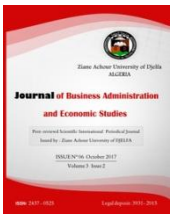

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The impact of corruption on the economic growth by taking FDI as intermediate variable

أثر الفساد على النمو الاقتصادي بإعتبار الاستثمار الأجنبي المباشر كمتغير وسيط

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Abstract

In this paper the aim is to investigate the effect of corruption on the economic growth in Algeria by taking foreign direct investment as intermediate variable, using macroeconomic data consisting of: foreign direct investment inflows, corruption perception index (CPI), and Gross Domestic Product (GDP) in Algeria from 2000 till 2018. The research method used is structural equation modeling depending on the partial least squares approach (PLS approach), and it results that the corruption has a negative impact on foreign direct investment and also a negative impact on economic growth in Algeria, however the impact of foreign direct investment on economic growth is positive.

Keywords

Foreign Direct Investment ;Corruption ; Economic growth ; PLS approach ;

JEL Classification Codes : C51 ; O33 ; O47 ; K42

الملخص

الهدف من هذه الورقة هو معرفة مدى تأثير الفساد على النمو الاقتصادي في الجزائر من خلال أخذ الاستثمار الأجنبي المباشر كمتغير وسيط ، وذلك باستخدام بيانات الاقتصادية الكلية التي تتكون من: تدفقات الاستثمار الأجنبي المباشر ، مؤشر إدراك الفساد (CPI) ، والناتج المحلي الإجمالي (GDP) في الجزائر خلال الفترة 2000-2018. طريقة البحث المستخدمة هي النمذجة باستخدام المعادلات الهيكلية اعتمادًا على نهج المربعات الصغرى الجزئية (نهج PLS) ، وقد توصلنا إلى نتيجة مفادها أن للفساد تأثير سلبي على الاستثمار الأجنبي المباشر وله كذلك تأثير سلبي على النمو الاقتصادي في الجزائر ، لكن تأثير الاستثمار الأجنبي المباشر على النمو الاقتصادي إيجابي.

الكلمات المفتاحية

الاستثمار الأجنبي المباشر ؛ الفساد ؛ النمو الاقتصادي ؛ طريقة PLS؛ كلمة مفتاحية ؛ كلمة مفتاحية ؛ كلمة مفتاحية ؛ كلمة مفتاحية.

تصنيف JEL: C51 ؛ O33 ؛ O47 ؛ K42

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I. INTRODUCTION:

For the developing countries, foreign direct investment (FDI) is considered to be a way to transfer technology and capital from other developing and especially developed countries. A reason in theoretical literature is as following: when FDI comes to a domestic country (in specific business) that firm receives competitive advantage due to the usage of new knowledge, experience, ways of production and management. Current successful economic growth of developing countries is explained by "catch up effect" in technological development with developed countries. (Melnyk, Kubatko, & Pysarenko, 2014), and one of the greatest threats to economic and political development of any nation is corruption. (Donwa, Mgbane, & Julius, 2015) Ancient philosophers, economists, politicians, scientists and policy - makers expressed concern about corruption as a problem since the fourth century. Corruption is a symptom and result of institutional weakness, with potential negative effects on the economic performance of a country. However, analysis of the causes and consequences of corruption have increased significantly in the last two decades.)Shera(2014 ، Corruption has not only penetrated the government sector but has also penetrated into the oil sector which is seen as the engine growth of the economy. (Onyinye, 2015)

This study was premised on the following research question:

- ***How affects corruption on the economic growth of Algeria?***

Through this problem, some of the following sub-questions can be formulated:

- How affect corruption on the foreign direct investment?
- How affect the foreign direct investment on the economic growth?
- Does foreign direct investment mediate the relation between corruption and economic growth?

To answer the problematic and sub-questions, we formulated the following hypothesis:

- ***Corruption affects negatively on the economic growth.***
- Corruption affect negatively on the foreign direct investment.
- Foreign direct investment affect positively on the economic growth.
- Foreign direct investment mediates the relation between corruption and economic growth.

To study the impact of corruption on economic growth, we proposed a model comprise three variables: corruption perception index (CPI), Gross Domestic Product (GDP per capita), and foreign direct investment (FDI). The research method used is structural equation modeling depending on the partial least squares approach (PLS approach).

