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**The Role of Foreign Direct Investment in Achieving Economic Growth, Surveying
a Group of International Experiences with Emphasis on the Case of Algeria.
Empirical Study for the Period 1990-2018**

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Dedication

I would like to dedicate this work to.....

My Parents

My Wife

My Brothers and sister

Family in law

All my Friends

Abdelhak Lefilef

Acknowledgement

Thanks to Allah for giving me the willingness and strength to fulfill this work

(ALHAMDULILLAH)

I would like to thank those who generously made this dissertation possible with their support and encouragement.

*Firstly I express my sincere gratitude to my supervisor **Prof.Dr Mohammed Lamine Cherbi** for the continuous support of my Ph.D study and related research, for his patience, motivation, and immense knowledge. His guidance helped me in all the time of research and writing of this Research. I could not have imagined having a better advisor and mentor for my Ph.D study.*

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Abdelhak Lefilef

Abstract

Abdelhak Lefilef (2020), “**The Role of Foreign Direct Investment in Achieving Economic Growth, Surveying a Group of International Experiences with Emphasis on the Case of Algeria for the Period 1990-2018**”. Department of Economic Sciences, Faculty of Economic, Commercial, and Management sciences. Kasdi Merbah University, Ouargla, Algeria.

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Prof.Dr. Mohammed Lamine Cherbi

The main objective of this study is to investigate the role of FDI in achieving EG, surveying a group of international experiences (Middle East and North Africa countries) with emphasis on the case of Algeria using annual data over a period of 29 years from 1990 to 2018. The study employs five macroeconomic variables; EG, FDI inflow, imports (IMP), exports (EXP), and gross capital formation (GCF) are considered as independent variables. Using recently developed panel and time series techniques, the four variables against GDP per capita have been tested. On the whole, the empirical Results revealed that FDI and IMP do not contribute to EG in Middle East and North Africa countries (MENA countries), and Algeria as well. However, EXP and GCF have a positive and significant effect on EG. Additionally, the same results have been highlighted for the case of Algeria. These findings provide critical indicator to MENA and in particular Algeria decision makers to make more efforts in order to create suitable environment, directing investments to productive sectors, and thus, to be independent from oil revenues and enhancing Economic Growth.

Keywords: foreign direct investment, economic growth, export, import, grosses domestic products, MENA countries, algeria

الملخص

عبد الحق لفيلف, (2020) دور الاستثمار الأجنبي المباشر في تحقيق النمو الإقتصادي، دراسة بعض التجارب الدولية مع التركيز على حالة الجزائر خلال الفترة 1990-2018. قسم العلوم الاقتصادية، كلية العلوم الاقتصادية و التجارية وعلوم التسيير. جامعة قاصدي مرباح ، ورقلة ، الجزائر.

المشرف:

أ.د. محمد ملين شربي

هدفت هذه الدراسة إلى فحص دور الاستثمار الأجنبي المباشر في تحقيق النمو الاقتصادي من خلال دراسة بعض التجارب الدولية مع التركيز على حالة الجزائر باستخدام بيانات سنوية خلال فترة 29 سنة من 1990 إلى غاية 2018. و اعتمدت الدراسة على خمس متغيرات اقتصادية كلية: النمو الاقتصادي معبرا عنه بالناتج المحلي الإجمالي للفرد (GDP per capita) كمتغير تابع من جهة، و الاستثمار الأجنبي المباشر (FDI)، الواردات (IMP)، الصادرات (EXP) ، و إجمالي تكوين رأس المال (GCF) كمتغيرات مستقلة من جهة أخرى. باستخدام آخر تقنيات نماذج البائل بالنسبة لواحد وعشرون دولة من دول الشرق الأوسط وشمال إفريقيا و آخر تقنيات نماذج السلاسل الزمنية بالنسبة للجزائر، و أظهرت النتائج عدم وجود أي تأثير ذو دلالة إحصائية لكل من الاستثمار الأجنبي المباشر و الواردات على النمو الاقتصادي في كل من دول الشرق الأوسط وشمال إفريقيا. وبالمقابل أظهرت النتائج وجود تأثير إيجابي و ذو دلالة إحصائية لكل من الصادرات وإجمالي تكوين رأس المال على النمو الاقتصادي في كل من دول الشرق الأوسط و شمال إفريقيا من جهة و الجزائر من جهة أخرى. هذه النتائج تعتبر بمثابة مؤشر لمتخذي القرار من أجل العمل على خلق مناخ استثماري مناسب لجلب المستثمرين الأجانب، مع العمل على استقطاب وتوجيه هذه الاستثمارات للقطاعات المنتجة، للخروج من التبعية للنفط و الرفع من معدلات النمو.

كلمات مفتاحية: استثمار أجنبي، نمو اقتصادي، صادرات، واردات، إجمالي تكوين رأس المال ، الجزائر

Résumé

Abdelhak Lefilef (2020), «**Le rôle de l'investissement étranger direct dans la réalisation de la croissance économique, enquête sur un groupe d'expériences internationales mettant l'accent sur le cas de l'Algérie pour la période 1990-2018**». Département des sciences économiques, Faculté des sciences économiques, commerciales et de gestion. Université Kasdi Merbah, Ouargla, Algérie

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L'objectif principal de cette étude est d'étudier le rôle des investissements directs étrangers (IDE) dans la réalisation de la croissance économique (CE), en examinant un groupe d'expériences internationales (pays du Moyen-Orient et d'Afrique du Nord) en mettant l'accent sur le cas de l'Algérie à l'aide de données annuelles sur une période de 29 ans de 1990 à 2018. L'étude utilise cinq variables macroéconomiques; croissance économique mesurée par le produit intérieur brut par habitant (PIB par habitant) en tant que variable dépendante, tandis que les entrées d'investissements directs étrangers (IDE), les importations (IMP), les exportations (EXP) et formation totale de capital (FTC) sont considérés comme variables indépendantes. En utilisant des techniques de panel et de séries chronologiques récemment développées, les quatre variables par rapport au PIB par habitant ont été testées. Dans l'ensemble, les résultats empiriques ont révélé que FDE et l'IMP ne contribuent pas à EG dans les pays du Moyen-Orient et d'Afrique du Nord (pays MENA), ainsi qu'en Algérie. Cependant, EXP et FTC ont un effet positif et significatif sur CE. De plus, les mêmes résultats ont été mis en évidence pour le cas de l'Algérie. Ces résultats fournissent un indicateur critique aux décideurs de la région MENA et de l'Algérie spécialement pour qu'ils fassent plus d'efforts afin de créer un environnement approprié, des investissements directs vers les secteurs productifs, et ainsi, d'être indépendants des revenus pétroliers et de renforcer la croissance économique.

Mots clés: investissement direct étranger, croissance économique, exportation, importation, formation totale capital, MENA, algérie.

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List of Abbreviations

List of Abbreviations	
GDP per capita	Gross Domestic Product per capita
EG	Economic Growth
FDI	Foreign Direct Investment
IMP	Imports
EXP	Exports
GCF	Gross Capital Formation
MENA	Middle East and North Africa
U.S	United States Dollars
NGT	New Growth Theory
IMF	International Monetary Fund
UNCTAD	United Nations Conference on Trade and Development
OECD	The Organization for Economic Co-operation and Development
FPI	Foreign Portfolio Investment
HDI	Human Development Index
NEG	New Endogenous Growth
PRISMA	Preferred Reporting Items for Systematic Review and Meta- Analysis
GDI	Gross Domestic Income
VAR	Vector Auto regression
ARDL	Autoregressive Distributed Lags
UK	United Kingdom
VECM	Vector Error Correction Model
FMOLS	Fully Modified Ordinary Least Square
DOLS	Dynamic Least Squares
CCR	Canonical Co-integrating Regression
WDI	World Development Indicator
SAMA	Saudi Arabian Monetary Agency
AMU	Arab Maghreb Union
GMM	Generalize Method of Moments
WEO	World Economic Outlook
ADF	Augmented Dickey-Fuller

Chapter One

Introduction

1.1. Preface

1.2. Hypotheses of the Study

1.3. Objectives of the Study

1.4. Importance of the Study

1.5. Structure of the Study

1.1. Preface

foreign direct investment (FDI) phenomenon is still generating a large number of empirical studies. special interest in the creation of the so-called ‘new theory of economic growth’ in the last decades has been oriented toward the role played by FDI in deciding the speed of economic growth (EG) in less developed countries (**Balasubramanyam et al., 2001**).

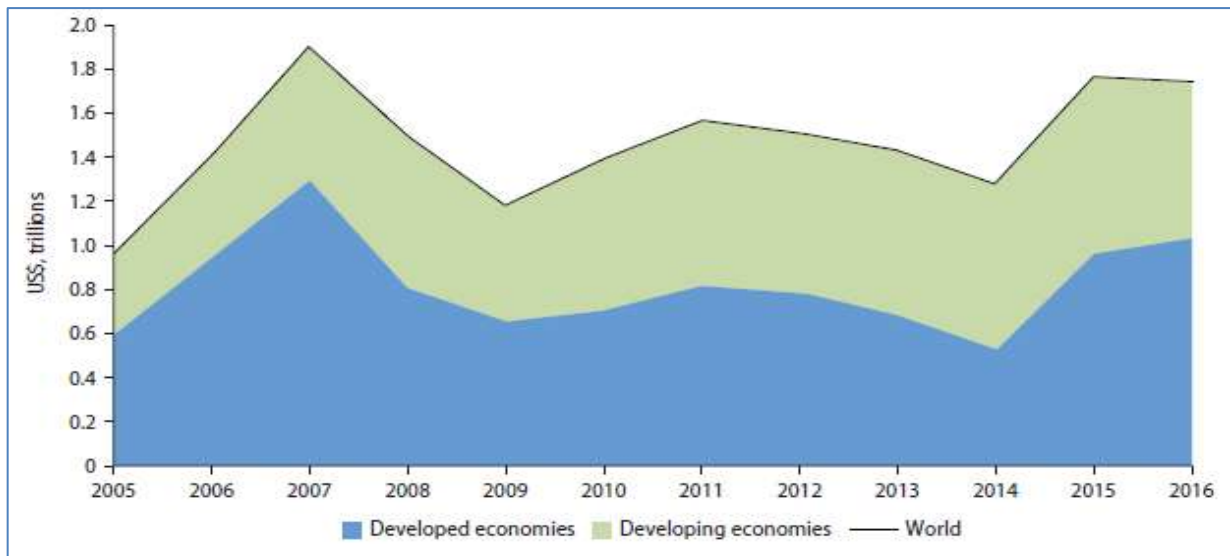
The essence of new growth theory is that contrary to neoclassical knowledge, growth can be endogenous. Therefore, the engine of growth is innovation or technical change. Therefore, new ideas or invention that enhance capital and labor productivity (**Bloch & Kenyon, 2001**). However, the neoclassical growth theory focuses on the fact that the future rate of production growth, which reflects a balance and a normal rate of growth, is calculated exogenously by the level of labor force growth and also by technological progress. (**Solow, 1956**).

FDI can be defined as international investment by an entity resident in one economy in the business of an enterprise resident in another economy that is made with the objective of obtaining a lasting interest (**IMF, 1993**). It can also improve the economies of the host country through capital investment by introducing new products and expanding the knowledge base of the host country through the transfer of skills. (**Hong, 2014**).

Many policy makers and experts argue that foreign direct investment (FDI) can make significant positive influences on the development effort of the host country. theoretical and empirical literature both show that FDI can be a source of valuable technology and know-how while promoting links with local companies, which can give an economy a further boost.

For many developing countries, FDI has been the main source of foreign financing, surpassing official development aid, remittances, or portfolio investment flows. More than 40 percent of the nearly US\$1.75 trillion in global FDI flows have been directed to developing countries (See **figure 1.1**), providing much-needed private capital, yet financing is still needed to achieve the objectives of sustainable development (**World Bank Group, 2017,P.2**).

(Figure 1.1): FDI inflows, Global and by Development Group, 2005-2016



Source: World Bank Group, 2017,P.2

Indeed, both developed and developing countries are now increasingly seeking FDI, but it is not seen as a dominant factor. Conversely it is considered as a major channel for technology transfer and innovation. Thus, the global economy has completely been transformed in recent years. It operates in an environment progressively complicated as free trade, free movement of capital and goods become hallmarks, where FDI is continuously selected as a new way to encourage EG. Moreover, in order to increase their investment capacity, to positively impact the balance of payments, to compensate for the shortfall in national savings, to create new opportunities for better paying jobs and better working conditions,

many countries are motivated to make FDI one of the most powerful pillars of the economic growth strategies (**Abbes et al., 2015**).

The need for FDI has not been taken highly into account by socialists since the early seventies, they relied on their own resources such as petrochemical, steel, plastics and international credit, as well as on achieving good EG rates. It is well known that FDI came as a result of colonialism, but Algeria continued his socialist leadership by relying on public dominance over all sectors of the Algerian economy between 1980 and 1990, rather than enhancing the attractiveness of FDI inflows. (**Si mohamed et al., 2015**).

The determination of low level in FDI flows since the 1990s (black decade) has been associated with an average rate of 3% of annual FDI inflows. Yet, in 1999, FDI remained low, it increased by 0.6% as a percentage of gross domestic products (GDP), on the other hand, Algerian FDI net inflow fluctuated substantially in recent years, it tended to decrease through 2004-2018 period ending at 1.0506 million current U.S dollar in 2018 (**Unctad, 2019**).

Certainly, academics and practitioners have recently turned more attention to the influence of FDI inflows on EG in developing countries by conducting cross-country studies, ignoring the selection of peers' countries, and pay no attention to examine the role of these inflows on a single host country particularly in Middle East and North Africa countries (MENA countries). In spite of up to date studies on the impact of FDI on EG, their findings remain unclear for two main reasons. Firstly the focus on cross countries analysis without applying any criterion of choosing the sample, leads to different results due to policy differences in each countries. Secondly, such influences in developing economies vary from those in developed economies.

Therefore, by contrast this present study, addresses some gap in the existing empirical literature and investigates the role of FDI in achieving EG, surveying a

group of international experiences (MENA countries), with emphasis on the case of Algeria for the period 1990-2018. One specific question arose that require answer: **Does FDI have a significant impact on EG of MENA countries and Algeria in particular from 1990 to 2018?**

Under this question, the following sub-questions can be extended:

1. What is the kind and the direction of the relationship between foreign direct investment and economic growth?
2. What is the relationship between imports and economic growth?
3. Do exports have an influence on economic growth?
4. What is the extent to which gross capital formation affect economic growth?

1.2. Hypotheses of the Study

To accomplish the aim of the study, the following hypotheses are formulated:

- Hypothesis 1: there are effects of foreign direct investment on economic growth.
- Hypothesis 2: there is an impact of imports on economic growth.
- Hypothesis 3: there is an influence of exports on economic growth.
- Hypothesis 4: there is an effect of gross capital formation on economic growth.

1.3. Objectives of the Study

The main purpose of this study is to investigate the role of FDI in achieving economic growth in MENA countries with emphasis on the case of Algeria during the period 1990-2018, the related specific aims are:

1. With reference to the importance and the great need to diversification of income resources and risk reduction of over-reliance on

hydrocarbon revenue that exceeds 97% in Algeria. Then this study will examine the impact of FDI on EG in MENA countries and Algeria in particular and therefore, to ascertain the extent to which FDI can be considered as an alternative to oil export revenues.

2. Showing the influence of the IMP on EG in MENA countries and Algeria, and this is a value added to this work since according to the best knowledge of the researchers there is no work that deal with direct relationship between IMP and EG over the period of the study.
3. Since the oil-exporting in MENA countries especially Algeria need a stable price of oil to achieve development, this study aims to empirically provide evidences of whether FDI inflows efficiently encourage non hydrocarbon exports or not.
4. Empirically the study will seek to link between FDI inflows and EG in MENA countries and Algeria.

1.4. Importance of the Study

The research, which is on the area of economies of FDI, explores the effects in developing countries especially Algeria. FDI inflow has become commendable and as such a need to attract more FDI. According to well knowledge of the researchers, **no previous macro study has empirically investigated the effects of FDI flows to MENA countries and Algeria using these macro economic variables**. Therefore, by choosing MENA countries all together, then, Algeria in particular, the thesis' results will be more appropriate for policy makers, to an emerging economy, Algeria in particular, and to any hydrocarbon-based economies in general.

