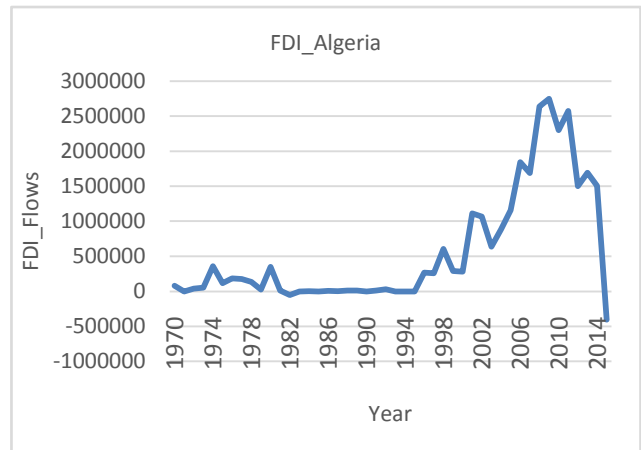


Figure 2. Algerian FDI Flows (1970-2015)

3. Data and Methodology

3.1. Structural Analysis and MICMAC Methods

In the structural analysis, a system is a set of interrelated variables. The network of the relationships between variables is very important to understand the evolution of the system in the future [13].

The structural analysis aims to highlight the structure of the relationships between the qualitative variables (quantifiable or not), which characterize the system under study [13].

The structural analysis allows us to describe a system using a matrix with interconnect which are their system components. The final objective of the structural analysis is the identification of key variables controlling the evolution of the system under study [13].

Two categories of variables are used in the structural analysis: internal variables, which characterize the studied phenomenon, and external variables that characterize the explanatory environment [14].

3.2. Description of the Method

- Phase 1: listing variables

The first step consists in listing all the variables that characterize the system (both internal and external). The

* There are many recent studies about the determinants of FDI inflows in Algeria on one hand, and the effect of FDI on economic growth on the other hand.

- An econometric study realized by [15], political risk have a negative effect on FDI in Algeria. however, financial risk was strong.

- Economic institutional quality (EIQ), voice, and accountability (VA) have a long-term positive effect on FDI inflows in Algeria. The improvement of economic freedom, voice and accountability can be considered as an effective way to attract FDI inflows in the long term [16].

- FDI inflows could be bring considerable benefits to Algeria in the form of capital inflows, technology transfer, human capital formation, international trade integration and job creation. The elaboration of structural economic policies improves the investment climate [17].

list of variables does not generally exceed 70 or 80 variables. Then, we give a precise definition for each variable.

Table 1. Listing of variables

Influence Of → On ↓	Internal Variables			External variables		
	V1	V2	...	V1	V2	...
Internal variables	V1					
	V2		1		2	
	...					
External variables	V1		3		4	
	V2					
	...					

- 1: relations between internal variables;
- 2: the influence of internal variables on the environment;
- 3: the influence of the environment on the internal variables;
- 4: relations between external variables.

- Phase 2: description of the relationships between variables

With regard to the degree of the influence between variables, there are four levels:

- 0: no direct influence
- 1: low direct influence
- 2: medium direct influence
- 3: high direct influence

The filling of the matrix is carried out using a questionnaire distributed on the experts and the members of the foresight team.

- Phase 3: Identification of the key variables with MICMAC

The key variables are those are essential to the system's development. The MICMAC method means Impact Matrix Cross-Reference Multiplication Applied to a Classification.

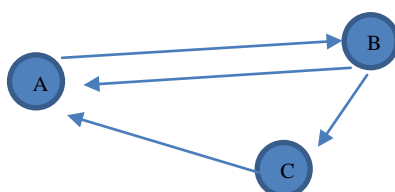
Comparing the hierarchy of variables in the various classifications (direct, indirect and potential) allows us to confirm the importance of certain variables.

3.3. MICMAC Principles

MICMAC (Impact Matrix Cross-Reference Multiplication Applied to a Classification) is based on the classical properties of Boolean matrices [13].

The MICMAC classification can classify the variables according to their influences described by the structural analysis matrix.