II. THEORETICAL FRAMEWORK AND PREVIOUS STUDIES:

1. The theoretical framework:

A. The impact of corruption on economic growth:

The World Bank (1997) has identified corruption as "the single greatest obstacle to economic and social development". Again, the World Bank (2004) has projected that more than 1 trillion US$ is paid for bribes over the world as a whole each year. (Pulok, 2012)

Economic growth is defined as "an increase in the capacity of an economy to produce goods and services, compared from one period of time to another". (Abd Rahman, 2015)

Over the past years, the question of the economic consequences of corruption on economic growth has long been a subject of analysis and debate. Which are essentially focused on the effect of corruption on economic growth. (ghalawash, 2014)

Corruption is generally perceived as detrimental to economic growth by deterring investment and undermining the government's ability to implement effective policies. However, a significant number of studies indicate that corruption actually promotes growth based on its role in increasing public officials' productivity and speeding up bureaucratic delays. Still, others found that there is no significant relationship between the two variables. (Chamseddine, 2016)

According to (Igwike, Hussain, & Noman, 2012) there are two schools of thoughts exist:

1) Some experts claim that corruption has a positive effect on economic growth. The most popular justification of the beneficial effects of corruption rests on so-called "grease the wheels" hypothesis. (Méon & Sekkat, 2005)

Also (Huntington, 1968) stated that: "the only thing worse than a society with rigid, over centralized dishonest bureaucracy is one with a rigid, vercentralized, honest bureaucracy". He justify his thoughts that bribery act as speed money for the entrepreneurs and businessman to avoid bureaucratic delays and cumbersome rules and regulations in investment mechanisms.

(Lui, 1983) Develop an equilibrium queuing model of bribery, where customers are ranked based on their respective values of time. He suggests that efficiency of the public administration improves as bribing tactics to reduce waiting costs. So that individuals with higher values of time are able to move the front of the queue.

(Ackerman, 1999) said that: "I begin with cases of low level corruption and then consider the more controversial case of high level or "grand" corruption in the awarding of contracts, concessions, and privatized firms"

In cases where corruption's only efficiency cost stems from its illegality, the payments should be legalized. Surveys of private individuals and firms in Pakistan and India indicate that even quite poor people would be willing to make legal payments for improved service

Corrupt payments to win contracts, concessions, and privatizing companies are generally the preserve of large businesses and high level officials.

Under competitive conditions the high briber will be the most efficient firm, and the winner will behave efficiently although those who obtain licenses and tax breaks through bribery are rarely thought to behave inefficiently once the benefit is obtained. (Ackerman, 1999)

2) The alternative view of corruption has a negative impact on economic growth. Proponents of this school of thought point the following transmission channels to support

their argument: first, a decline in domestic and foreign investment; second, an increase in the cost of production; third, misallocation of natural resources; fourth, an increase in inequality and poverty; and fifth, uncertainty in decision making, among others. (Igwike, Hussain, & Noman, 2012)

(Mauro, 1995) became one of the pioneers when he engaged in an empirical analysis of corruption, by studying the relationship between corruption and economic growth, employing a cross sectional panel data consisting of 70 selected countries for a three years period extending from 1980 to 1983. He finds that corruption has a significant negative effect on private investment and economic growth.

(Shleifer & Vishny, 1993) Point out that corruption is more distortionary than taxation and is responsible for raising the cost of doing business, which in turn impedes economic growth.

(Mo, 2000) has shown that corruption reduces economic growth through human capital and political instability channels. His study reveals that 1% rise in the corruption level decreases the growth rate by about 0.72%.

Corruption is perceived as a negative phenomenon for the economy worldwide. It is one of the most important factors affecting the reduction of economic growth in many countries. This is a common occurrence today in many developing countries

Corruption literature assesses the impact of corruption on economic growth. While corruption may have played a positive role at certain times in specific places, the main findings of the empirical literature claim that corruption is endemic and pervasive and tends to lead to grow lower economist, hampers the allocation of private and productive government curbs in investment and refrains the effectiveness of public services.)Shera(2014 ،

(Pulok, 2012) add that many studies have claimed that corruption is a hindrance to development as it slows down the pace economic activity by exerting negative externalities through its long-lasting effect in the economic environment. Moreover, it is difficult to get precise estimation of the impact of corruption on economic development via different channels such as investment, human capital, public sector, openness …etc.