Additionally, providing empirical evidences will help policy makers to understand how the FDI inflow is determined and how beneficial it is. Explicitly,

the findings will prove whether FDI is consistently has a positive influence on gross domestic product per capita (GDP per capita) in the presence of other macroeconomic variables employed in the research or not. Thus, it enables decision makers to use the best strategies to maintain, utilize such benefits, and enhance the available tools and policies currently in place. Finally, this research will add to knowledge through its empirical quantitative perspectives that focuses on five variables; EG, FDI, IMP, EXP and GCF.

1.5. Structure of the Study

In addition to the current chapter, this study includes five other chapters. While chapter two discusses the theoretical background of the study, Chapter three surveys relevant literature and presents studies associated with study's subject. Chapter four then illustrates the methodology adopted and describes in some details on the sample of data and the empirical test procedures that are used to achieve the goals of the study. Then after, chapter five which analyses and assess the results obtained. Finally, chapter six demonstrates a summary of the topic handled in this study, also it provides conclusions and suggests recommendations for further researches.

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2.1. Introduction

The significant increase in FDI flows, in the last decades, has created a great area of awareness for many economists. This trend opens the gate for several questions concerning the influence of FDI on EG. In recent years, enormous economists and policymakers have turned their interest to the nexus between FDI and EG, different economic and financial variables. FDI is considered as an engine of growth for host countries through the transfer and diffusion of knowledge (**De Mello Jr, 1997**). Given the benefits of FDI inflows, there is now a rising need to demonstrate this relationship between FDI and economic growth in host country economies. This chapter clarifies briefly the main concepts of FDI, EG and explores theoretically the relationship between FDI and economic growth.

2.2. Foreign Direct Investment (FDI)

According to (**Brems, 1970**) and also the neoclassical growth traditional models, FDI usually increases capital stock and thus EG in the host country via financing capital formation. From the viewpoint of modernization theories (exogenous and endogenous), the transfer of technology through FDI in developing countries is particularly essential because most developing countries require the necessary infrastructure in terms of an educated population, liberalized markets, economic and social stability that are needed to innovation to promote growth (**Bengoa & Sanchez-robles, 2002**).

In contrast to the recent view, dependency theorists argue that reliance on foreign investment is expected to have a negative impact on growth and the distribution of income. Accordingly, (**Chase-Dunn, 1998**) stated that FDI generates an industrial structure in which monopoly is predominant, leading to what they express as; underutilization of productive forces. The assumption being that an economy controlled by foreigners would not develop in nature, but would rather grow in a disarticulated manner. This is because the multiplier influence by

which demand in one sector of a country builds demand in another is weak and thereby leading to heavy growth in the developing countries. This statement is important, as the majority of FDI inflows to Africa are to be found in natural resource sectors which have large barriers to entry (Pigato, 2000).

2.2.1. The Concept and Definitions of FDI

According to (Unctad, 2019) “*FDI is defined as an investment reflecting a lasting interest and control by a foreign direct investor, resident in one economy, in an enterprise resident in another economy (foreign affiliate)*”. In view of that, FDI inflows include capital given by a foreign direct investor to a foreign associate, or capital received by a foreign direct investor from foreign affiliate. FDI outflows represent the same flows from the view of the other economy, so that, FDI might be negative in case of reverse investment or disinvestment since FDI flows are usually stated on a net basis. Furthermore, FDI stock is the value of capital and reserves attributable to a non-resident parent firm, plus the net indebtedness of foreign affiliates to parent enterprises.

The international Monetary Fund (IMF) defines the FDI as the investment that involves a long-term relationship representing a durable interest of resident entity in economy (direct investor) in an entity resident in an economy other than that of the investor. Likewise, the World Bank considers FDI as “*the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in a firm, operating in an economy other than that of the investor and can be further developed as the sum of equity capital, reinvestment of earnings, other long term capital, and short term capital as shown in the balance of payment in that economy*” (Almafraji & Almsafir, 2014).

Another definition of (OECD, 2008,P.48) perceives FDI as the aim of set up a regular interest by a resident firm in one economy (direct investor) in an enterprise (direct investment firm) that is resident in an economy other than that of the

direct investor. The lasting interest involves the subsistence of a long-term Nexus between the direct investment firm and direct investor. **(Oatley, 2015,P.376)** consider it as a form of cross-border investment in which resident or corporation relied in one country has a productive asset located in a second country. Such investment usually made by multinational corporations. FDI can include the creation of a new, or the acquisition of plant or factory. Additionally, **(Sobel, 2006,P.460)** supposes that FDI is an investment in control of productive facilities overseas, habitually defined by an investment that amount to control of 10 percent or more of a company's equity.

The last two definitions comprise different points of view, where **Oatley** states that a foreign source of capital constitutes a necessary condition of FDI (cross-border investment), while Sobel's explanation more evidently allows locally raised capital to count as FDI as long as a foreign based Multinational corporations controls that capital (control of productive facilities overseas).

It should be noted that FDI differs from foreign portfolio investment (FPI), where **(Chaudhuri & Mukhopadhyay, 2014)** stated that FPI is basically intended at creating short-term interests and habitually adjusts to changing short-term conditions in the host country. In situations of unfavourable business conditions, FPI can be readily withdrawn while FDI has much less flexibility. Likewise, FPI is also includes investing in financial assets such as stocks and bonds of entities located in another country.

FDI and FPI are similar in some respects but very different in others. Thus, **(Khor, 2000)** mentioned that countries desiring for foreign investment into their country usually prefer FDI to FPI because of the highly volatile and irregular nature of FPI. Yet, FDI can also be a cause of financial instability. It can react quickly to short-term economic changes.

Otherwise, before conducting any foreign investment project, the enterprise has to make an intentional choice between FDI and FPI. In view of the fact that FDI necessitates higher investment-specific costs than FPI, the former cannot be readily adjusted, while FPI can be attuned directly to short-term changes in the environment.

2.2.2. The Concept of Foreign Direct Investment Spillovers

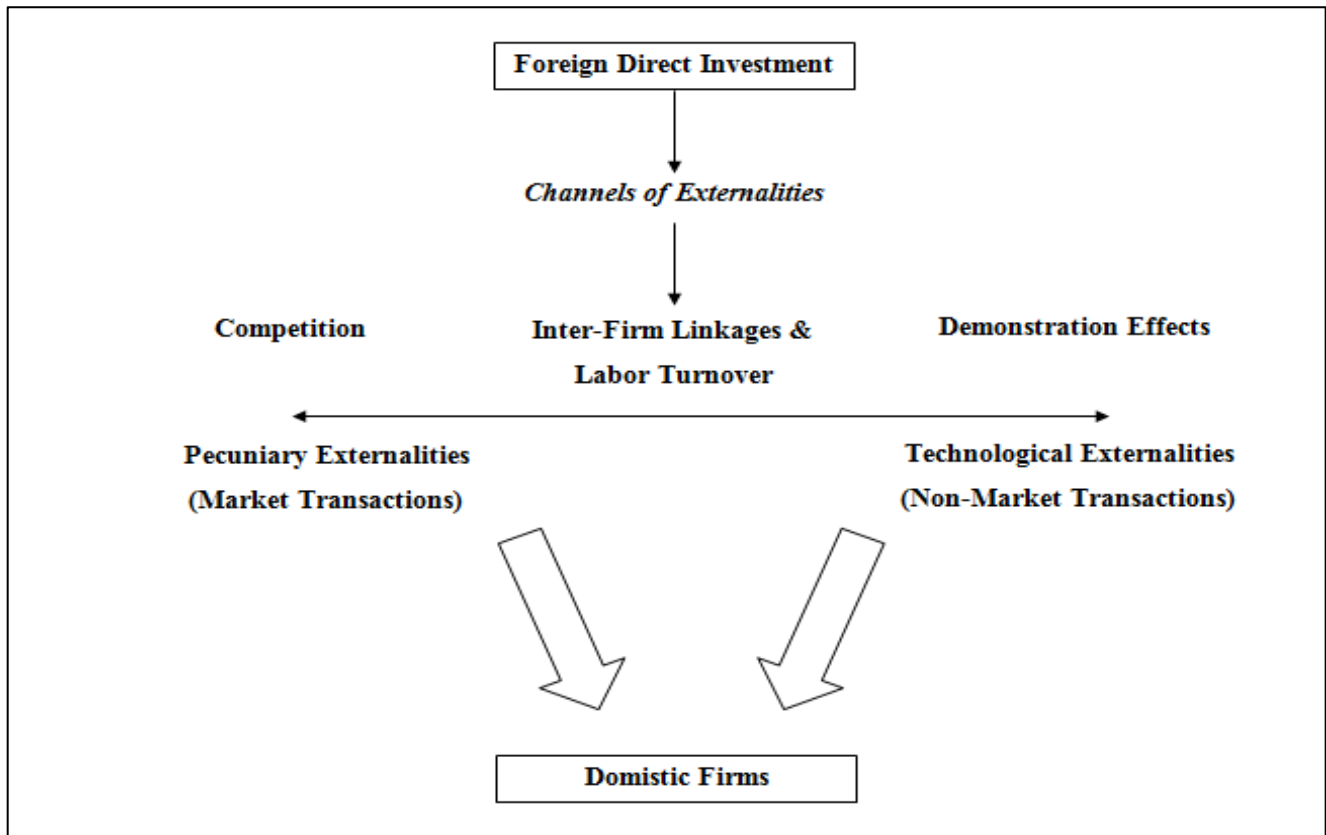
Multinational Enterprises (MNEs) have an essential role in the creation of new technologies. Moreover, by participating in FDI, these technologies are expanded to a large number of developed and developing host economies. Not only does this improve the overall level of technology in these host economies, the level of technological development of domestic firms in these host economies may also be motivated. One way how this can occur is through formal technology transfers, where domestic firms purchase technologies from FDI. Otherwise, it is gradually more thought that domestic firms promote their level of technological development through the occurrence of FDI externalities or spillovers. Externalities can be categorized into two types, consisting of technological and pecuniary (financial) externalities. Technological externalities take place when the actions of one entity directly affect the environment of another entity; the effect is not transmitted through prices (**Papandreou, 1994,P.5**).

To explain more, according to (**Scitovsky, 1954,P.146**) the inflow of FDI might expose a domestic firm to a new piece of technology. The implementation and successful assimilation of the new technology by the domestic firm illustrates a form of technological externalities, as the domestic firm will not recompense the foreign owned firm for this effect. On the other hand, pecuniary externalities are influences that are transferred through the market, so that, to arise whenever the profits of one producer are affected by the actions of other producers.

2.2.3. Channels of Foreign Direct Investment Spillovers

There are four main mechanisms or channels through FDI externalities can be achieved, these are shown below in **(Figure 2.1)** alongside the axis representing whether the externalities are technological (non-market) or financial (market) nature. On the far left of the axis there are competition effects, which consist of pure financial externalities. In the middle are placed inter-firm associations and labor turnover, which can be allied to both financial and technological externalities. Finally, on the far right are obvious effects, which are related to pure technological externalities. The competition effect consists of financial externalities. The ancient explanation of this impact is that the inflow of new FDI creates positive externalities, as it forces domestic firms to become more competent or productive in response to the raise in competition. However, recent findings demonstrate a negative relation between the existence of FDI and productivity of domestic firms suggest that the competition influence might alternatively result in negative externalities. This can be interpreted by a so-called market stealing effect, where foreign-owned firms take over part of the market from domestic firms. The capacity of production of the domestic firms lowers as a result of this, which, in the presence of scale economies, results in a decreased level of efficiency **(Jordaan, 2016,P.5)**.

(Figure 2.1): Presents the Channels of FDI Spillovers



Source: (Jordaan, 2016, P.6)

2.2.4. Types of Foreign Direct Investment

In the view of (Caves,1971,P.4) FDI can be classified from the view of the investor (the source country) and from the perspective of the host country, it should be distinguished between horizontal FDI, vertical FDI and conglomerate FDI, where horizontal FDI is undertaken conducted for the aim of horizontal expansion to manufacture identical goods in a foreign country (the host country) . Therefore, product differentiation is the crucial factor of market structure for horizontal FDI. On the whole, horizontal FDI is conducted to achieve monopolistic or oligopolistic benefits.

However, according to (Pazienza,2014,P.8) vertical FDI is accomplished for the aim of utilizing raw materials (backward vertical FDI) or to be nearer to the consumer via the acquisition of distribution outlets (forward vertical FDI). For

example, for long time US car makers found it not easy to promote their products in Japan because nearly all Japanese car dealers have close business relationships with Japanese car markets, thus making them reluctant to promote foreign cars. To address this challenge, American car dealers have launched a campaign to create their own network of dealerships in Japan to sell their products. The third form of FDI is the FDI conglomerate, which comprises both horizontal and vertical FDI.

From the view of the host country, **(Moosa,2002,P.5)** argues that FDI can be classified into three types: import-substituting FDI, export-increasing FDI, and government-initiated FDI. Where import-substitution involves the production of goods previously imported by the host country, this necessarily means that imports by the host country and exports by the host country will decline. In addition, the incentive to explore new sources of input, such as raw materials and intermediate goods, typically motivates export-increasing FDI. Therefore, this kind of FDI is export increasing in the sense that the host country will increase its exports of raw materials and intermediate products to the investing country and other countries. From the other hand, Government-initiated FDI may be triggered, for example, when a government offers incentives to foreign investors in a trial to eliminate a balance of payment deficit.

2.2.5. The Measures of Foreign Direct Investment

Regardless of the quantitative side of FDI, **(Pazienza,2014,P.10)** provides how can FDI be measured, is generally demonstrated either in terms of flow or in types of stock. So that, FDI flows consist of the capital invested, whichever directly or indirectly via related agents, in a firm by a foreign investor, or the capital acquired from a firm by a foreign investor. Thus, from the view of some countries, FDI flows might be inward if an investment established in a targeting country by a foreign investors. However, it may be considered as outward because of the

investment of home country abroad. FDI is generally includes the following elements:

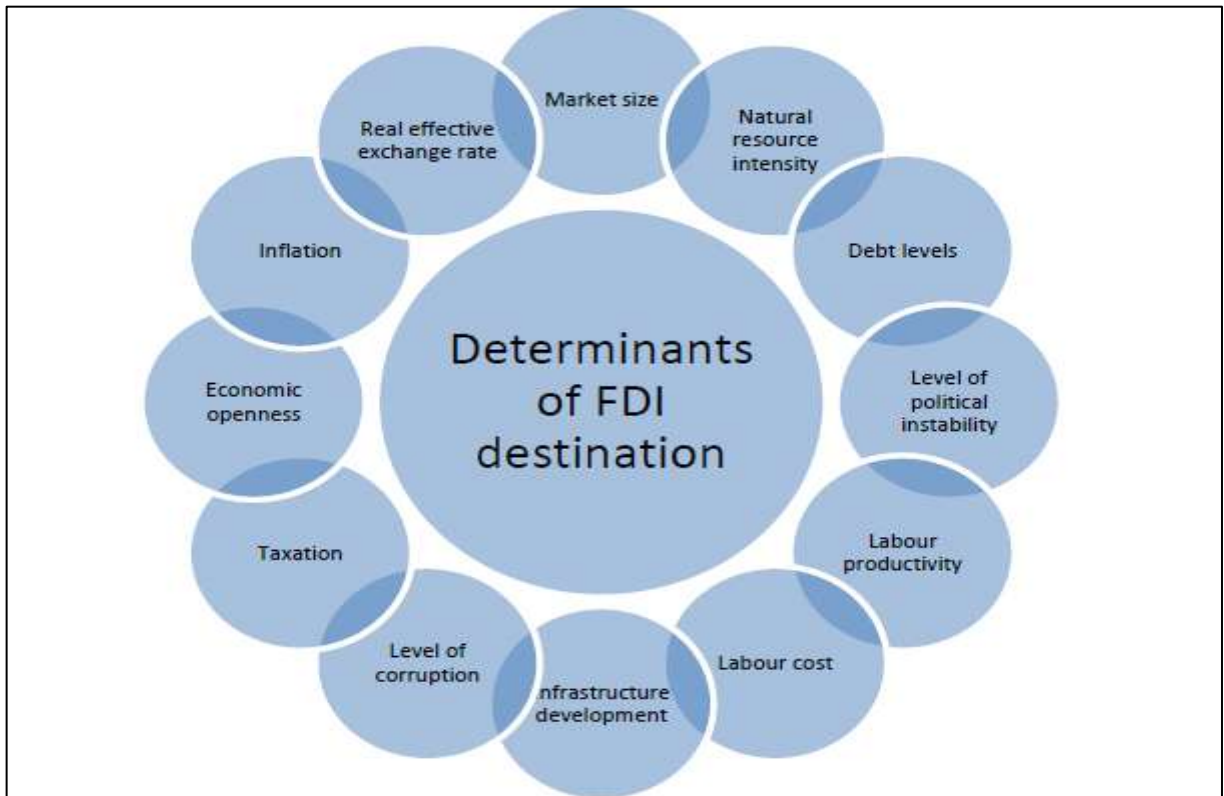
1. Equity capital purchased by the foreign investors of shares in a company in a foreign country.
2. Reinvested earnings, which includes the investor's earning share not distributed as dividends by the affiliates or transferred to the home country rather than reinvested in the host country.
3. Intra-company loans, which refer to short term or long term borrowing and lending of funds between the parent company and its affiliates.