The example of Lefebvre' theses (1982) explain the process; three variables are characterizing the system, A, B and C, which interact in the following way:



The structural analysis matrix is can be written as follows:

$$M = \begin{matrix} A \\ B \\ C \end{matrix} \begin{pmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix} \begin{matrix} \left[\begin{matrix} 1 \\ 2 \\ 1 \end{matrix} \right] \\ \left[\begin{matrix} 2 \\ 1 \\ 1 \end{matrix} \right] \end{matrix}$$

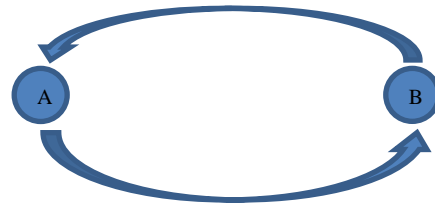
Sum of the elements in each column

In this first matrix, the diagonal elements are set at zero which means that the influence between the variable and its self in not taken into account.

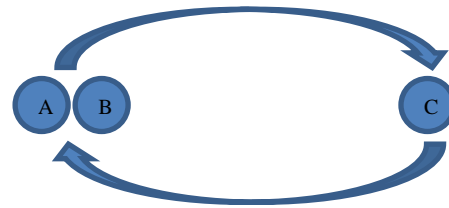
Squaring the matrix shows us the indirect effects.

$$M^2 = \begin{pmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 0 & 1 & 0 \end{pmatrix} \begin{matrix} \left[\begin{matrix} 2 \\ 2 \\ 1 \end{matrix} \right] \\ \left[\begin{matrix} 2 & 2 & 1 \end{matrix} \right] \end{matrix}$$

The value 1 in the first row and first column means that: there is circuit of length 2 going from Variable A to itself.



The value 1 in the second row, first column, shows us an indirect relationship with path of length 2 between variable B and variable A.



Raise the matrix to the power 3 (M³) shows us an indirect relationship with path of length 3.

The value 1 in the second row, first column, means that there is an indirect relationship between variable B and variable A with a path of length 3.

$$M^3 = \begin{pmatrix} 1 & 1 & 0 \\ 1 & 1 & 1 \\ 1 & 0 & 1 \end{pmatrix} \begin{matrix} \left[\begin{matrix} 2 \\ 3 \\ 1 \end{matrix} \right] \\ \left[\begin{matrix} 3 & 2 & 2 \end{matrix} \right] \end{matrix}$$

After each raise operation, we realize a classification of variables according to the level of influence and dependency. At certain level of rising, the classification of the variables stay fixed. Therefore, we can conclude the maximum of the lengths of paths describing the indirect relationships between variables.

4. Finding and Discussion

4.1. The List of Variables

The first step in the study is the listing of variables:

Table 2. List of variables

N°	TITLE LONG	TITLE COURT	DESCRIPTION	THEME
1	Access to free trade areas	Access	The access of Algeria to free trade areas, and joining to the international organizations of free trade.	Economic
2	Lobbying	Lobbying	international lobbying	Political
3	Infrastructure	Infra	General facilities	Economic
4	Natural resources	Nat_res	Gas, Petrol, land, water	Economic
5	Inflation	Inflation	measured by Consumer Price Index	Economic
6	Historical context	His_ctxt	The period of colonization and the relationships with the colonizer	Historical
7	Political stability	Poi_stab	Democracy and coups	Political
8	Regulation quality	Reg_qlt	Various regulatory laws about trade and investment	Economic
9	Corruption control	Cor_cntrl	Various laws against corruption and bribery	Political
10	General governance	Gen_gov	The level of the application of the principles of governance in companies and public administrations.	Economic
11	Economic growth	Eco_grow	measured by Gross Domestic Product	Economic
12	Business climate	Bus_climat	Measured by the ease of doing business index	Economic
13	Qualified human resources	Q_hum_rec	The productivity of human resources	social
14	Privatization	Privit	The level of privatization and The role of the private sector in the economic growth.	Economic
15	Openness	Openness	Measured by the ration: the sum of exports plus imports, to the country's gross domestic product	Economic
16	Geographical location	Geo_loc	Maritime borders and common borders.	Geographical