B. The impact of corruption on foreign direct investment:

Corruption can be described according to where it occurs: at the political or bureaucratic levels of the public sector, or within the private sector. It can be defined according to its intensity: whether it is isolated or systematic. Other specifications include: grand versus petty, local versus national, personal versus institutional, and traditional versus modern. (Zurawicki & Habib, 2010)

Corruption perception index (CPI), this index is derived by using surveys to determine the perceived levels of corruption in different countries. The results of the surveys are transformed into numerical values ranging from 0 to 100 with a higher CPI score indicating a lower level of perceived corruption. (Udenze, 2014)

By definition, foreign direct investment (FDI) is a kind of long-term investment in which it is conducted by entities from a country and located in another country; namely the ‘host country’.

Developing countries can gain huge benefits from FDI via the access of advanced technologies, expertise, innovation, research and development as well as management practices. Those are among the key elements that are needed for the purpose of economic transformation from the status of developing to developed countries. These elements, which are almost unavailable in the host developing countries, can be very crucial to stimulate economic growth. The absorption of the productivity effects from the FDI may vary between countries. It depends on their openness level, development of financial markets, the quality of human capital, trade policies, infrastructure as well as the level of inflation. (Abd Rahman, 2015)

By the late of 1990s, additional analyses helped to detail the overall understanding of the impact of corruption on the Foreign Direct Investment (FDI), while some other studies focused on more specific aspects. As for the first issue, the new studies attempted to estimate the evil of corruption with respect to FDI. In that respect, the quantitative models demonstrated to what extent corruption is a detriment to FDI relative to other factors.

Further, corruption was shown to be detrimental in a number of ways and linked to other institutional phenomenon. (Zurawicki & Habib, 2010)

The FDI literature comprises two opposing views of corruption:

1- The *grabbing hand* hypothesis holds that corruption impedes FDI by raising uncertainty and transaction costs (Quazi, Vemuri, & Soliman, 2014) also the corruption have a negative impact on the import, export, FDI inflow, and FDI outflow. (Zurawicki & Habib, 2010) It is now recognized that other institutional factors including the prevalence of corruption increase the costs of firms and reduce productivity. This implies that corruption can affect the impact that FDI has on economic growth. Recent studies of the relationship between FDI and corruption have found that corruption reduces FDI inflows. (Freckleton, Wright, & Craigwell, 2010)

2- The *helping hand* hypothesis holds that corruption facilitates FDI by greasing the wheels of commerce in the presence of weak regulatory frameworks. (Quazi, Vemuri, & Soliman, 2014) Such a methodology revealed the existence of low-level corruption countries, where the influence of corruption on FDI is far less obvious. The implication of this result is in line with the intuition and seems to confirm that there might exist a (presumably high) threshold of acceptable corruption such as that any further improvements exert a relatively minor impact on the growth of FDI. (Zurawicki & Habib, 2010)

According to (Drabek & Payne, 2002) transparent economic policies are vital for foreign investors, and the reasons are several. The first reason is that non-transparency imposes *additional* costs on businesses. These additional costs arise as firms have to tackle the *lack of information* that should have been provided by the appropriate government department in the implementation of its policies and in the activities of government institutions.

Moreover, the majority of law-abiding companies will typically avoid doing business in countries in which bribery is an inseparable part of business. In brief, the existence of strong legal provisions against bribery and their effective enforcement will go a long way towards inducing FDI flows. The second reason why transparent economic policies are important for FDI is because they facilitate *cross- border mergers and acquisitions*. When firms decide to acquire companies abroad,

they will often have to have their acquisitions approved by the Monopoly Commission or its equivalent in the host country.

The third reason is closely related to the previous discussion of competition policies. Foreign investors require transparent *protection of property rights*. Investors generally require that their property be protected and that the protection be transparent. What holds for investors in general holds, of course, for foreign investors in particular.

The fourth argument for transparent economic policies is that they positively influence business attitudes. Virtually all surveys of business attitudes convincingly show that companies base their decisions to invest abroad on their perceptions of what economists like to call "fundamentals". (Drabek & Payne, 2002)

C. The impact of foreign direct investment on economic growth:

FDI and economic growth are closely related. The theoretical foundation of FDI is the classical international trade theory of comparative advantage and differences in factor endowments between countries. Furthermore, the importance of capital to an economy has been well stated in Keynesian, neoclassical and endogenous growth theories.