Separately from this particular view, **(Moosa ,2002,P.19)** believes that measuring FDI is not uncomplicated since the existence of problems mainly existing when the investment takes the form of machinery or contributions of technological capitalization. Besides, because of the unwillingness of most countries to offer inclusive information on the foreign processes of their companies due to secrecy, gaps exist in FDI statistics available for source and host countries.

2.2.6. Determinants of Foreign Direct Investment

There are various factors that determine the amount of FDI flowing into a country including the economic sectors. **(Figure 2.2)** below summarizes the significant determinants of FDI presented by **(Alam & Zulfiqar Ali Shah, 2013,P.40)**

(Figure 2.2): Determinants of FDI Destination



source: Alam & Zulfiqar Ali Shah, 2013,P.75

From the above noted determinants of FDI, it is important to note that some determinants have a higher influence in the attraction of the foreign investor into particular economic sectors and others have less influence.

2.2.7. Trends and Global Patterns of FDI

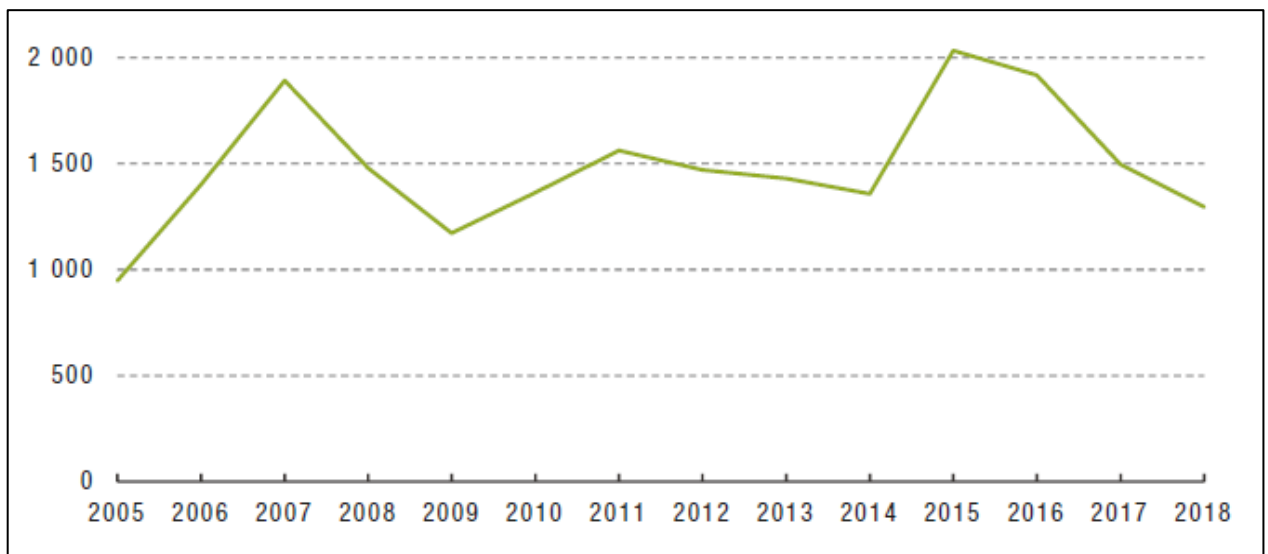
As a sign of internationalization and transformation of economic activity, FDI phenomenon is the defining dictum of our age. With the immense boom of transportation and communication infrastructure, along with the continuous liberalization of exchange and investment regime, as cross-border flows of trade, investment and financial resources grow, national economies are undoubtedly becoming more and more interconnected. Recently, with the rising prominence of FDI, it has gained a serious attention as multinational corporate phenomenon,

around the same time the world has undergone a major shift in the pattern and trend of FDI flows (Azim, 1999).

2.2.7.1. FDI Inflows

FDI inflows and outflows during the period 2005-2018 are shown in (Figure 2.2). With regard to (Unctad,2019,P.52) It is argued that, in 2018, world FDI inflows reduced by 13 per cent to US\$1.3 trillion. This is the third consecutive annual decline. FDI to developed economies has been decreasing to US\$557 billion, whereas flows to developing economies remained stable at around US\$700 billion. That reason, dissimilar to prior years, more FDI was oriented to developing than to developed economies. Additionally, in 2018, eight of the top 20 host economies were developing economies. However, the largest recipient of FDI was the United States of America, followed by China, Hong Kong SAR and Singapore. Likewise, for most countries in Latin America and the Caribbean, Africa and South-Eastern Asia, FDI inflows accounted for more than two per cent of national GDP. The world's largest foreign direct investors were Japan, China and France.

(Figure 2.3): Presents World Foreign Direct Investment Inflows (Billions of United States Dollars)



Source: (Handbook of Statistics, UNCTAD, 2019, P.52)

To explain more the following (**Table 2.1**) provides the top host economies ranked by inflow value of FDI:

(Table 2.1): FDI inflows top 20 economies, 2018

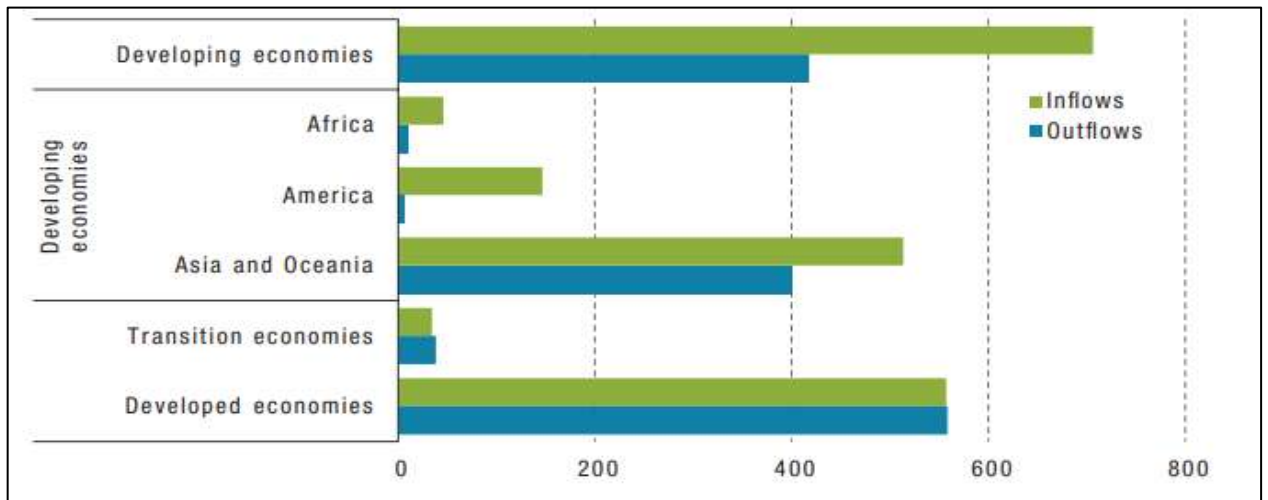
	Economy (Ranked by inflow value)	Inflow		Inward stock Ratio to GDP (Percentage)
		Value (Billions of US\$)	Ratio to GDP (Percentage)	
01	United States of America	252	1.2	36
02	china	139	1.0	12
03	China, Hong Kong SAR	116	31.9	550
04	Singapore	78	22.4	426
05	Netherlands	70	7.6	183
06	United Kingdom	64	2.3	67
07	Brazil	61	3.3	37
08	Australia	60	4.2	47
09	Spain	44	3.1	46
10	India	42	1.5	14
11	Canada	40	2.3	52
12	France	37	1.3	30
13	Mexico	32	2.6	40
14	Germany	26	0.6	24
15	Italy	24	1.2	21
16	Indonesia	22	2.1	22
17	Israel	22	5.9	40
18	Vietnam	16	6.3	59
19	Korea, Republic	14	0.9	14
20	Russian Federation	13	0.8	25

Source: (Handbook of Statistics, UNCTAD, 2019, P.55)

2.2.7.2. FDI Inflows and Outflows by Group of Economies

More specifically, according to (Unctad,2019,P.53) and as it is shown in (Figure 2.3) in 2018, FDI inflows to developing economies amounted to US\$706 billion, three quarter more than their FDI outflows (US\$418 billion). 73 per cent of these inflows and 96 per cent of the outflows were attributed to developing economies in Asia and Oceania. Developing economies in America and Africa attracted less FDI and played only a marginal role as foreign direct investors. Developed and transition economies generated as much FDI as they received.

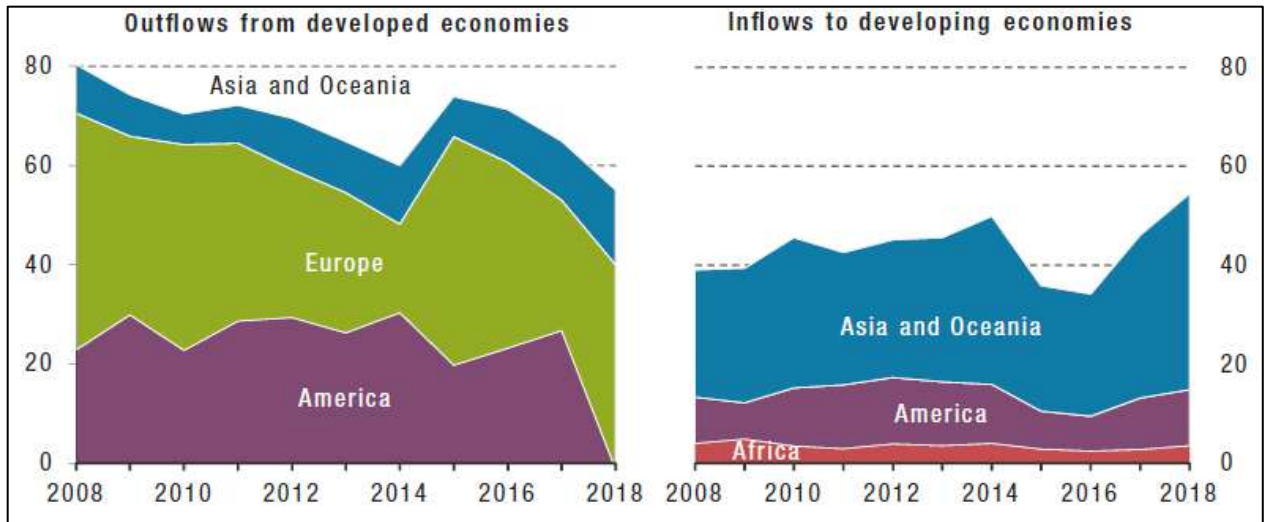
(Figure 2.4): Presents World foreign direct investment inflows and outflows (Billions of United States dollars)



Source: (Handbook of Statistics, UNCTAD, 2019, P.52)

In the other hand, it is detectable in (Figure 2.4) that, between 2017 and 2018, developed economies' share of global outward FDI dropped from 65 to 55 per cent. This was mainly due to a strong fall of FDI from American developed economies from 27 per cent to less than zero in 2018, reflecting a net disinvestment equivalent to 1 per cent of world FDI. On the recipient side, the relative importance of the developing world as a host region increased, but mainly as a result of the negative trend in developed countries. Asia and Oceania strengthened their position within the developing world, accounting for 40 per cent of world FDI in 2018.

(Figure 2.5): FDI Flows (Percentage of World Total)

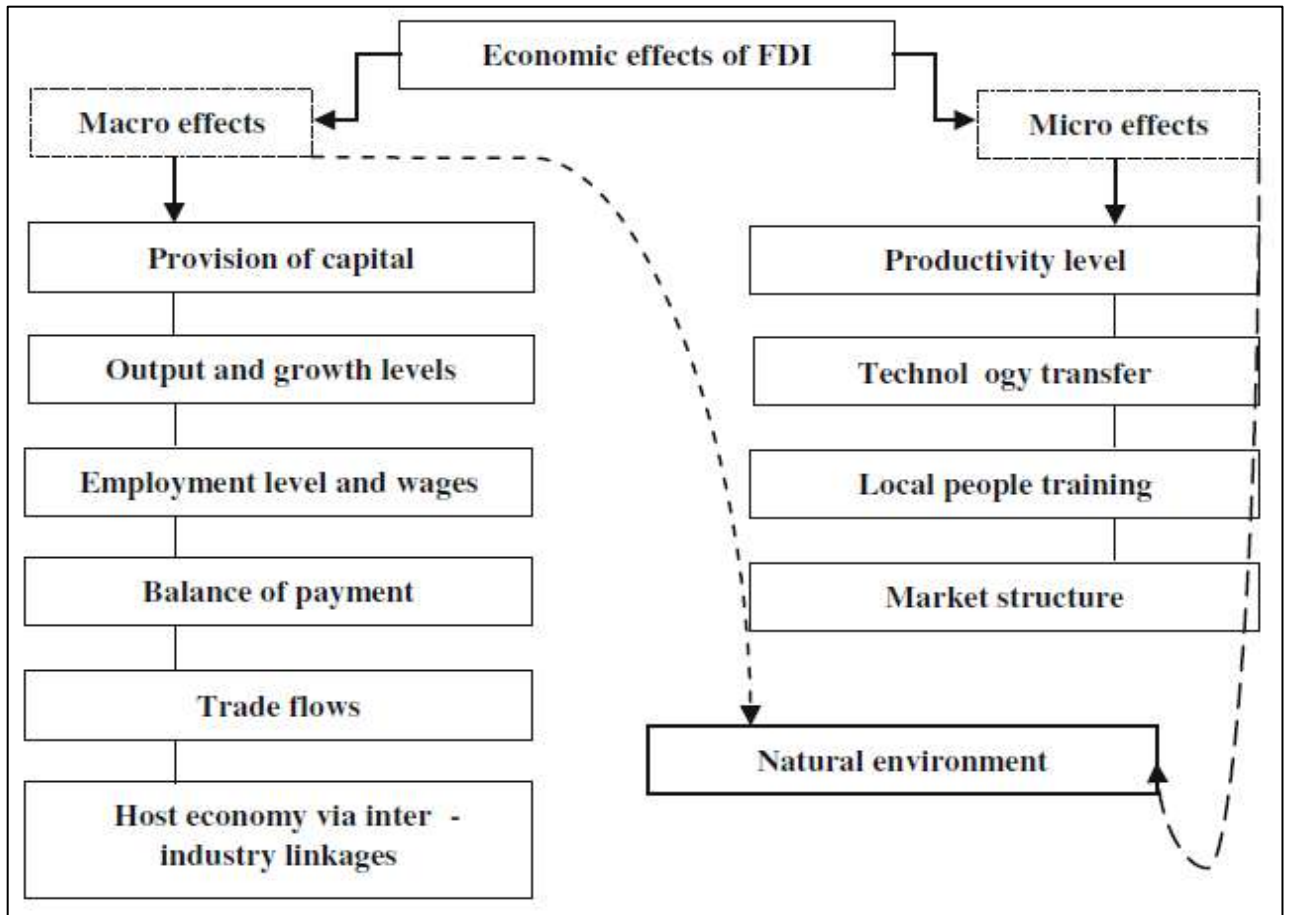


Source: (Handbook of Statistics, UNCTAD, 2019, P.53)

2.2.8. The Effects of FDI

The FDI dynamic includes the transfer of different factors (financial capital, technology, labour skills, etc.) from a country (the source of the investment) to another (the destination or recipient of the investment). According to **(Moosa,2002,P.69)** the impact of FDI on an investment host country can be of the following types: economic, political and social. Briefly, the social issue mainly involves the establishment of provinces and foreign elite in the host country, additionally, cultural and behavioral changes as a result of a sort of contamination generating from the contact between the foreign and local entities. Furthermore, the political influences refer to the issue of national sovereignty. Besides, the economic effects are separated into macro and micro effects as it is shown in **(figure 2.5)**.