Source. Realized using MICMAC software

4.2. Direct Influences Matrix

Table 3. Direct Influences Matrix

	1: Access	2: Lobbying	3: Infra	4: Nat res	5: Inflation	6: His_ctxt	7: Poi_stab	8: Reg_qlt	9: Cor_cntrl	10: Gen_gov	11: Eco_grow	12: Bus_climat	13: Q_hum_rec	14: Privit	15: Openness	16: Geo_loc
1: Access	0	0	0	0	0	0	0	0	1	1	2	2	2	0	2	0
2: Lobbying	2	0	0	0	2	0	2	2	0	0	0	2	0	1	0	0
3: Infra	1	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0
4: Nat_res	0	0	0	0	0	0	2	0	0	0	2	1	0	0	0	0
5: Inflation	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
6: His_ctxt	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
7: Poi_stab	0	0	0	0	0	0	0	2	0	2	0	2	0	0	0	0
8: Reg_qlt	2	1	0	0	0	0	0	0	2	1	0	3	0	1	1	0
9: Cor_cntrl	1	0	0	0	1	0	1	0	0	1	0	2	0	1	0	0
10: Gen_gov	1	0	0	0	1	0	1	1	1	0	0	1	1	1	1	0
11: Eco_grow	1	0	1	0	0	0	0	0	0	0	0	1	0	0	1	0
12: Bus_climat	1	0	0	0	0	0	0	0	0	0	1	0	0	2	1	0
13: Q_hum_rec	0	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0
14: Privit	0	0	0	0	0	0	0	0	2	0	1	1	0	0	1	0
15: Openness	3	0	0	0	1	1	2	2	1	2	2	1	0	0	1	0
16: Geo_loc	2	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0

Source: Realized using MICMAC software
Influences are noted from 0 to 3, where:
0: No influence, 1: Low, 2: Average, 3: Strong

Table 4. Descriptive statistics of the Direct Influences Matrix

Indicator	value
Size of the matrix	16
Number of iterations	2
Number of zeros	181
Number of one	45
Number of two	21
Number of three	2
Number of P	7
Total	75
Filling rate	29,29688%

Source: Realized using MICMAC software.

The stability of the matrix:

The matrix becomes stable starting from iteration 2; this means that from this iteration the classification of the variables by influence and by dependence no longer changes because all indirect influence relationships have been detected. The longest path is of length 2.

Characteristics of Direct Influence Matrix:

The 29.296% fill rate reflects the direct influences between system variables. This rate is less than 30%; it is considered a good rate of filling. The rest 70.704% represents the indirect influences between the variables of this system, of which the rest of the MICMAC method is based.

4.3. Direct Influence/Dependency Plan



Figure 3. Direct Influence/dependency plan

Results from the short to medium terms shows interplay of a relationships, its horizons correspondents to less than ten years.

This plan gives the final result of the MICMAC method applied to analyze the interactions between the variables of this system. This plan is divided into 5 sectors:

Sector B: which regroups the variables general governance, regulation quality and lobbying: input variables or determining variables, they are very influential and less

dependent on the evolution of the other variables of the system. These variables control and condition the evolution of the system.

Sector A: regroups the variables openness and access to free trade areas: in this sector, we find the key variables or the relay variables, they are both very influential and very independent.

These are sensitive variables and should be carefully monitored for the development of scenarios and strategies.

Sector D: regroups the variables Economic growth and business climate: the result variables, they are not very influential and very dependent. Their values are explained by the evolution of the other variables.

Sector C: regroups variables geographical location, historical context, quality of human resources, infrastructure and inflation: variables excluded, they are both less influential and less dependent.

Sector E: Middle cluster variables. These variables are averagely influential and/or dependent variables. We can say nothing about these variables. These variables are privatization, political stability and corruption control.

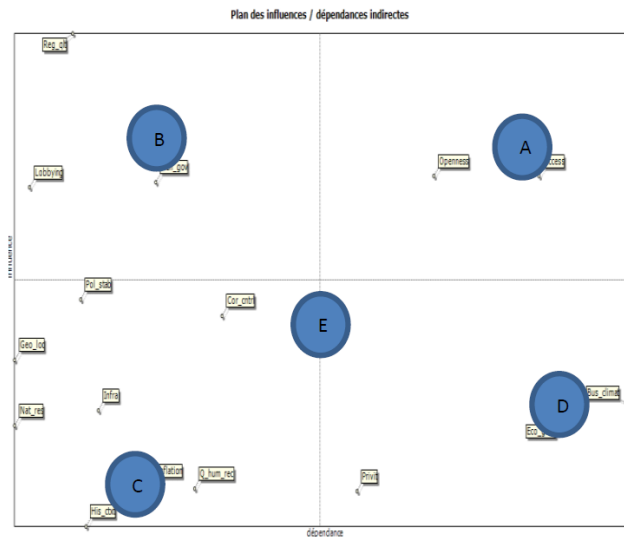


Figure 4. Indirect Influence/dependency plan

5. Conclusion

For many countries including Algeria, FDI inflows are the most important sources of projects finance. The most

important variables in the evolution of this system in Algeria are the determinate variables and the key variables: openness, access to free trade areas, general governance, regulation quality and lobbying. We can draw from key variables the issues of the evolution of the system.

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