The Solow's neoclassical growth model suggests that FDI increases capital stock and growth in a host economy through enhancing capital formation. According to neoclassical growth models with diminishing returns to capital, FDI has only a short-run growth effect as countries move towards a new steady state. Contrarily, endogenous growth theory assumes that FDI is more effective than domestic investment as it incorporates new technologies in the production function. It assumes that FDI associated technological spillovers offset the effects of diminishing returns to capital and keep the economy on a long-term growth path. (Seiko, 2016)

In line with the neo-classical growth theory, the inflow of FDI allows higher rates of economic growth through an increase in the stock of capital, expertise and technology in the host countries. (Abd Rahman, 2015)

Unlike the previous ones, the new growth models (Romer-Lucas models) emphasize the role of research and development, human capital accumulation and externalities on economic growth. (Seiko, 2016) Capital accumulation and augmentation of human capital through education, trainings, and new managements are also prescribed to FDI inflows. (Melnyk, Kubatko, & Pysarenko, 2014) Quality of institutions and, by implication, the level of economic freedom, can affect both availability and productivity of human and capital resources and might play an impressive role in its economic development. (Haydaroğlu, 2016)

FDI inflows has contributed significantly to the host country's economic development such as gross domestic product, raised standard of living through job creation, export performance, improved budget surplus, a source of revenue, and transferring of managerial expertise and technology to the host country.

Modernization Theory proposes that FDI contributes positively to economic growth in developing countries, particularly because it meets the demand for capital formation. Modernization

Theory also claims that FDI transfers knowledge, technologies, managerial skills and ideas, all of which enhance economic growth. (Pandya & Sisombat, 2017)

FDI are mostly done through multinational firms, where the motherboard company invests to increase its production, sales, and services abroad. FDI are sound when the multinational firm technology is superior to the domestic one and allows them to be more productive and profitable. (Melnyk, Kubatko, & Pysarenko, 2014)

There are several studies done on FDI and economic growth. Their findings vary from different methods used on their research, some of the researchers found that FDI has a positive effect on economic growth. (Antwi & Zhao, 2013), and at the same time it was noticed that FDI was not the single factor of economic growth. Moreover, it does not automatically ensure a stable economic growth and at a high rate. (Pelinscu & Ardelscu, 2009)

(Abd Rahman, 2015) comes to a different conclusion, a conclusion in line with Dependency Theory, which claims that foreign investment has a negative impact on economic development. Abd Rahman finds that, for a particular country –Bangladesh –growth in FDI has not been associated with positive economic growth; and that this may be related to a low absorptive capacity of Bangladesh to absorb capital inflow.

The well-known dependency theory claims negative impact of FDI on economic development of recipient country. This theory was considerably supported by successor authors because of the huge profit transferred to parent country nation for long run. There are experts believes that FDI can unnecessary overflow investments in the country that makes investment environment overcrowded and that leads to inflation in the interest rate of the recipient country. (Pandya & Sisombat, 2017)

According to (Melnyk, Kubatko, & Pysarenko, 2014) at early stages of the development and/or transition to the market economies, FDI may have a negative impact. In some cases investments aimed at other countries might be harmful for domestic economy decreasing rates of economic growth. The FDI recipient country may fear foreign ownership of domestic firms.

Additional inflows of FDI in firms may push out of the market other firms without FDI. This fact is referred to as a "market stealing" effect, when domestic firms are not so productive compared to the foreign ones.

An important issue of FDI is where research and development is held. If FDI comes with R&D it has greater spillover effect, but if the R&D stays in some other countries, FDI can reduce job places for highly qualified researches consequently may cause brain drain.

Among other factors of negative influence are dependence from foreign investors and repatriation of profits. When the foreign capital leaves the market domestic firms will not be able to fulfill that gap in a short run.