(Figure 2.6): The Effects of FDI on Macro and Micro Factors.



Source: (Pazienza, 2014, P.12)

2.3. Economic Growth

Economic growth is a complex process. Both theoretically and empirically, growth-oriented economists have devoted much of their efforts in recent decades to identifying which phenomena are most important for economic growth: does technological innovation matter more than investment or education?, does culture or social structure or political stability have an important effect?. These efforts are valuable but have tended by their very nature to downplay the interactions among the causes of growth (Durlauf & Blume, 2010,P.9).

It has long been understood to economists that growth is significant. Yet, since the late 1960s, the study of economic development languished at the heart of the discipline. Then, after two decades, in the late 1980s, this area of science

became intensive again. New research started with models for long-term growth, a field that is now called endogenous growth theory. Other recent research expanded the older neoclassical growth model, particularly to bring out the empirical implications for convergence across economies (**Barro & Sala-i-martin, 2004,P.15**)

2.3.1. Definition of Economic Growth

According to (**Harvey, 1991,P.478**) EG is essentially a long-run phenomenon represented by an increase in the productive capacity in the economy over time. This increase is usually measured by calculating the rate of change of real gross national product (GNP) per head of the population.

Moreover, (**Choudhury, 1999,P.225**) declared that Economic growth is measured by two complementary indicators. First, it involves the rate of change of Real (GNP) which defined as:

$$\text{GNP} = \text{GNP in market prices}/(1+\text{rate of change in prices}).$$

The second factor influencing economic growth is the rate of growth of output as determined by technological change. This involves use of factors of productions such as labor, capital, land and energy in ways that can maximize their contributions to production. Therefore, payments are made to such factors in accordance with their individual marginal products. The means for improving factor productivity are human resource development, technical change, land improvements etc

likewise, (**Durlauf & Blume, 2010,P.38**) stated that EG is typically measured as the change in per capita gross domestic product (GDP). Sustained long-term economic growth at a positive pace is a fairly new occurrence in human history, much of which has occurred in the last 200 years. Hence, EG can be characterized as; an increase in the production of goods and services in society. However, caution is recommended to calculate growth. Many researchers often

report growth in aggregate GDP but this may grow simply because population has grown, and thus may not reflect any increase in individual incomes. It generally makes more sense to track measures of per capita GDP.

Furthermore, **(Fraumeni, 2020,P.1)** considered EG as the continuing increase in constant dollar GDP per capita. This growth started in England in the 18th century. New production techniques created a series of cheaper and new products, creating a succession of mass markets, starting with cotton goods and progressing through products made using steam power, iron and steel.

2.3.2. Economic Growth and Economic Development

The terms “development” and “growth” are often used as synonyms. In economic literature the theory of economic development has been mostly concerned with the process by which an underdeveloped country achieves a development stage. It attempts to explain the process of increase in income and level of living. It is sometimes called the level effect. Economic growth theory is usually applied for explaining the steady state or long-run growth measured by the percentage increase in national income or some measure of the standard of living such as the human development index (HDI). This is sometimes called the growth effect. It was employed by **(Solow, 1957)** to emphasize the dynamic role of technological progress. Real per capita income is often used to measure economic development or growth **(Sengupta, 2011,P.4)**.

2.3.3. The Characteristics of Economic Growth

Economic growth can be divided into two broad categories: quantitative growth and qualitative growth. In quantitative growth, production is increased mainly increasing input under a given technological level and industrial growth. In qualitative growth, production is improved by technological advancements resulting from innovation or an enhanced industrial structure and by new products which create new demand. In agricultural societies, qualitative growth is slight

because technological advancements are slow to occur, and quantitative growth gradually decreases because of agriculture's characteristic of diminishing marginal returns. Therefore, growth becomes stagnant. In agriculture societies, in the perspective of economic growth, the economy gets caught in a vicious cycle because of simple reproduction character. In industrial societies, however, even though short-term production shows diminishing returns, qualitative growth is possible due to the comparatively fast rate of technological advancements. Hence, from an economic growth perspective, the agricultural economy which decelerates and the industrial economy which accelerates have different characteristics (**Kim & Heshmati, 2014,P.7**).

2.3.4. Causes of Growth

According to (**Harvey, 1991, P.479-480**) there are three basic causes of growth:

2.3.4.1. A rise in the Productivity of Existing Factors

In the short run, productivity may be raised by improvement in organization, which secures, for example, more division of labor and economics of large-scale production, or a more intensive use of capital equipment (the adoption of shift-working). Physical improvements for labour force, e.g. better food and working conditions, may also increase productivity.

In the longer run, more significant increases can come with education and the acquisition of capital skills. These really represent, however, an increase in the capital invested in labour.

It is also important to draw attention to the differences in personal incentives provided by the market economy and the command economy.

2.3.4.2. An increase in the available stock of factors of production

- **A Rise in the Labour Input**

The size of the labour input can increase relative to total population through either an increase in the ratio of the working population to the total population. The first is hardly likely to be a cause of growth in normal conditions. For as living standards improve the tendency is to demand more leisure. The second, however, may come about by an increase in the percentage of the population of working age and by changing attitudes to work.

- **Development of Natural Resources**

North Sea natural gas and oil, for instance, have allowed Britain to obtain her fuel supplies from fewer factors of production, enabling resources to be transferred to other output and thus promoting growth.

- **Additional Capital Equipment**

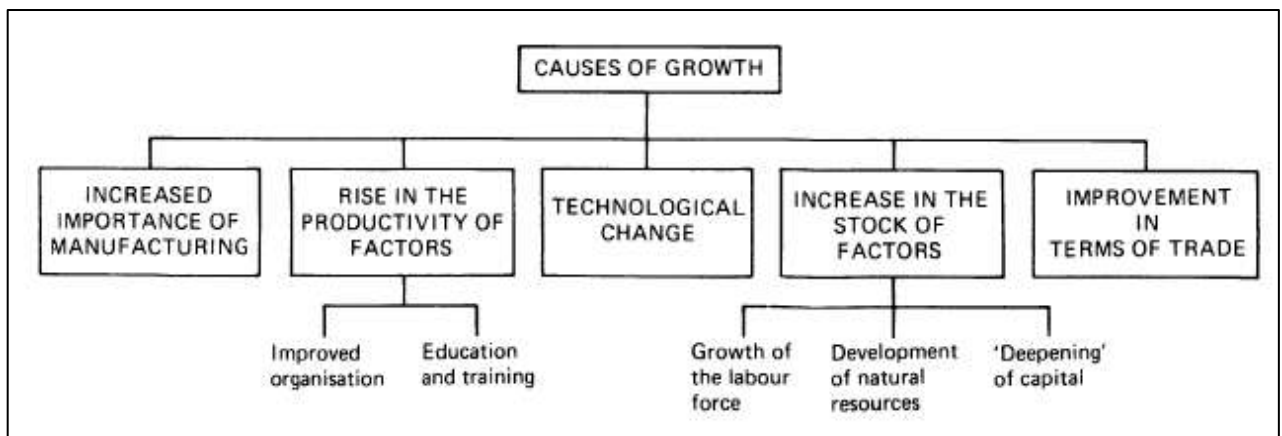
Here it must distinguish between ‘widening’ and ‘deepening’ capital, widening capital – adding similar capital equipment- is necessary if the labour force increase, in order to maintain the existing capital- labour ratio and thus output per head. Suppose 10 men, digging a long ditch, have 5 spades between them. If the labour force is increased to 20 men the capital-labour ratio falls from 1:2 to 1:4 unless widening takes place. ‘Widening’ does not increase productivity; it simply prevents diminishing returns to labour setting in.

Deepening capital occurs when the capital-labour ratio is increased. If, for example, when there were 10 spades to 20 men, then men were given a further 10 spades, the capital-labour ratio would be raised to 1:1.

2.3.4.3. Technological Change

All we have done in our example so far has been to increase the stock of a given kind of capital equipment, spades. Over time, however, productivity can be raised much more significantly by technological improvement. The speed with which new capital and improvements are introduced also depends upon the price of capital equipment relative to the wages of the labour for which it can be substituted. Over time, wages have tended to rise relative to the cost of capital equipment. This has been marked since the Second World War; the effect has been to increase the rate of technological change in such industries as agriculture, cargo handling, transport, shipbuilding and mining. The following (**Figure 2.6**) summarizes factors leading to growth.

(Figure 2.7): Factors Leading to Growth



Source: (Harvey, 1991, P.480)

2.3.5. Models of EG

The work of Adam Smith was advanced at his time. He realized the sources of growth were labor division, capital accumulation, and technological progress. But with regard to capital accumulation, David Ricardo put forward the law of diminishing returns which concludes that must be an end for economic growth. This has become a major problem that every economic growth model must try to address. The common ground of various solutions is to add technological progress

to economic growth analysis in one way or the other. Looking back at Adam Smith's point of view, both labor division and technological progress are indeed key factors to settle the diminishing returns problem in economic growth and capital accumulation. As Adam Smith said, labor division seemed to be the single reason for any increase in labor productivity, labor proficiency, technique, and judging ability. Labor division is dependent on exchange; an exchange is related to money and value issues. Represented by Adam Smith, the classical economists regarded labor division and specialization as the source of economic growth **(Liang, 2014,P.4)**.

2.3.5.1. The Classical Approach

Adam Smith laid great emphasis on increasing returns as a source of economic growth and development. He pointed out that the division of labor and specialization due to increasing returns leads to the establishment of new trades. But for this to happen to market has to be large enough. He stressed the gains from foreign trade, which help widen the extent of the market, thereby raising the productivity of the trading countries. Central to the gains from free trade are the allocative efficiency gains arising from international specialization based on absolute differences in costs. Trade enables a country to buy goods from abroad at a lower real cost than that at which they can be produced at home **(Sengupta, 2011,P.10)**.

Moreover, In modern growth theory **(Lucas, 1993,P.401)** and others have strongly emphasized the role of increasing returns through FDI, which induced learning by doing through knowledge capital. Furthermore, in recent decades the economies have undergone a profound transformation from large-scale material manufacturing to the design and use of new technologies according to improved software and designs. These new technologies are increasingly characterized by increasing returns to scale. These increasing returns occur due to three reasons:

1. High fixed cost and very low variable costs
2. Network effects where the value of a product increases with the number of users
3. High switching costs.

2.3.5.2. The Neoclassical Approach

The essence of the neoclassical growth theory by **(Robert M. Solow, 1956)** is that the future rate of production growth, which reflects the equilibrium and normal rate of growth, is calculated exogenously by the rate of labor force growth and also by technological development. The emphasis is on reconciling the real balance and the normal growth rates. It is a basic structure of a well-functioning output function, an investment-saving relationship, and a function of labor growth.

As Solow has shown, long-term growth in per capita income in an economy with an aggregate neoclassical output function must be supported by growth in total factor productivity, i.e. residual productivity. However, residual calculates total factor productivity precisely if: the production function is Cobb-Douglas, there is perfect competitiveness in demand factors, and the output and input growth rates are determined perfectly.

Additionally, **(Barro & Sala-i-martin, 2004)** confirmed that Solow had emphasized the importance of technological change in long-term economic growth but what determines technological progress was left unanswered and was assumed to be exogenous. Besides, technical change is assumed to be neutral, that is, the marginal rate of substitution between capital (K) and labor (L) given by K/L ratio is unchanged in spite of technical progress.

Otherwise, **(North, 1994)** argued that this theory proposes the performance of an economy should be judged in terms of how close it is to a theoretical optimum. It also expects long-run income convergence across countries due to the increased mobility of capital. North stated that the dissatisfaction with the

theory is regarding its fundamental assumptions: diminishing returns to capital, perfect competition in the markets and that technological change is exogenous makes the theory untenable. The theory, though theoretically plausible, has limited empirical support, does not fit the facts and is inadequate to explain economic growth.

2.3.5.3. The Endogenous Growth Theory

There was a path-breaking work in the mid-1980s in the form of endogenous growth theory which also called the second-generation neoclassical growth theory. It was different and innovative in several respects and relatively closer to reality. It is noticeable that the first endogenous growth theory did not make any explicit distinction between capital accumulation and technological progress. Conversely, but the second wave of the theory, recognizes that intellectual capital, the source of technological progress, is distinct from physical and human capital (**Lakhera, 2016, p. 27**).

from one hand (**Frankel & Romer, 1999; Paul M. Romer, 1988**) declared that The theory explicitly introduced the notion of imperfect competition and increasing returns, admitting the possibility that the marginal product of capital will not fall even if the large investment are made. On the other hand (**Aghion & Bolton, 1992**) affirmed that the theory is also distinguished by other characterizations and defined in one of the two ways: in which the growth rate is determined by the solution of the model itself rather than being imposed upon the model from outside, and in which the technical progress is explicitly modeled, rather than being treated as exogenous.

2.3.5.4. The New Growth Theory (NGT)

According to new-growth theorists the engine of growth is innovation or technical change. That is, new ideas or invention that enhance capital and labor productivity. Moreover, the new growth theory (NGT) also known as the new

endogenous growth theory (NEG), it is much richer and led to receive much attention from both economists and policy makers in recent periods. In contrast, to the neoclassical theory, the NGT argues that increased returns to scale are the element key of explaining growth (**Sengupta, 2011, p. 11**).

The new growth models treat technological change as being endogenous to the growth process. The endogeneity is explained by learning effects to capital accumulation, in particular if the concept is broadened to include human capital as well. The main characteristic of NGT is the absence of diminishing returns to capital. The rate of profit no longer tends to fall and an increase in saving rate can raise economic growth with thriftiness, therefore, due prominence. One of the results of the NGT is the catch-up theory. It argued that low-income countries and latecomers to the industrialization process can succeed in achieving higher growth rates and can transform themselves by using the stock of technology already developed by more advanced economies and offer opportunities of structural change (**Lakhera, 2016, p. 28**).

2.3.6. Theoretical links between FDI and EG

EG and improving national welfare are among key priorities of developing countries governments and FDI is thought to be a key driver of EG and ultimately poverty eradication. It is vital to understand that there are both macro and micro-economic fundamentals that should be satisfied for FDI to have a positive impact on the host countries' economic growth. From a macro-economic point of view there should be capital accumulation which is brought by having a positive net transfer on the capital account, current account and government revenues (**Sarode, 2012,P.102**) .

While from a micro-economic point of view there should be a positive spillover effect to the indigenous firms. Additionally, in terms of the micro-economic point of view, FDI has been shown to assist in economic development

through a two pronged approach, the direct and indirect channels. Conceptually from a direct channel point of view, FDI has been noted to help create jobs, develop local skills, and stimulate technological progress and spillovers to the local private sector. Accordingly, technological progress and positive spillovers occur when FDI creates backward linkages with local firms who would be supplying them with inputs or forward linkages with local firms that will distribute their outputs. Moreover, FDI may also create positive horizontal spillovers by encouraging competition among foreign owned and local firms which forces firms to be more innovative resulting in new technologies being implemented **(Christian Imoudu, 2012,P.132)**

The macro-economic point of view on the linkage between FDI and EG follows the new-liberal school of thought which gained prominence in the 1980s and which asserts that there is an almost automatic link on the inflow of FDI to economic development due to capital accumulation. The fundamental reasoning is that if a country's overall net transfer of revenues is positive then foreign capital would increase a country's total investment thus automatically increasing the gross domestic product (GDP) **(Chang, 2010,P.14)**.

2.5. Conclusion

This chapter presents the conceptual framework of the topic with its sections, and dealing with the different sides of three concepts: FDI, EG, and the theoretical relationship between FDI and EG. The basic concepts, definitions, types, and determinants of FDI are discussed in the first section. In the second section: the definitions, the characteristics, the causes, and the models of EG are demonstrated also. The third section provided the theoretical links between FDI and EG. The next chapter will be concerned with empirical literature.

Chapter Three

The Empirical Literature

3.1. Introduction

3.2. Method

3.3. Information Sources

3.4. Systematic Search and Study Selection

3.5. Quality Assessment and Data Extraction

3.6. Review and Survey Selected studies

3.7. Contribution of the Study

3.8. Conclusion

3.1. Introduction

Many studies investigated the relationship between FDI and EG; there have been varying conclusions from the existing empirical literature. Empirical results either show a positive or increasing effect, or a negative or decreasing effect of inward FDI on EG, this inconsistency in the results leads us to research more deeply on this topic. In order to have a true understanding it is crucially important to review carefully the previous studies. Literature review help the researchers to build knowledge in the field of study all the way through; identifying the important concepts, methods of research, experimental techniques, finding gaps, and make challenges for future studies. In order to achieve all of the above, this chapter is intended to present systematic survey of past and recent studies that empirically investigated the role of FDI in achieving Economic growth.