Thus, the danger of FDI should be considered by private, state and public organizations at all stages of attracting foreign capital. (Melnyk, Kubatko, & Pysarenko, 2014)

But the number of studies that show the positive effects of FDI is much higher than those which focus on the negative effects. (Ali & Hussein, 2017)

The IMF and the World Bank started to recommend to all countries (recommendation that they make currently) to create favorable conditions to attract FDI and to ensure, in this way, high development rates. (Pelinscu & Ardelscu, 2009)

In 2002, Organization of Economic Cooperation and Development (OECD) reported the fact that FDI is considered as the only source of economic growth and modernization for the countries with weak economies. (Ali & Hussein, 2017)

The interdependency analysis of *direct foreign investment* and *economic growth* (in developed and developing countries) showed that FDI had a positive impact upon economic growth just in the case when the state insistently promoted its own policies regarding this matter and attracted FDI taking into account the national interest and the development priorities of that country. Where the state assigns its functions to transnational companies, where they do business, FDI does not ensure stable and high economic growth. In addition, these countries can lose their sovereignty. (Pelinscu & Ardelscu, 2009)

2. Previous studies:

A. Pierre Guillaume Méon, and Khalid Sekkat (2005) in their study "does corruption grease or sand the wheels of growth", the aim was to assesses the relationship between the impact of corruption on growth and investment and the quality of governance in a sample of 63 to 71 countries between 1970 and 1998. The equations are estimated using Generalized Least Squares to correct for heteroscedasticity, they find that corruption has a negative impact on growth independently from its impact on investment. The results not only reject the "grease the wheels" hypothesis but are consistent with the reverse hypothesis: the "sand the wheels" hypothesis (Méon & Sekkat, 2005).

B. The study of **Richard S Igwike, Mohammed Erahad Hussain, and Abdullah Noman (2012)** titled by "the impact of corruption on economic development: A panel data analysis" examined the link between corruption and economic development with the help of several empirical tests. The authors collected data from about 201 countries for the period 2000 to 2009 and employed the annual growth rate of the gross domestic product to measure economic development and the Corruption Perception Index compiled and published by Transparency International to measure corruption in the selected set of countries. They used fixed effects and random effects models to test the relationships. The authors found that corruption has a negative impact on economic growth (Igwike, Hussain, & Noman, 2012).

C. The purpose of **Thuy Thu Nguyen, and Mathijs A. van Dijk (2012)** in their paper "Corruption, growth, and governance: Private vs. state-owned firms in Vietnam" is to present the effect of corruption on firm growth in Vietnam. The authors provide a firm-level analysis of the relation between corruption and growth for private firms and state-owned enterprises in Vietnam. They obtain three different measures of the perceived corruption severity from a 2005 survey among 741 private firms and 133 SMEs. They find that corruption hampers the growth of Vietnam's private sector. The results suggest that corruption may harm economic growth because it favors the state sector at the expense of the private sector and that improving the quality of local public governance can help to mitigate corruption and stimulate economic growth (Nguyen & Van Dijk, 2012).

D. The research aim of **Adela Shera, Bernard Dosti, and Perseta Grabova (2014)** in their study "corruption impact on economic growth: An empirical analysis" is to analyze the impact of corruption on economic growth across 22 developing countries for the period of 2001-2012. This

model has as dependent variable the growth of real GDP, Index corruption, population growth, government expenditures, level of secondary education enrollment, investment, and trade as a percentage of GDP, inflation, and capital formation are going to be tested as dependent variables. The authors used fixed model (FE) and Random effect model (RE). The panel data analyses reveal that there is a statistically significant negative relationship between corruption and economic growth. The relationship is directly related to inclusion of other determinants of economic growth)Shera(2014 ،.

E. The research aim of **Basel Elmukhtar Artimi, Abdulkacel Dowa, Elham Mohamed Albisht, and Basim Aboubaker Oqab (2016)** "the impact of corruption on economic growth in OIC countries" is to analyze whether the levels of perceived corruption in a cross-section of countries have affected their economic growth rates over the years 2003 to 2010. The study is conducted with a panel regression on a sample of 14 countries and eight variables for the time period in question which were: corruption, investment, trade openness, FDI, human capital, government expenditure, population growth, inflation. The models are constructed on the basis of the endogenous growth theory. Results using economic freedom index (EFI) shows that corruption has a negative impact of economic growth in the countries in question (Artimi, Dowa, Albisht, & Oqab, 2016).

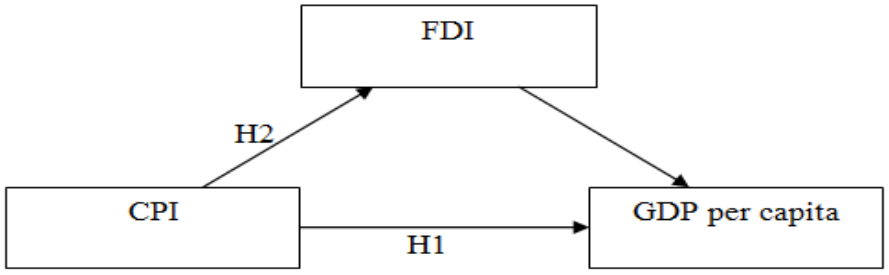
F. The study of **Nour Chamseddine (2016)** named by "corruption and economic growth in the middle East and north of Africa" examines the effects of corruption on economic growth in the region of the Middle East and North Africa (MENA) by using the Transparency International Corruption Perceptions Index and employing two panel data on the North African and Gulf countries between 2003 and 2013 where GDP (per capita) is a measure of economic growth, FDI is a measure of net inflows of foreign direct investment a country receives, labor is a measure of the labor force, CPI is a measure of corruption, GOV is a measure of government effectiveness, and CPI*GOV is an interactive variable combining both corruption and government effectiveness. The study includes two unit root tests and co-integration analysis, to test for a stable long-run economic structure between the variables in question. The findings suggest a negative but statistically insignificant relationship between the observed countries' economic growth and the level of corruption (Chamseddine, 2016).

III. METHOD AND PROCEDURES:

1. Model:

To study the impact of corruption on economic growth, and according to literature review we proposed a model comprise three variables, namely corruption perception index (CPI), Gross Domestic Product (GDP per capita), and foreign direct investment (FDI), as we can visualize it:

Figure (01): model of the study and its hypotheses



Source: presented by researchers according to literature review

The study hypotheses are given as follows:

H1: There is a significant and negative direct effect of corruption perception index (CPI) on Gross Domestic Product.

H2: There is a significant and indirect effect of corruption perception index (CPI) on Gross Domestic Product with the existence of foreign direct investment as intermediate variable.

2. Data:

In the empirical analysis we have used information from the World Bank (WB), The International Transparency Organization (ITO), and the United Nations Trade and Development (UNCTAD). This dataset cover Algeria over the period 1999-2018. Also, we have used the structural equation modeling (SEM) by STATA v14 software to test the conceptual model. This method can be viewed as a combination of factor analysis and regression or path analysis. (Hox & Bechger, 1999)

The following tables clarify all the data:

Corruption: we measured this variable by the corruption perception index (CPI), this is limited between 0 **(highly corruption)** to 100 **(very clean)**. To facilitate comprehension, the data were transformed by subtracting the CPI score from the maximum score of 100 to show that 0 is (**low corruption**).

Table (01): CPI's data

Years	CPI	100-CPI
1999	24	76
2000	24	76
2001	25	75
2002	26	74
2003	26	74

2004	27	73
2005	28	72
2006	31	69
2007	30	70
2008	32	68
2009	28	72
2010	29	71
2011	29	71
2012	34	66
2013	36	64
2014	36	64
2015	36	64
2016	34	66
2017	33	67
2018	35	65

Source: international transparency organization (ITO)

Economic growth: we measured this variables by GDP per capita, PPP (current international $)

Table (02): GDP's DATA

years	GDP
1999	7 795,27
2000	8 093,288
2001	8 416,500
2002	8 911,413
2003	9 620,872
2004	10 176,370
2005	10 971,517
2006	11 332,450
2007	11 843,364
2008	12 161,899
2009	12 241,811
2010	12 609,869
2011	12 989,955
2012	13 404,009
2013	13 715,332
2014	14 202,866
2015	14 612,680
2016	15 074,925

2017	15 266,485
2018	15 621,589

Source: World Bank

Foreign direct investment: is a dependent and an independent variable in this study, we measured this variable by FDI inflows (millions of dollars)

Table (03): FDI's data

years	FDI inflows
1999	291,6
2000	280,10
2001	113,10
2002	1 065,00
2003	637,90
2004	881,90
2005	1 145,30
2006	1 888,20
2007	1 743,30
2008	2 631,70
2009	2 753,80
2010	2 301,20
2011	2 580,40
2012	1 499,40
2013	1 684,00
2014	1 506,70
2015	-584,00
2016	1 546,00
2017	1 201,00
2018	1 506,00

Source: UNCTAD

IV. STUDY RESULTS

1. Correlation between the study variables:

Table 4 shows the correlation between the study variables: FDI inflows, CPI, and GDP.