3.2. Method

For the sake of obtaining targeted studies circumstantially, Simple Boolean searches and advanced Boolean are employed through the following Keywords: foreign direct investment AND economic growth, (foreign direct investment OR FDI) AND "economic growth", (economic growth OR EG) AND "foreign direct investment". We also limit our scope to the English literature.

3.3. Information Sources

For this systematic review we have developed a search strategy to identify relevant literature. This strategy was tailored to four databases: EbscoHost, Science Direct, Jstore, and Google Scholar. The rationale behind this selection is to enable the researcher to understand and evaluate the results reached in different published studies in the largest possible number of databases, and provide a broader view of researchers' efforts in a wide, but relevant, range of disciplines.

3.4. Systematic Search and Study Selection

The selection criteria were based on the preferred reporting items for systematic review and Meta-Analysis (PRISMA) Statement (**Liberati et al., 2009**). The search mainly focused on the mapping existing literature on FDI and EG in all the fields. The review then narrowed to the subject areas: economy, business, finance, and Social science. The survey span was from 2000- 2020. All articles before 2000 were excluded from search except few studies conducted by the oldest pioneer in the theorization of FDI and EG. The survey has also been covering all the countries with a specific emphasis on the studies that conducted in Arabic countries.

3.5. Quality Assessment and Data Extraction

The study is based only on original research articles, books and review papers. For maintaining the quality of the survey, all duplications were checked thoroughly, abstracts of the articles were checked deeply for the analysis and purification of the articles to ensure the quality and relevance of academic literature included in review process. A careful evaluation of each research paper was carried out at a later stage. As a summary of that, all selected articles and books are characterized by the following criteria: firstly, the study must be original paper, book or review paper, secondly, the research must be in English language and from the field of economy, business, finance, and Social science, and finally, extracted articles must be published between 2000 and 2020. On the other hand, published reports, conferences, and encyclopedia...Ext were excluded.

3.6. Review and Survey Selected Studies

Many studies have been conducted to examine the relationship between FDI and EG in developed and developing countries.

The first signal of awareness in growth theory is related with the contribution of **Roy Harrod (1939, 1948)** and **Evsey Domar (1946, 1947)** came into existence as a derivative of John Maynard Keynes's General Theory, this was shown in Harrod's association with Keynes and in his seminal 1939 paper, "An Essay on Dynamic Theory," published in the Economic Journal. Likewise Domar strived to expand Keynes's analysis into the long run by wondering: under what conditions a growing economy could realize full-capacity utilization and full employment. The second signal of awareness in growth theory was raised by the development of the neoclassical model by **Robert Solow (1956, 1957)**. Solow's neoclassical model appeared as a response to the Harrod-Domar model and a few shortages related with it, specifically the numerous instability problems. In addition to the studies mentioned previously, there are other researchers attempted to develop the model and provide more explanations for the relationship between FDI and EG such as **(Kaldor, 1963), (Findlay, 1978), (R. E. Lucas, 1988), (Paul M. Romer, 1988), (Barro R.J, 1990), (Rebelo, 1991)**.

One of the most ideas, came through the research paper of (De Mello Jr, 1997), in which argued that under neoclassical growth models, long-run growth could only outcome from population or labor, force growth (growth of factor inputs) and technological progress. Moreover, depending on the assumption of decreasing returns to capital inputs, FDI would only influence output growth in the short run. However, In the long run, the host country would converge to its stable state and the only way for FDI to enhance growth would be through permanent technological shocks.

Recently and during the period selected by the researcher 2000-2020, the nexus between FDI and economic growth has been extensively studied. The results were inconsistent, where some researchers found a positive relationship between

the two variables, others detected a negative relationship and some of them did not figure out any relationship.

The positive effect of FDI on EG has been established by many researchers, **(Berthélemy & Démurger, 2000)** in their study entitled foreign direct investment and economic growth: theory and application in china, they investigated the relationship between the two variables both theoretically and empirically in case of Chinese provinces over the period 1985 to 1996, they employed a model of endogenous growth, a positive effect of FDI on EG have been detected.

An alternative approach was developed by **(Jai S. Mah, 2010)** in which he examined the causality between FDI and EG for the whole country and not provinces, the empirical results demonstrated that EG has not been affected by FDI, in contrast, FDI has been influenced by EG, according to this result it would not be necessary for the Chinese government to provide taxes incentive to attract foreign direct investment.

In their study **(Ai & Zhang, 2013)** tried to verify whether FDI could promote EG or not, the researchers focus on 29 provinces in China rather than the provincial panel data together, the study also covered the period from 1985 to 2008, the data is collected from China Statistical Yearbook ,Statistical Yearbook of each province, and the website of Chinese Ministry of Commerce. The results suggested that FDI is positively affect EG in China, this outcome is consistent with **(Berthélemy & Démurger, 2000)** results. However, this finding was inconsistent with the results of **(Jai S. Mah, 2010)** .

Our perspective to these findings is that the impact of FDI on EG growth in china is changing from a province to another; we suggest doing more research and selecting the appropriate period to achieve more accurate findings.

Another study of **(Ali & Ahmad, 2010)**, where the authors tried to investigate the effect of FDI on economic development and regional disparities in Malaysia, they assume that FDI might be one of the factors that contribute to the problem of disparities between regions in a country, this is because FDI normally has a tendency to focus on the areas that offer economic advantages which be able to decrease the production cost of goods and services as compared to those areas of backward regions of the country, the period covered was 26 years ranging from 1980 to 2006, the authors involved time series data and cross-sectional data (data panel), the study utilized GDP as a dependent while the independent variables consisted of FDI, domestic investment and labor. The analysis applied the classical production function describing the output as a function of capital and labor. The results showed a positive impact of FDI on EG in Malaysia, however domestic investment and labor were negatively related with Economic growth.

Other researchers also investigated the relationship between FDI and EG in Malaysia such as **(Lee, 2009; Tang & Tan, 2015)**, both studies concluded that EG is positively affected by FDI in Malaysia. In light of these results, especially when **(Tang & Tan, 2015)** detected that FDI had a stronger influence on EG than domestic direct investment, up to my well knowledge I recommend Malaysia's decision-makers and researchers to pay attention to domestic direct investment, perhaps it would be better to get some out of dependence on foreign investment in order to create a domestic value added for the reason that foreign direct investors are commonly ever prepared to rearrange to another country as they suppose appropriate for their bottom-line.

(Asafu-Adjaye, 2000) estimated the effect of FDI on Indonesia's economic growth for a period ranging from 1970 to 1996, in which economic growth is measured by gross domestic product (GDP) and domestic income (GDI).

Additionally, two types of foreign investment have been considered; FDI and net private capital flows. Engle and Granger model has also been employed to achieve the goal of the study. Co-integration assessment outcomes indicated that economic growth; foreign investment (FDI or private capital flows), human capital, and gross domestic savings are co-integrated, implying that causality exists in at least one direction. The error correction model revealed that the independent variables together affect economic growth. The statistically significant error-correction terms imply that foreign direct investment, human capital and gross domestic savings together Granger-cause economic growth. The paper is extremely well written. In addition the method is very modern, but to generalize these findings the researcher would take in consideration other variables similar to political stability, inflation and external economic effects which might influence the direction and the kind of relationship between FDI and EG. Another limitation is the quality of the data. For example, the proxies for stock of human capital (labor force participation rate and secondary school enrolment rate) are inaccurate.

A better demonstration would be the proportion of skilled workers in the labor force.

In their research paper (**Ford et al., 2008**) examined the relationship between FDI and EG in the united states. The United States has received a dramatic raise in FDI in recent years. The researchers used data from the 48 contiguous United States for the period 1978–1997. Following Cobb–Douglas production model, the results demonstrated that FDI has a greater impact on EG than domestic investment.

Another study of (**Kim and Pang, 2008**) examined the long-run and the short-run relationships between FDI and EG in Ireland. Using an augmented aggregate production function growth model, the study consisted on a bounds

testing approach to co-integration, which is more appropriate for estimating small sample studies. The data span for the study was from 1975 to 2006. The results pointed out that FDI, domestic capital, and trade are statistically significant in both the long-run and the short-run, having positive influence on economic growth in Ireland. Moreover, the causality analysis also implies that there is a bi-directional Granger causality between GDP and FDI, and hence, we conclude that the FDI-led growth hypothesis is valid for the Irish economy. However, labor appears to have an insignificant impact on growth both in the long-run and the short-run, while there appears to be a unidirectional causality from growth to labor.

A number of researchers have also examined the relationship between FDI and EG in other countries just as **(Bajo-Rubio et al., 2010)** in their study foreign direct investment and regional growth an analysis of the Spanish case. Overall, the results sustain the outstanding role played by FDI as a tool for technology transfer, and its relationship with productivity growth. More specifically, accumulated FDI inflows would have played a positive and significant role in the evolution of gross domestic product GDP per employee in the case of the Spanish regions , **(Lee, 2010)** where the results of the multivariate framework showed that there is a long-run positive unidirectional causality from outward FDI to EG which estimated by gross domestic product GDP per capita in Japan. Additionally, **(Thu et al., 2010)** in their research paper argued that there was a strong and positive influence of FDI on economic growth in Vietnam.

Later on **(Arisoy, 2012)** assess the impact of FDI on total factor productivity and economic growth in turkey. The empirical results suggested that FDI contributes positively EG during the study period from 1960 to 2005. Similarly **(K. Kim & Pang, 2008)** the purpose of his study was to explore the impact of FDI on EG in South Korea. The study covered the time period from 1980-2009. Using

macroeconomic annual time series data; FDI, domestic investment, employment, export and human capital are considered as the endogenous variables for economic growth. The multiple regressions were employed in study. The findings demonstrated a strong positive impact of FDI on South Korean EG. Besides, the study indicated that human capital, employment and export also had positive and significant impact, while domestic investment had no significant impact on South Korean Economic growth.

In Tunisia another empirical study of **(Soltani & Ochi, 2012)** was conducted to examine the relationship between FDI and EG in the time period from 1975 to 2009. Using a model of time series, the results indicated that there was a significant positive effect of FDI on EG in Tunisia.

Afterward, In view of the recent success of Qatar in attracting foreign direct investment, Although Qatar is a small oil-exporting country, **(Almfraji et al., 2014)** attempted to explore the relationship between FDI inflow and EG in Qatar covering the period between 1990 and 2010. The VAR Impulse Responses and the Granger Causality test were mainly employed to achieve the goal of the study. The results showed that FDI inflows and the economic growth in Qatar interact with each other in a relatively long term. In the same year the influence of FDI on EG has been conducting in Slovakia by **(Szkorupová, 2014)**, Romania by **(Nistor, 2014)**, and Pakistan by **(Ullah et al., 2014)**. All the results were consistent with the economic theory. Otherwise, **(Sissani & Belkacem, 2014)** sought to demonstrate the determinants of FDI attractiveness in Algeria. The authors employed FDI inflows as a dependent variable. However, country risk, inflation, GDP and Foreign exchange reserves as independent variables. The data of the study covered the time period from 1990 to 2012. Using multiple regression techniques', the results indicated that FDI inflows remained fairly weak and inadequate. The researchers also concluded that attractiveness of FDI in Algeria depends on the control of

inflation .overall; a positive relationship was detected between foreign exchange reserves and foreign direct investment.

Recently as well as the relationship between FDI and EG has been examined by many researchers, in which **(Kisswani et al., 2015)** tested the impact of FDI on EG in Estonia using a co-integration approach and causality test. Likewise, **(Khoshnevis Yazdi et al., 2017)** explored the relationship between tourism, foreign direct investment and economic growth in Iran by using annual data covering the period from 1985 to 2013. A positive relationship between FDI and EG in the short term has been detected by employing autoregressive distributed lag and the Error Correction model. in his study **(Ibrahiem, 2015)** provided an ARDL approach to find out the relationship between Renewable electricity consumption, FDI and EG in Egypt ,over time series data from the period 1980 to 2011. Real GDP per capita (at constant 2005 US\$), net consumption of total renewable electricity (billion Kilowatt hours), FDI is net inflows of FDI (current US\$) are the variables utilized in his study. The empirical outcomes showed that the variables in the study are co-integrated indicating the existence of long-run relationship among them. Furthermore, renewable electricity consumption and FDI have a long-run positive effect on economic growth. Granger causality test detected that there exists unidirectional causality running from FDI to economic growth; in addition there was bidirectional causality between economic growth and renewable electricity consumption.

In their research papers **(Pandya & Sisombat, 2017)** inquired about the relationship between FDI and EG in Australia for the period 2001 to 2013. The results highlighted that FDI inflows contribute to the Australian economy including a growth in GDP. For Saudi Arabia **(Nasir et al., 2017)** investigated the relationship among FDI , financial development and EG for the period 1970 to 2015. Using Vector Auto Regression (VAR) and modified Granger Casualty

Models. The result of Johansen co-integration test illustrated that no long run co-integration could be established among the variables. VAR has established a link between economic growth, financial development and foreign direct investment. The Granger causality test also confirms that economic growth affect FDI and financial development which is a unidirectional causality running from economic growth towards FDI and financial development.

Investigating the impact of FDI on the various economies of countries was a continuing concern so that **(Sfar and Mtar, 2017)** provided a research paper to test whether FDI exerts positive or negative influence on Moroccan economy growth for the period 1980 and 2014. A simultaneous equations system has been presented in order to achieve the study's aim. The variables employed in this study are; GDP growth rate, trade openness, human capital, domestic investment, infrastructure, political stability, natural resources, total population, total employment, real exchange rate, inflation rate . The model had also been estimated by a system of five simultaneous equations which were presented in their linear form. The study concluded that FDI has positive and significant effects on economic growth, foreign trade and human capital, while the domestic investment variable seemed to have no significant relationship with foreign direct investment.

Equally important, the relationship between (FDI), political risk and EG in South Africa has been investigated by **(Meyer & Habanabakize, 2018)**, the study was based on a quantitative research methodology. Quarterly time series data for the time period from 1995 to 2016 was collected. Different econometric approaches such ARDL bound test for co-integration, Granger causality and residual tests were applied to the study. The results indicated that an increase in gross GDP and political risk rating lead to a short and long run growth in the level of FDI. Additionally, the study found that, in the long run, political risk has a high impact on the FDI compare to the effect of gross domestic product.

With this in mind, **(Ahmad & Bouchemal, 2018)** intended to test what the extent the EG can be affected by FDI in Algeria in the Perspective of Free Trade Zone. Moreover, the authors tried to analyze the effect of imports and domestic capital on the economic growth after the establishment of a free trade zone in Algeria for the period ranging from 1997 to 2016. Additionally, Cobb-Douglas production function was used in this study to establish a link between FDI and EG. The independent variables considered in this study were; Gross Production (Gross Domestic Product plus Imports), capital, labor, goods and services, however, imports and FDI as dependent variables. Multiple linear regression models were implemented to achieve the purpose of study. The results showed that FDI had a significant positive effect on the EG of Algeria after the establishment of free trade zone. Furthermore, Algerian exports and domestic capital also have a significant positive association with the FDI. Therefore, it was concluded that due to FDI in a country, its exports and EG as well affect the EG of the country. According to these findings, it is recommended that Algeria should provide tax incentives, political stability, secure, bribe-free and research-oriented environment so that, the more foreign direct investment could be attracted in free trade zone of Algeria and EG targets could be accomplished.

Thereafter, some researchers had also a try to explore the relationship between FDI and EG. In 2019 , **(Pinudom, 2019)** investigated the relationship between FDI and EG in Thailand during the period 2006 to 2016 using the simple linear regression model. The results showed that total FDI inflow had a positive effect on the economic growth of Thailand.

In their study (Othman et al., 2019) firstly, examined the correlation between FDI and EG in United Kingdom, then the type of correlation that exists, this was estimated by employing a regression analysis. The study also seeked to survey the role played by host country conditions in FDI. The results highlighted

that FDI is significant to the growth of the economy of the United Kingdom. This contribution of FDI to economic growth was in fact higher than earlier thought. While it is true that FDI enhance EG in UK according to the study's findings, but we believe that other macroeconomic indicators (such as unemployment rate, gross national product, purchasing power parity, poverty level, and foreign exchange rate) should be included in future research, which might help to better explain the impact of FDI on the economic growth of united kingdom.