Table (04): correlation between study variables

```
. correlate CPI FDI_Inflows GDP_Per_Capita
(obs=20)

             |      CPI FDI_In~s GDP_Pe~a
-------------+---------------------------
         CPI |   1.0000
 FDI_Inflows |  -0.2275   1.0000
GDP_Per_Ca~a |  -0.9140   0.3655   1.0000
```

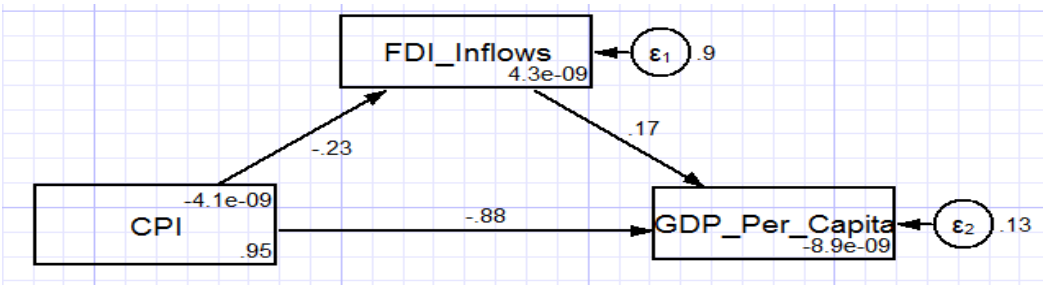
Source: presented by researchers using STATA 14 outputs

From the above table, there is: a weak negative correlation between CPI and FDI inflows with coefficient of correlation of (-0.2275); and a strong negative correlation between GDP per capita and CPI with coefficient of correlation of (-0.9140); However there is a medium positive correlation between FDI inflows and GDP per capita (0.3655).

2. Path analysis:

The method of SEM does maximum likelihood (ML) estimation. (Allison, 2017) Thus, we estimate likelihood that corruption affects negatively on GDP, and foreign direct investment is an intermediate variable between them.

Figure (02): path analysis



Source: presented by researchers using STATA v14 outputs

From the figure (2) above it's clear that the direct effect of corruption perception index (CPI) on GDP per capita is -0.88 and it's significant, so we accept the hypothesis H1: There is a significant and negative direct effect of corruption perception index (CPI) on Gross Domestic Product.

The direct impact of corruption perception index (CPI) on foreign direct investment (FDI) is -0.23 and the impact of this last on the GPD per capita is 0.17. Which makes the indirect impact (-0.0391) and it's significant and bigger than the direct impact of corruption perception index (CPI) on GDP per capita that leads us to accept the hypothesis H2: There is a significant and indirect effect of corruption perception index (CPI) on Gross Domestic Product with the existence of foreign direct investment as intermediate variable.

3. CFA: **Figure (03): endogenous and exogenous variables**

```
Endogenous variables

Observed:  FDI_Inflows GDP_Per_Capita

Exogenous variables

Observed:  CPI

Fitting target model:

Iteration 0:   log likelihood = -63.288678
Iteration 1:   log likelihood = -63.288678

Structural equation model                       Number of obs     =         20
Estimation method  = ml
Log likelihood     = -63.288678
```

Source: presented by researchers using STATA v14 outputs

This first part shows us a few things. First, it identifies our three observed variables. It also shows how many iteration it took to set the target model (1 is good). It also tells us our number of observation (17). (Salas, 2012)

Next we can look at the rest of the output

Table (05): estimation of the model

	OIM Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Structural						
FDI_Inflows <-						
CPI	-.2274733	.2177448	-1.04	0.006	-.6542452	.1992987
_cons	4.28e-09	.2122314	0.00	1.000	-.4159658	.4159658
GDP_Per_Capita <-						
FDI_Inflows	.1661721	.0854198	1.95	0.052	-.0012477	.3335919
CPI	-.876222	.0854198	-10.26	0.000	-1.043642	-.7088022
_cons	-8.93e-09	.0810743	-0.00	1.000	-.1589027	.1589027
var(e.FDI_Inflows)	.9008431	.2848716			.4847029	1.674259
var(e.GDP_Per_Capita)	.1314609	.0415716			.0707331	.2443262

Source: presented by researchers using STATA v14 outputs

This output gives us standardized factor loading values for each of the three observed variables as well as their standard error, significance, and confidence intervals. (Salas, 2012) For example, the standardized factor loading for corruption perception index (CPI) onto FDI inflows was -0.22 with a standard error of 0.21. It is significant at $p<0.05$ and had a 95% confidence interval that ranged from [-0.65 to 0.19].