Several attempts have been also made in order to explain the relationship between FDI and EG in Arabic countries such as **(Al-Mihyawi, 2019)** reexamined whether FDI influence EG in Jordan or not for the period ranging from 2000 to 2017. This study was relied on the endogenous growth theory that EG is mainly the result of the impact of endogenous rather than exogenous factors. Other variables have been added, like gross fixed capital formation was estimated on a percentage to GDP basis. The case of domestic private sector credit, which was estimated, based on its ratio to GDP (%), and trade openness was estimated by the result of total imports with exports divided by GDP (%). The data Collected from various sources including the World Bank, and the Department Jordan General Statistics. The findings obtained indicated that FDI was positively affect EG in Jordan in the period considered. What we know about Jordan is an Arabic country mostly suffered from a permanent deficit in its balance of payments. Successive governments have always sought to reduce the investment gap by encouraging foreign investment. Attracting FDI is good for the economy on the one hand, but similarly it may lead to a lack of independence .Therefore, it is better to enhance domestic direct investments rather than relying entirely on foreign investments. Hence, much uncertainty still exists about the relation between domestic direct investment and EG in Jordan. We thus believe that is reasonable to include Domestic direct investment in the model constructed.

Recently, other investigators have examined the effects of relationship between FDI and EG In Indonesia and Oman. The first study by **(Saepuloh, Nuning Mulatsih and Sutarjo, 2019)**, they examined The Influence of EG, interest rate, Inflation on FDI in Indonesia for the period 2010-2017. The study concluded that GDP had a significant impact or influence on FDI in Indonesia, interest rates have a significant impact or influence on FDI in Indonesia. However, Inflation had no impact on FDI. A key limitation of this research is that the causal relationship has not been included in this research paper. We believe a causality test should be applied in further research to accomplish more accurate outcomes.

The second research paper in Oman by **(Muawya & Sid Ahmed, 2019)** they provided a research paper to empirically find out the relationship between FDI and EG in Oman during the period from 1990 to 2014. Employment, and GDP have been considered as dependent variables, on the other hand, FDI inflows has been employed the dependent variable. Relied on multiple regression analysis; the findings stated that, FDI has been revealed as steam engine of EG. Also there was a bidirectional association between FDI and GDP. The trend of causation ran from FDI to GDP and from GDP to FDI at the same time, but from FDI to GDP found to be stronger which enables to conclude that FDI cause GDP. It seemed good to find a strong relationship between FDI and EG in Oman, but, it is very known that Oman's economy is wholly reliant on oil as a key source of income. On the top of that, diversification of economic activities needs improvement in the technological infrastructure. That so, the role of FDI in raising a region's technological level, productive efficiency and its ability to compete internationally would be included in this study or should be examined in further research.

Previous research mentioned before has demonstrated a positive relationship between FDI and EG in many countries for the period ranging from 2000 to 2020.

Yet, much more research on the same issue has been done and stated a negative relationship or the absence of the relationship completely between the two variables.

Just to mention a few, **(Akinlo, 2004)** investigated the impact of FDI on economic growth in Nigeria, for the period 1970–2001. Financial development, labor, human capital and export were considered as independent variables. The results showed that FDI had no influence on EG in Nigeria. The results suggested that extractive FDI particularly oil might not be growth enhancing as much as manufacturing foreign direct investment.

the study of **(Jai Sheen Mah, 2010)**, the author also attempted to explore the relationship between the two variables in Korea and tests the Bhagwati hypothesis which said that FDI inflow is more beneficial to economic growth in an open trade regime. The paper used annual data for Korea during the period 1970–2006. There is no evidence of co-integration among the variables. The Granger causality test results showed that, although FDI inflows did not affect per capita real GDP, the latter is revealed to cause the former when the economic crisis dummy variable was included. There was a unidirectional short-run causality from domestic investment to per capita real GDP growth rate.

Next, the studies of **(Asheghian, 2011)** in Canada where the determinants of economic growth in Canada over 1976 to 2008 were investigated. Employing a 33 year period of annual data, the model was estimated by using the Beach-Mackinnon technique, which corrects for autocorrelation. The estimation results showed that the major determinants of economic growth in Canada are total factor productivity, and domestic investment growth. There was no time-series support for foreign direct investment.

In **(Mohamed, Rashid, and Singh, 2013)** research paper, of vector error correction modeling (VECM) was applied to 1970-2008 data. The objective was to

analyze the long-run causal FDI, domestic investment EG in Malaysia. The results suggested there was no evidence of causality between FDI and EG in Malaysia.

Additionally, the study of **(Belloumi, 2014)** in Tunisia the relationship between the two variables was explored using bounds testing (ARDL) approach for the period 1970 -2008. The results indicated that there was no significant Granger causality from FDI to economic growth.

After that, the effect of FDI on Algerian Economy was conducted by **(Si Mohamed *et al.*, 2015)**. The study utilized; respectively non-hydrocarbon GDP, non-hydrocarbon export, industry and employment as independent variables. The dependent variable was the FDI inflows. The estimation through the bounds testing ARDL and ECM-ARDL stated that FDI had no impact on non-hydrocarbon and export in the short run. In the long run, the study employed co-integration analysis which did not highlight any dynamic relationship between; FDI and non hydrocarbon economic growth, FDI and unemployment and between FDI and non hydrocarbon Exports.

In the study of **(Gaikwad, 2016)** the nexus between FDI and EG has been examined in India for the period from 1990 to 2014. Co-integration analysis and error correction mechanism were used to estimate the causal relationship. For the period under study, the research could not find a statistically significant causal relationship running from FDI to economic growth.

one more research paper of **(Akalpler & Adil, 2017)** was conducted in Singapore. The study employed a Vector Error Correction Model on the period between 1980 and 2014. The results showed strong evidence of the absence of a long-run relationship or causality that runs FDI to economic growth.

Likewise, **(Belloumi, and Alshehry, 2018)** utilized the autoregressive distributed lag (ARDL) bounds testing to co-integration approach in Saudi Arabia, to investigate the influence of FDI on EG for the period 1970 to 2015. The fully

modified ordinary least squares (FMOLS), dynamic ordinary least squares (DOLS), and the canonical co-integrating regression (CCR) have been employed to check the robustness of the ARDL long run estimates. The data corresponding to inward FDI flows are obtained from UNCTAD online database. The data corresponding to finance development, trade openness, and real gross fixed capital formation were gathered from WDI. The data corresponding to real GDP growth and real non-oil GDP growth were sourced from Saudi Arabian Monetary Authority (SAMA). The results detected that in the long term there was negative bidirectional causality between non-oil GDP growth and FDI, and bidirectional causality between FDI and domestic capital investment. Moreover, domestic capital investment was negatively affected by FDI in the short run. FDI was negatively influenced by domestic capital investment. A negative relationship was detected in the study of **(Werner, 2018)** in Spain.

Finally, the study of **(Al-mihyawi, 2019)** in Kuwait, where the researcher attempted to illuminate the nexus and explore the trend of interaction between FDI and EG in Kuwait for the period 2000-2016. Using; Domestic credit to private sector by banks, FDI inflow, Gross capital formation, Openness trade and Inflation as independent variables. All this variables were regressed against GDP as a dependent variable. Based on a least square method, the results revealed that there was no serious relationship between the GDP and FDI, and GDP does not granger affect FDI, as well FDI does not granger cause GDP. It is noticeable that in the years 2001, 2003, and 2008 the FDI inflows to Kuwait were negative due to more funds investment in other countries. We believe that more studies should be applied and in other selected period of time, also advanced analysis techniques should be utilized to get more truthful findings.

The majority of prior research has employed time series data, to examine the relationship between FDI and EG in each country separately. However, a number

of authors have investigated that relationship in group of countries mutually, such as the study of (Nasser, 2010), he tried to answer the following question how does FDI affect EG. The paper empirically examined that relationship in 14 Latin American countries from 1978 to 2003. Using panel data methods the results of the study showed that, the causal link between FDI and EG is unidirectional. The author also provided evidence that the link between FDI and EG is bidirectional for Latin American countries, which indicated that EG primarily could attract more FDI, which, in turn, would then result in accelerated economic growth.

Another recent study (**Tiwari, 2011**) examined the impact of FDI on EG in Asian countries, using a panel framework for the period 1986 to 2008. Based on the production function; where GDP per capita represent EG, the amount of capital (which was measured by Gross capital Formation (GCF) as percentage of GDP), the amount of labor (measured by labor force of the country) and as independent variables. The findings stated that FDI improve EG. However, we argue that there were many studies argued that FDI had a negative impact on EG in these countries. So that, more studies should be conducted to accomplish the accurate results.

The study of (**Zenasni & Benhabib, 2013**) aimed to find out the determinants of FDI, and empirically test its effect on EG the Arab Maghreb Union (AMU) countries. The study used a dynamic panel system GMM estimator to study the determinants and the growth effects of FDI in three Maghreb countries (Algeria, Morocco, and Tunisia) during the period 1980-2010. The variables employed in these study are; FDI estimated by the inflow of capital to the country, real GDP per capita to estimate EG, gross fixed capital formation, trade openness measured by the sum of imports and is in percentage of GDP, development of domestic financial systems which is calculated by the money supply as a share of per capita GDP, the inflation rate in the three North African countries and

represents the annual rate of change of the Consumer Price Index. The study emphasized that FDI played a positive role in boosting the economic growth of Maghreb countries.

the Granger causal link between FDI and EG for 23 African countries covering the period from 1970 to 2011, has been investigated by **(Seyoum et al., 2014)**. Empirical results of Granger causal relationship observed in this paper did not indicate strict cause and effect but rather shows that past values of FDI are useful in predicting future economic growth and vice versa. Moreover, the findings observed in this research imply that FDI and EG have reinforcing causal relationship. The study recommended African countries to devote resources on the promotion and attraction of FDI in order to accelerate economic growth.

In their research **(Kalai & Zghidi, 2017)** analyzed the interrelationship FDI, international trade, and EG for 15 selected Middle Eastern and North African countries over the period 1999–2012 using autoregressive distributed lag test, as an approach to examine the co-integration and the vector error correction model. The results demonstrated a long-run unidirectional relationship between FDI and EG in MENA countries. It also found that FDI can generate positive spillover externalities for the previously mentioned countries. This belief was also confirmed for the host countries.

The paper of **(Goh et al., 2017)** re-examined whether there is a long relationship among FDI, Exports, and EG in Asian economies Using a Bootstrap ARDL Test for Co-integration or not. Annual data have been collected from the World Bank Database for the period 1970-2012. EG is measured by GDP in constant US\$, while real FDI is proxied by the net inflows (balance of payments, in current US\$) adjusted by the GDP deflator (US\$). Real exports is obtained by dividing the export of goods and services (current US\$) by the GDP deflator (US\$).

All variables were converted into log form. The study shed the light on Asian economies: China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan, and Thailand. The study failed to uncover evidence of co-integration between FDI and EG. The absence of a long-run relationship forces relation from FDI and exports to GDP. These results is inconsistent with the result of **(Tiwari & Mustacu, 2011)**.

Furthermore **(Wali & Mna, 2019)** in their research entitled The effect of FDI on domestic investment and economic growth Case of three Maghreb countries: Tunisia, Algeria and Morocco. Re-examined the relationship between FDI and EG for the period 1980-2014 Using the GMM estimator technique. The authors utilized the following variables; Economic growth rate as measured by the natural logarithm of GDP, domestic investment rate as measured by gross fixed capital formation as a percentage of GDP, FDI the ratio (in percent) between FDI and GDP, Credit granted to the private sector in relation to GDP, indicates the availability and effectiveness of financial intermediaries, Education expenditure as a percentage of GDP, The amount of exports as a percentage of GDP, Domestic saving as a percentage of GDP, and domestic real interest rate. The results revealed that FDI had a positive effect on EG only in the case of Morocco. However, for Tunisia and Algeria, there is a neutrality of these effects.

A study entitled foreign borrowing, foreign direct investment inflows and economic growth in European Union transition economies, has been conducted by **(Bayar & Sasmaz, 2019)**. The countries chosen by the author were; Croatia, Czechia, Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, and Slovenia. The study employed the following variables; the growth rate of real GDP per capita represented EG. On the other side, foreign borrowing and FDI inflows were respectively proxied by net external debt and FDI net inflows. All the data

series were annual and the study period was determined as 2004-2016 by taking into consideration data availability. Using co-integration and causality tests, the results showed that the effect of both foreign borrowing and FDI inflows on economic growth varied from country to country depending on how the borrowed funds were used and which type of FDI inflows were involved. In the study, it had stated that foreign borrowing generally affected economic growth negatively, while the effects of FDI inflows on economic growth were identified as mixed. The findings revealed that some countries did not use foreign borrowing in productive investments and also that some countries experienced negative growth effects of FDI inflows.

The nexus between FDI , export and EG have been tested in the study of **(Logun, 2020)** , in 7 developing countries which were; Turkey, Mexico, China, India, Brazil, Russia and Indonesia. The study covered the period of 1992-2018. Panel unit root test was used for the analysis of the series stationary. Panel ARDL approach, which allows short and long term relationship was used for series with different levels of stationary. As a result of the panel causality test, one-way causality findings were found between EG and exports. Additionally, there was a causality relationship with FDI and exports.

The following **Table (3.1)**: provides a short summary for each study reviewed in this chapter:

Author(s)and Year	Objectives and Periods	Estimation Methods	Main Results
Studies Found a Positive Relationship between FDI and EG			
Berthelemy and Demurger (2000)	Investigate the relationship between FDI and EG in China 1985-1996	Generalized Method of Moments (GMM)	Positive Relationship Between FDI and EG in China
Asafu Adjaye (2000)	Examine the Effect of FDI on EG in Indonesia 1970-1996	Error Correction Model (ECM)	FDI Positively affect EG in Indonesia
Kim and Bang (2008)	Highlight the Impact of FDI on EG in Ireland 1975-2006	Bound Test Approach , Autoregressive Distributed Lag (ARDL)	FDI Positively influence EG in Ireland
Ford, Rock and Elmslie (2008)	Assess FDI's Long-term Impact on EG 1978-1997	Least Square Dummy Variable (LSDV), OLS	FDI had a Greater Impact on EG in USA
Ging Lee (2009)	Examine the Relationship Between FDI, Pollution and EG in Malaysia 1970-2000	Bound Test, Autoregressive Distributed Lag (ARDL)	FDI played a Significant role in the adjustment of EG.

Ali and Ahmad (2010)	Find Out The impact of FDI on Economic Development and Regional Disparities in Malaysia 1980-2006	Panel Data Analysis	FDI Positively and Significantly EG in Malaysia
Ging Lee (2010)	Analyzed the Role of FDI outflows in Economic Performance and the Impact of EG on outward FDI in Japan 1977-2006	Bound Testing Approach to Co-integration	EG had Short-run Effects on outward FDI, however FDI had a Positive influence on EG in the Long-run.
Thi Hoang, Wiboonchutikula and Tubtintong (2010)	Examined whether FDI Promote EG in Vietnam's 61 Provinces or not 1995-2006	Panel Data Analysis	FDI had a Positive Impact on EG in Vietnam
Hassan and Anis (2012)	Test the Nexus between FDI and EG in Tunisia 1975-2009	Error Correction Model (ECR)	FDI was Positively Linked with EG in Tunisia
Arisoy (2012)	FDI on Investment Total Factor Productivity and EG in Turkey 1960-2005	Granger Causality, Error Correction Model (ECM)	FDI Contributes Total Factor Productivity and EG in Turkey.

Ai and Zhang (2013)	Empirically study the influence of FDI on EG in 29 Chinese Provinces 1985-2008	Panel Data Analysis	FDI Positively affect EG and The Main channel through which FDI Contributed to EG be by increasing Total Capital Accumulation.
Sissani and Zairi (2014)	Highlighted the Determinants of FDI Attractiveness to Algeria 1990-2012	Multiple Linear Regression Model	Positive Relationship is detected between FDI and Foreign Exchange Reserve. Attractiveness of FDI in Algeria Depends on the Control of Inflation. Algeria has stayed Dependent on the Hydrocarbon Sector.
Foon tang and Chye tan (2015)	Explored the Contribution of Domestic and FDI and Exports to Malaysia's EG 1991:Q1 to 2010:Q2	Co-integration and Granger Causality	All the three Variables had a Positive Impact on EG but the Influence of Domestic Direct Investment on EG was more Stable.
Kisswani, Kein, and Shetty (2015)	Examined the Impact of FDI on Real GDP in Estonia 1994:Q1-2013:Q2	Granger Causality and Vector Error Correction Model (VECM)	Real GDP did Respond to Changes in FDI in the Long Run. FDI did Granger Cause Real GDP.

Dalia M. Ibrahim (2015)	Investigated the Nexus between Renewable Electricity Consumption, FDI, and EG in Jordan 1980-2011	ARDL Approach	A Long-run Relationship among the Variables in stated. Renewable Electricity Consumption and FDI had a Long-run Positive effect on EG. Unidirectional Causality Running from FDI to EG. Bidirectional Causality between EG and Renewable Electricity Consumption.
Pandya and Sisombat (2017)	Tested the Impact of FDI on EG in the Australian Economy 2001-2013	Multiple Regression	FDI inflows contribute to the Australian Economy Including a Growth in GDP, Export Performance and Employment.
Nasir, Rehman and Ali, (2017)	In investigated the relationship between FDI, Financial Development and EG in Saudi Arabia 1970-2015	Vector Auto Regression and Modified Granger Causality	EG causes FDI and Financial Development, Unidirectional Causality Running from EG towards FDI and Financial Development.
Bannour and Matar (2017)	Attempted to find out the Effect of FDI on the Moroccan Economy 1980-2014	A model with Simultaneous equations system	FDI had a Positive and Significant Effect on EG, Foreign Trade, and Human Capital, While the Domestic Investment Seemed to have no Significant Relationship with FDI.

Meyer and Habanabakize (2018)	Analyzed the relationship between FDI, Political Risk and EG in south Africa 1995-2016	Granger Causality Approach	Bi-directional Relationship between FDI and EG, while it was found that Political Risk affect changes in FDI. In other word, separately, Political Risk and Gross Domestic Product influence changes in FDI.
Bouchemal and Ahmad (2018)	Examined the Impact of FDI on EG in the Perspective of Free Trade Zone in Algeria 1997-2016	Multiple Linear Regression Models	FDI had a Significant Positive Effect on EG After the Establishment of Free Trade Zone. Moreover, Exports and Domestic Capital also have a Significant Positive Association with FDI.
Pinudom (2019)	Tested the Relationship between FDI and EG in Thailand 2006-2016	Simple Linear Regression Model	Total FDI Inflow had a Significant effect on the Economic Growth.
Othman et al., (2019)	Explored the Impact of FDI on the Economy of the United Kingdom 2000-2010	Multiple Linear Regression Models	EG was positively affected by FDI
Al-Mihyawwi (2019)	Investigated the Impact of FDI on EG in Jordan 2000-2017	Error Correction Model (ECM)	FDI had a Positive Impact on EG.

Saepuloh, Nuning Mulatsih, and Sutarjo (2019)	Examined the Influence of EG, Interest Rate, and Inflation on FDI in Indonesia 2010-2017	Multiple Regression Model	EG, Interest Rate, and Inflation had a positive effect on FDI
Muawya and Sid Ahmed (2019)	Attempted to find out the Impact of FDI on EG in Oman 1990-2014	Multiple Regression Analysis	Positive influence of FDI on EG.
Studies Found no Relationship/Negative Relationship between FDI and EG			
Enisan Akinlo (2004)	Empirically Investigated the Nexus between FDI and EG in Nigeria 1970-2001	Error Correction Model (ECM)	EG was not affected by changes in FDI.
Sheen Mah (2010)	Highlighted the Relationship between FDI inflows and EG in Korea 1970-2006	Cointegration Test	FDI inflows did not Cause Per Capita Real GDP.
Parvis Asheghian (2011)	Explored the Determinants of EG and FDI Causality in Canada 1976-2008	Granger Causality Test	The Major Determinants of EG in Canada are Total Factor Productivity and Domestic Investment Growth. However, there was no causal Relationship between FDI and EG in Canada.

Masoud and Singh Jit Singh (2013)	Illustrated the Impact of FDI and Domestic Investment on EG in Malaysia 70-2008	Vector Error Correction Model (VECM)	There was no Evidence of Causality between FDI and EG in Malaysia.
Belloumi (2014)	Checked the Relationship between Trade, FDI, and EG in Tunisia 1970-2008	Autoregressive Distributed Lag Model	There was no Significant Granger Causality from FDI to EG.
Si Mohammed et al., (2015)	Examined the Effect of FDI on Algerian Economy 1970-2014	Bound Testing ARDL and ECM-ARDL.	FDI was ineffective and Presented a Negligible Impact on Non-hydrocarbon Export.
Rastogi and Gaikwad (2016)	Investigated The EG and FDI Nexus in India 1990-2014	Vector Error Correction Model (VECM)	There was no Statistically Significant Causal Relationship Running from FDI to EG.
Akalpler and Adil (2017)	Empirically Tested the Impact of FDI on EG in Singapore 1980-2014	Vector Error Correction Model (VECM)	There was no Positive Long Run Relationship or Causality between FDI and EG.
Belloumi and Alshehry (2018)	Demonstrated the Influence of Domestic and FDI on EG in Saudi Arabia 1970-2015	Autoregressive Distributed Lag Model (ARDL)	There was a negative Bidirectional Causality between Non-oil GDP growth and FDI. Additionally, FDI affected Negatively Domestic Capital investment in the Short Run.
Warner (2018)	Investigated Whether FDI Generate EG in Spain	Autoregressive Distributed Lag Model (ARDL) and Ordinary	There was no Evidence for FDI to Stimulate EG.

	1984-2010	Least Square.	
Al-Mihyaw (2019)	Explored the Nexus between FDI and EG in Kuwait 2000-2016	Granger-Causality Test	There was no Relationship between FDI and EG in Both Directions.
Studies Conducted on a Group of Countries			
Al-Nasser (2010)	Attempted to find out how did FDI influence EG in 14 Latin American Countries 1978-2003	Panel Data Methods	There was a positive Interaction Effect FDI with Technology Gap and a Negative interaction Effect of FDI on EG.
Tiwari (2011)	Examined the Impact of FDI on EG in 23 Asian Countries 1986-2008	Panel Data Model	It was Stated that FDI and Exports Enhance Growth Process
Zenasni and Benhabib (2013)	Seeked to Explore the Determinants of FDI and their Impact on EG in Arab Maghreb Union (AMU) 1980-2010	Dynamic Panel System (GMM)	A Positive impact of FDI on EG was detected in Morocco and Tunisia; Whilst, EG was Negatively Affected by FDI in Algeria
Seyoum, wu, and Lin (2014)	Investigated the Link between FDI and EG for 23 African Countries 1970-2011	Granger-Causality Test	Two-way Granger Causality Link between FDI and EG was demonstrated. However, this Causal Link was not Homogeneous among Individual Countries.

Zghidi, Sghaier, and Abida, (2016)	Attempted to Assure Whether Economic Freedom Enhance the Impact of FDI on EG in 4 North African Countries 1980-2013	Generalized Method of Moments (GMM)	Strong Evidence of a Positive Link between FDI and EG. Furthermore, it found that Economic Freedom Appears to Work as a Complement to FDI.
Khoon Goh, Yan Sam, and McNow, (2017)	Re-examined the Nexus between FDI, Export, and EG in 9 Asian Countries. 1970-2012	Bootstrap Autoregressive Distributed Lag	There was no Evidence of Cointegration when GDP as the Dependent Variable.
Ali and Mna (2019)	Examined the Effect of FDI on Domestic Investment and EG in Three Maghreb Countries 1984-2014	Generalized Method of Moments (GMM)	A Positive impact of FDI on EG was detected in Morocco. However, There was a Neutrality of these Effects in Algeria and Tunisia.
Bayar and Sasmaz (2019)	Investigated the Relationship between FDI and EG in 10 European Union Countries 2004-2016	Panel Cointegration and Causality Analysis	It was revealed that the Influence of FDI on EG was varied from Country to Country in European Union Transition Economies.
Logun (2020)	Aimed to Explore the Relationship between FDI, Exports and EG in E7 Countries 1992-2018	Panel ARDL Approach	One-Way Causality was Found between EG and Export, and between FDI and Export.

3.7. Contribution of the Study

Although this dissertation has benefited a lot from the previous studies in both conceptual and empirical framework and it shares several points with them; it also has specific issues which can be considered as a contribution in scientific research. The dissertation is different from the other previous studies in three points:

1. This study investigates the direct effect of FDI on EG in Algeria particularly and MENA countries as peers countries in general, which has not been taken into consideration in the previous empirical works.
2. Differently to the other studies that focused on the time series model or panel models only in showing the impact of FDI on EG, the study in hand employs time series data for Algeria and panel data for MENA countries which represents a challenge in doing such kind of studies because of the lack of data facing the researcher.
3. The current dissertation among the first studies in Algeria that examines the influence of FDI on EG in the perspective of Arabic Free Trade Zone (2005).

The **Table (3.2)** below summarizes the different points between the current study and the previous one:

(Table 3.2): Contribution of the Current Study Comparing with Previous ones

	The previous studies	The current studies
The Sample	Covered the period 19**-2016	Covered the period 1990-2018
The Type of Data	Time Series or Panel data	Time Series and Panel Data

<p>The Variables Used</p>	<p>(Sissani & Belkacem, 2014): FDI dependent variable. Country risk, inflation, GDP and Foreign exchange reserves as independent variables.</p> <p>(Ahmad & Bouchemal, 2018): The independent variables; (Gross Domestic Product plus Imports), capital, labor, goods and services, however, imports and FDI as dependent variables.</p> <p>(Si Mohamed <i>et al.</i>, 2015): non-hydrocarbon GDP, non-hydrocarbon export, industry and employment as independent variables. The dependent variable was the FDI inflows.</p> <p>(Zenasni & Benhabib, 2013): The variables employed in this study are; FDI estimated by the inflow of capital to the country, real GDP per capita to estimate EG, gross fixed capital formation, trade openness.</p> <p>(WAli & Mna, 2019). The authors utilized the following variables; Economic growth rate , domestic investment rate, FDI expenditure, exports, Domestic saving, and domestic real interest rate.</p>	<p>GDP per capita as a Measure of EG is the dependent variable, FDI inflow, EXP, IMP and GCF as independent variables. According to the well-knowledge of the researcher there is no previous study has empirically investigated the effects of FDI on EG using these macro-economic variables</p>
<p>The Econometric Method</p>	<p>Multi-regression Model, ARDL , or Panel Data model using Eviews</p>	<p>ARDL and Panel data (fixed effect model, random effect model and pooled regression model) using Stata 15.1</p>
<p>The Study Approach</p>	<p>Descriptive and Analytical Approaches.</p>	<p>Descriptive, Comparative and Analytical Approaches</p>
<p>The Countries' Experience</p>	<p>Algeria or a set of world countries</p>	<p>Algeria and a Set of World Countries (MENA countries)</p>

3.8. Conclusion

This chapter investigates the different studies dealing empirically with the relationship between FDI and EG. The chapter has been divided into three main sections; the first section shows the studies that employed time series data then stated a positive relationship between FDI and EG. The second provides a survey of studies that relied on time series data but failed to find a positive relationship between FDI and EG. The third section presents previous studies that utilized panel data models to test that nexus in group of countries mutually. All the studies are summarized in **Table (3.1)** so as to set up a basis for answering the research question, formulating the research method, also the hypotheses. The data and methodology will be discussed in the next chapter.

Chapter Four

Data and Methodology

4.1. Introduction

4.2. Research Approach

4.3. Data of the Study

4.3.1. Source of Data

4.3.2. Population and Sample

4.3.3. Variables of the Study

4.3.3.1. The Dependent Variable

4.3.3.2. The Independent Variable

4.4. The Methodology of the Study

4.4.1. The Model

4.5. Conclusion

4.1. Introduction

Any scientific research involves the application of various methods (also referred to as strategies or approaches) and procedures to create scientific knowledge (**Welman & Kruger, 1999, p. 2**). The main objective of this chapter is to provide an insight on how this study developed, and to describe in some details the sample of data and the empirical model procedures that are used to examine the role of FDI in achieving EG. The chapter consists of two sections: the first section provide full clarification of the sample used in the study, the source of data, the population, and variables. The second section describes the methodology adopted to find out the appropriate test of the hypothesis.

4.2. Research Approach

Research approaches are research plans and procedures that cover phases from general expectations to systematic data collection, analysis, and interpretation processes. There are many decisions involved with this method, and they do not need to be made in the order in which they make sense to me. The ultimate judgment includes which methodology should be used to research the subject. The philosophical concepts the researcher brings to the study can guide this decision; investigation procedures (research design): and basic data collection, analysis, and interpretation research methods. The research approach is most often based on the nature of the research problem or question being tackled, the personal perspectives of the researchers, and the study audiences. There are indeed three research approaches; quantitative qualitative and mixed-method research (**Creswell, 2014, p. 31**).

In order to achieve the desired goals of the study quantitative research approach is considered appropriate. Quantitative research, in contrast to qualitative

research, deals with data that are numerical or that can be converted into numbers. The basic methods used to investigate numerical data are called ‘statistics’. Statistical techniques are concerned with the organization, analysis, interpretation and presentation of numerical data (Sheard, 2018, p. 2). According to (Creswell, 2014, p. 32) quantitative research is an approach for testing objective theories by examining the relationship among variables. These variables, in turns can be measured, typically on instruments, so that numbered data can be analyzed using statistical procedures.

In comparison, (King et al., 1994, pp. 3–4) suggests that the types of quantitative and qualitative analysis are somewhat different. Quantitative analysis is focused on numbers and mathematical approaches. It is focused on numerical observations of particular features of phenomena; abstracts from specific instances to look for a general description or to evaluate explanatory hypotheses; finds measurements and analyzes that can easily be repeated by other researchers.

Qualitative analysis, on the other hand, encompasses a wide variety of methods, but by necessity none of these approaches depends on numerical measures. Such work tended to rely on one or a limited number of instances, to use intensive interviews or an in-depth study of historical content, to be method-based, and to deal with a rounded or thorough account of certain events or units.

4.3. Data of the Study

The sources of data, population, sample, and variables of the study are discussed in this section.

4.3.1. Sources of Data

According to **(Polit & Beck, 2004, p. 716)** the data collection process can be defined as the gathering of information needed to address a research problem. Structured data collection is applied in quantitative research, it also entails asking a fixed set of pre-defined question that are generally answered in a specific sequence.

This present research study, counts on various sources of data; but it mainly obtained from secondary sources such as statistical databases published by international institutions. The study relied on the databases of World Bank, international monetary fund (IMF), United Nations Conference on Trade and Development (UNCTAD), and the World Economic Outlook (WEO).

4.3.2. Population and Sample

A population consists of the totality of the observation with which we are concerned. However, samples are collected from populations, which are collections of all individuals or individual items of a particular type **(Walpole et al., 2012, pp. 3–11)**. In this research, the population of this study is all developing countries, whereas the sample chosen is the Middle East and North Africa countries (MENA) with emphasis in the case of Algeria.

The process of selecting a portion of the population to represent the entire population is known as sampling **(Polit & Beck, 2004, p. 95)**. The sample used in this study to execute the empirical test is chosen based on peer review criteria; geographic proximity of these countries in comparison with Algeria, economic characteristics (GDP of each countries), and cultures. The comparator countries are selected relying on the World Bank method. According to these criteria the sample of this study includes 20 countries. **(See: <https://mec.worldbank.org/comparator>)**.

4.3.3. Definition and Measurement of Variables

The purpose of this study is to examine the role of FDI in achieving EG, surveying a group of international experiences (MENA countries) with emphasis on the case of Algeria for the period 1990-2018. To achieve this objective the study attempts to identify the factors that are significantly influencing the EG measured by GDP per capita. Four macroeconomic have intuitively been chosen as regressors to explain the variation in the dependent variable. Annual time series data on GDP per capita, FDI, IMP, and EXP cover the period 1990-2018 have been used in this study.

4.3.3.1. The Dependent Variable

EG is measured by gross domestic product per capita in current U.S. dollar which shows a country's GDP divided by its total population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the product. GDP per capita is usually derived by first converting GDP in national currency to U.S. dollars and then dividing it by total population. In this study, EG is denoted by the logarithms of GDP per capita.

4.3.3.2. The Independent Variables

The question of how MENA countries and Algeria accelerate their EG has been the objective of this research study. One major clarification in literature review stated that FDI, EXP, IMP, and GCF enhancing activities, So that, they are vital contributors to economic growth. To reach the aim of this study all the variables are taken in current U.S Dollars.