Table (06): test of chi-square

Fit statistic	Value	Description
Likelihood ratio		
chi2_ms(0)	0.000	model vs. saturated
p > chi2	.	
chi2_bs(3)	40.618	baseline vs. saturated
p > chi2	0.000	

Source: presented by researchers using STATA v14 outputs

The output provides the chi-square value of 40.618; the degrees of freedom of 3, and the significance of the chi-square test ($p<0.05$). This preliminary goodness of fit statistics suggests that the model may not fit the data all that well. (Salas, 2012) As general approach to model evaluation, chi-square may be sensitive to sample size. Many alternative statistics have been proposed. Here are some that are reported by STATA. (Allison, 2017)

Table (07): goodness of fit statistics

```
. estat gof, stats(all)
```

Fit statistic	Value	Description
Likelihood ratio		
chi2_ms(0)	0.000	model vs. saturated
p > chi2	.	
chi2_bs(3)	40.618	baseline vs. saturated
p > chi2	0.000	
Population error		
RMSEA	0.000	Root mean squared error of approximation
90% CI, lower bound	0.000	
upper bound	0.000	
pclose	1.000	Probability RMSEA <= 0.05
Information criteria		
AIC	140.577	Akaike's information criterion
BIC	147.547	Bayesian information criterion
Baseline comparison		
CFI	1.000	Comparative fit index
TLI	1.000	Tucker-Lewis index
Size of residuals		
SRMR	0.000	Standardized root mean squared residual
CD	0.849	Coefficient of determination

Source: presented by researchers using STATA v14 outputs

This provides us with some of goodness of fit statistics. For instance, we can see that the RMSEA (Root Mean Square Error of Approximation) value is 0.000. According to (Allison, 2017) good models have an RMSEA of 0,05 or less. Models whose RMSEA is 0,10 or more have poor fit. He also said that the one nice thing about this statistic is that you can get a confidence interval. (Allison, 2017) We also see that the CFI (Comparative Fit Index) value is 1.000, and the SRMR (Standardized Root Mean square Residual) value is 0.000. The CD value of 0.849 provides

information similar to the R-squared value. In all, looking at this goodness of fit, statistics suggest that the fit of the model to the data is good.

At this point, it would be helpful to examine the modification indices and see if purely in empirical sense- any additional paths could be specified that may improve model fit. (Salas, 2012)

Figure (04) : modification indices

```
. estat mindice
(no modification indices to report, all MI values less than 3.841458820694123)
```

Source: presented by researchers using STATA v14 outputs

V. CONCLUSION:

Corruption it is an evil, certainly universal, but more wide spread in developing countries because conditions favor it. (Gbetnkom, 2012) Corruption is a disease similar to cancer which impedes cultural, economic and political development of any country and destroys the functioning of several organs of the governments. (Kanu, 2015)

Foreign Development Investors are mostly invited by transition and developing countries in a hope that through this international activity, the positive experience from developed countries will come to domestic countries, so the FDI contributes to greater technological growth and hence, faster economic development. (Silvio, 2009). The positive side for investors is that investing in developing countries may bring higher gain and profits. (Melnyk, Kubatko, & Pysarenko, 2014)

From using SEM by STATA v14 to maximum likelihood estimation we found that:

- There is a significant and negative effect to corruption perception index (CPI) on GDP per capita.
- There is a significant and negative effect to corruption perception index (CPI) on foreign direct investment (FDI inflows).
- There is a significant and positive effect to foreign direct investment (FDI) on GDP per capita.
- The findings from these study shows that corruption perception index (CPI) affects negatively on GDP per capita in Algeria, also the FDI is an intermediate variables, which leads us to say that corruption affect negatively on GDP per capita through foreign direct investment.

The fight against corruption should include moral education, values and norms of society which play an important role. However, mechanisms should be established to observe and make responsible the individuals who have abused.)Shera(2014 ،

Each research has a prospect that we have mentioned as follow:

- Corruption, growth, and governance.
- Corruption in the oil and gas industry implication for economic growth.
- The effect of economic freedom on economic growth.

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