FDI is considered as an essential tool for technology transfer, motivates domestic investment, facilitates enhancements in human capital more efficient

production, and reform of institutions in host countries. Likewise, export activity facilitates more efficient production by exploiting differences in comparative advantages across countries; achieve economies of scale, and lower costs by subjecting exporting firms to foreign competition (**Goh et al., 2017**).

The focus in the literature on exports in the economy's growth has led to an almost complete ignore of the role of imports. However, many evidences indicated the positive impact of imports on EG. The examinations imply that under certain conditions, import linearization can have a positive impact and significant contribution to growth and development (**Kim et al., 2007**).

Capital accumulation is considered as a vital cause of EG. This claim is stated both theoretically and empirically in literature. Indeed since the examination of (**Solow, 1957**), physical capital accumulation contributes to improve the level of production. After that, many other researchers confirm this findings such as (**Romer, 1988**), (**R. E. Lucas, 1988**) and (**Barro, 1990**), they added new factors (human capital, infrastructure, research and development) which mainly enhance gross capital formation.

According to (**Singer, 1950**), capital formation consists of both tangible goods like plants, tools and machinery and intangible goods like high standards of education, health, scientific knowhow etc

A positive effect of GCF has been proved by many empirical studies. As a fundamental role determinant of the production function in the usual growth models, capital accumulation is shown an interaction with EG. Consequently, any effort to increase capital accumulation will motivate EG (**Topcu et al., 2020**).

The following **Table (4.1)** summarizes the definitions and sources of variables:

(Table 4.1): Definitions and Sources of Variables

variable	Definition	Source
GDP Per capita	GDP per capita is usually derived by first converting GDP in national currency to U.S. dollars and then dividing it by total population. In this study, EG is taken in current U.S. dollars and denoted by the logarithms of GDP per capita.	World bank, Unctad
FDI	It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. This present research study utilizes the net inflows of investment from the world economy to the sample of study (MENA countries and Algeria). FDI is taken in current U.S. dollars and denoted by the logarithms.	World Bank, Unctad, IMF
IMP	Imports of goods and services in current U.S. dollars in logarithm	World Bank
EXP	Exports of goods and services in current U.S. dollars in logarithm	World Bank
GCF	GCF is usually measured by total value of the gross fixed capital formation, changes in inventories less disposals of valuables for a unit or sector.. GCF is taken current U.S. dollars and in logarithm as well.	World Bank ,WEO

Source: Prepared by the researchers (Lefilef and Cherbi)

4.4. Methodology of the Study

The main goal of this research is to find out the role of FDI in achieving EG in MENA countries with particular reference to Algeria for the period 1990-2018. The study employs annual data of each variable; GDP per capita, FDI, EXP, IMP and GCF. Panel data analysis and ARDL model are utilized In order to fulfill this aim. Panel data analysis is generally predestined by random and fixed effect techniques. Whereas, in the poled model, all the observations have been set together and the regression coefficient explains the global effect regardless of the time or any individual aspects.

Additionally, the motive behind the use of three techniques is to find out the appropriate one that provides the best for datasets. Thus, Breusch-Pagan Lagrange Multiplier (LM) Test is employed to decide between a random effects regression and a simple OLS regression. Moreover, Housman's test is also used to choose between random effects and fixed effects.

On the other hand, annual time series is utilized to investigate the influence of FDI on EG measured by GDP per capita in Algeria for the period of the study. An ARDL model is used to examine whether there are short and long-run relationship between FDI and EG. Unit root test considered Augmented Dickey-Fuller (ADF) approach to check stationarity of each variable. Furthermore, ARDL bounds test is developed to look at Cointegration among the variables. To ensure the results of this test some specification tests are also employed such as: Durbin Watson, Breusch Godfrey LM, Whit's test, and Skewness Kurtosis tests.

4.5. Econometric Model of the Study

The econometric model of this research is formed considering the relevant theoretical and empirical literature as the following:

$$GDP \text{ per capita} = \beta_0 + \beta_1 FDI_t + \beta_2 IMP_t + \beta_3 EXP_t + \beta_4 GCF_t + \varepsilon_t$$

Where:

GDP per capita_t: is a measure of the sum output of a country that takes the gross domestic product (GDP) and divides it by the number of people in the country GDP per capita is taken in U.S. dollars. In this model it is expressing the EG at year t.

β_0 : constant

β_i : the linear regression coefficient.

FDI_t: the inflow of foreign direct investment in U.S. dollars at year t.

IMP_t: imports of goods and services in U.S. dollars at year t.

EXP_t: exports of goods and services in dollars at year t.

GCF_t: Gross capital formation in dollars at year t.

ε_t : the error term.

In econometric analysis and forecasting, variables are commonly used in logarithmic form, so this is the first employed. In time series, Logarithmic transformation serves as a tool for stabilizing the variance and achieving homoskedastic and normally distributed residuals (Lütkepohl & Xu, 2012).

The natural log is used and the model is taken as follows:

$$\text{LOG GDP per capita}_t = \beta_0 + \beta_1 \log FDI_t + \beta_2 \log IMP_t + \beta_3 \log EXP_t + \beta_4 \log GCF_t + \varepsilon_t$$

The mathematical representation of an ARDL model is:

$$\text{LOG GDP per capita}_t = \beta_0 + \beta_1 \log GDP \text{ per capita}_{t-1} + \dots + \beta_k \log GDP \text{ per capita}_{t-p} + \alpha_0 \log FDI_{t0} + \alpha_1 \log IMP_{t-1} + \alpha_2 \log EXP_{t-2} + \alpha_3 \log GCF_{t-3} + \varepsilon_t$$

Where:

: is a random disturbance term

β_0 : intercept of the function

$\beta_1, \alpha_0, \alpha_1, \alpha_2, \alpha_3$: are parameters estimates

4.6. Conclusion

This chapter has illustrated the research method used and methodology approved to present a convincing answer for all the study questions. The sample, data collection, and the procedure utilized to investigate the role of FDI in achieving EG in MENA countries and Algeria have also been discussed. The construction of the research model; EG measured by GDP per capita and all the independent variables have been presented as well. As a final point, the formulation of the hypotheses is surveyed. The next chapter shows the results of estimations and analysis.

Chapter Five

Data Analysis

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5.1. Introduction

The main objectives of this chapter are: Firstly, to investigate to what extent we can count on FDI to achieve EG in MENA countries with emphasis in the case of Algeria mathematically and statistically. Secondly, to find out the main macroeconomic variables those explain variation in EG. The chapter consists of four sections: the first section provides results and discussion. Section two represents the descriptive statistics and empirical results. In section three each variable's significance is examined. Finally, a summary and some concluding remarks are discussed.

5.2. Data Analysis for MENA Countries

The data Analysis is divided into two parts. The first part reveals the results of MENA countries data analysis however, the second one demonstrate the outcomes of Algeria data analysis.

5.2.1. Statistical Analysis for MENA Countries

This section consists of three subsections. The first one shows the descriptive statistics. The second present the Multicoliniarity test between the independent variables. However, the last one provides the empirical results.

5.2.1.1. Descriptive Statistics

The descriptive statistics are presented for a sample of 21 countries from MENA countries, over the period 1990-2018. The data consists of 609 country-year observations during the above mentioned period for each variable. **Table (5.1)** which follows, reports the most important descriptive statistics for the sample of countries included in this study. It consists: the mean as one of central tendency measures,

minimum value, maximum value, and standard deviation as one of dispersion measures.

Table (5.1): Descriptive Statistics of the Variables of the Study

Variables	Number of Observations	Mean	Std. Deviation	Min	Max
GDP per cap	598	10044.36	14394.28	87.197	101933.1
FDI	609	1.70e+09	4.11e+09	-1.02e+10	3.95e+10
IMP	526	3.14e+10	4.75e+10	3.00e+08	2.91e+11
EXP	527	3.88e+10	6.86e+10	1.94e+08	4.01e+11
GCF	482	2.56e+10	4.08e+10	6.32e+07	2.42e+11

Source: prepared by the researcher using **Stata 15.1** **Note:** **GDP per capita:** gross domestic product per capita, **FDI:** foreign direct investment, **IMP:** import, **EXP:** export, **GCF:** gross capital formation.

The results presented in **Table (5.1)** demonstrate that GDP per capita shows a deviation in its observations with an average value of 10044.36 US Dollar, a standard deviation of 14394.28, and a maximum value of 101933.1 which are the lowest ones compared with the other variables. On the other hand, GDP per capita has a minimum value of 87.197. Moreover, FDI also shows a deviation in its observations with a minimum value of -1.02e+10 which is the lowest one. This negative value can be explained by the occurrence of divestment, which means withdrawing investment in a specific country because of its losses in the first years of investment in that country. FDI has also a mean value of 1.70e+09, a standard deviation of 4.11e+09, and a maximum value of 3.95e+09.

Furthermore, another deviation is observed in an export which has the highest values of mean value with 3.88e+10 US Dollar, with 6.86e+10 as standard deviation, and with of 4.01e+11 maximum values, an export has a minimum value of 1.94e+08. Conversely, imports and gross capital formation do not show any deviations in their observations where they have respectively 3.14e+10 and 2.56e+10 mean values, 4.75e+10 and 4.08e+10 standard deviation, also minimum

and maximum values ranging from 3.00e+08 to 2.91e+11 and from 6.32e+07 to 2.42e+11 in that order.

5.2.1.2. Multicollinearity Test

According to (Gujarati, 2004, p. 342) the term multicollinearity is due to Rangar Frisch. Originally it meant the existence of a perfect or exact linear relationship among or all explanatory variables of a regression model. For the K-variable regression involving explanatory variables X_1, X_2, \dots, X_k . An exact linear relationship is said to exist if the following condition is satisfied:

$$\beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k = 0$$

Where $\beta_1, \beta_2, \dots, \beta_k$ are constants such that not all of them are zero simultaneously. Accordingly, the Variance Inflation Factor (VIF) and Tolerance (1/VIF) are usually employed to examine and assess the multicollinearity problem. The VIF provides the degree to which each independent variable is explained by other independent variables. Therefore, the larger the value of VIF the more troublesome or collinear the variable, as a rule of thumb, if the VIF of variable exceeds 10, which happens if 1/VIF exceeds 0.90, that variable is said to be highly collinear (Iversen et al., 1989, p. 10).

On the other hand, we can use Tolerance (1/VIF) as a measure of multicollinearity on view of its intimate connection with VIF. The closer is Tolerance to zero the greater the degree of collinearity of that variable with the other regressors. Conversely, the closer the tolerance is to 1, the greater the evidence that a dependent variable is not collinear with the other regressors (Gujarati, 2004, p. 363). The multicollinearity test results are summarized in Table (5.2).

Table (5.2): Variance Inflation Factor (VIF) and Tolerance (1/VIF) for the Regressors

Variables	VIF	1/VIF (Tolerance)
LOG(FDI)	1.36	0.73
LOG(EXP)	3.63	0.27
LOG(IMP)	1.01	0.99
LOG(GCF)	3.29	0.30
Mean VIF	2.32	

Source: prepared by the researcher using Stata 15.

The results of VIF in **Table (5.2)** show that the average (mean) VIF for all variables included in the model is 2.32. Since the VIF for all regressors are 1.01 and 3.63 the lowest and the highest value respectively less than the critical value 10. Likewise, all the values of 1/VIF are closer to one than zero. All these findings indicate that the explanatory variables are not collinear with each another.

5.2.1.3. Breusch-Pagan Test for Heteroskedasticity

This test is proposed by **(Breusch & Pagan, 1979)** based on squared least squares residuals. The squared residuals divided by the mean-squared residual are regressed on a set of regressors chosen by the investigator, and the test statistic is one-half the explained sum of squares from this regression. The following table summarizes the test results:

Table (5.3): The Results of Breusch-Pagan/ test for Heteroskedasticity

Breusch-Pagan/ test for Heteroskedasticity	
Chi2 Statistic	6.48
Prob > Chi2	0.0109

Source: prepared by the researcher using Stata 15

According to **Table (5.3)**, Breusch-Pagan test has been conducted to find out heteroskedasticity problem. The null hypothesis consider the variance of residuals homogeneous or constant, however, the alternative hypothesis consider the variance

of residuals heteroskedastic or not homogeneous. The results in the above table state that the value of Chi2 equal to 6.48 is statistically significant. So that, we accept the alternative hypothesis: the variance of residuals is heteroskedastic rather than homogeneous. Therefore, Robust Standard Errors will be used to solve this problem when we run the appropriate model later on.

5.2.1.4. Correlation Matrix among the Explanatory Variables

A correlation matrix is a table showing correlation coefficients between variables. Each cell in the table shows the correlation between two variables. The results are demonstrated in the following table.

Table (5.4): Correlation Matrix among the Explanatory Variables

Variables	LogFDI	LogImp	LogEXP	LogGcf
LOG(FDI)	1.0000			
LOG(IMP)	0.0722	1.0000		
	0.0970			
LOG(EXP)	0.5335	-0.1021	1.0000	
	0.0000	0.0190		
LOG(GCF)	0.4346	0.0126	0.8428	1.0000
	0.0000	0.7825	0.0000	

Source: prepared by the researcher using Stata 15.

As mentioned above, **Table (5.4)** describes in details the correlation between all the regressors employed in this study. Commonly, the independent variables should not be correlated between each other, or at least the correlation between the independent variables should be low. Hence, the correlation coefficient between all the explanatory variables is low.

The results show that FDI has a positive but not significant correlation with imports. However it has a positive and significant correlation with exports and gross

capital formation. Besides, imports is positively correlated with gross capital formation from one hand, whereas, it is negatively correlated with exports. Finally, the results dictated a positive correlation between exports and gross capital formation. From **Table (5.4)** it is noticeable that the correlation between the independent variables is low as it should be.

5.2.2. Empirical Results

Panel data models examine group (individual-specific) effects, time effects, or both in order to deal with heterogeneity or individual effects that may or may not be observed. These effects are either fixed or random effects. A fixed effect model examines if intercepts vary across group of time period, whereas a random effect model explores differences in error variance components across individual or time period (**Park, 2011, p. 7**).

The following are the three types of panel analytic models used: pooled regression model, fixed effect model, and random effect model.

5.2.2.1. Pooled Regression Model (Estimated by OLS)

Pooled regression model is one type of model that has constant coefficients, referring to both intercepts and slopes. For this model researchers can pool all of the data and run an ordinary least squares regression model. if individual effect μ_i (cross-sectional or time specific effect) does not exist ($\mu_i=0$), ordinary least squares (OLS) produces efficient and consistent parameters estimates:

$$Y_{it} = \beta + Bx_{it} + \varepsilon_{it}$$

OLS consists of five core assumptions (**Greene, 2008, pp. 11–19**) :

1. **Linearity** says that the dependent variable is formulated as a linear function of a set of independent variable and the error (disturbance) term.
2. **Exogeneity** says that the expected value of disturbances is zero or disturbances are not correlated with any regressors.
3. Disturbances have the same variance (homoskedasticity) and are not related with one another (non-autocorrelation)
4. The observations on the independent variable are not stochastic but fixed in repeated samples without measurement errors.
5. **Full rank** assumption says that there is no exact linear relationship among independent variables (no multicollinearity).

The results of ordinary least square regression are presented in the following table:

Table (5.5): The Results of Pooled Regression Model Estimation

$LOG\ per\ capita\ GDP_t = \beta_0 + \beta_1 \log FDI_t + \beta_2 \log Im_t + \beta_3 \log EX_t + \beta_4 \log GCF_t + \varepsilon_t$				
Number of Observations = 439 , T = 29 , n = 20				
Variables	Coefficient	Std. Error	t-Statistic	Prob
LOG(FDI)	0.0001161	0.0215481	0.01	0.996
LOG(IMP)	-0.0065194	0.0151938	-0.43	0.668
LOG(EXP)	1.222715	0.0588677	20.77	0.000
LOG(GCF)	-0.78083	0.0543108	-14.38	0.000
C	-0.9593504	0.3230944	-2.97	0.003
R-Square = 0.5467, Adjusted R-Square = 0.5425 , Prob > F = 0.0000				

Source: prepared by the researcher using Stata 15.

According to the findings reported in **Table (5.5)**, export (EXP) has the highest coefficient with a value of (1.222715), while it has a statically significant positive effect on gross domestic product per capita (GDP per Capita). View that, the decrease in exports leads to an increase in gross domestic product per capita (GDP per Capita) in MENA countries for the period 1990-2018.

In addition, the results show a statistically significant negative impact of gross capital formation (GCF) on gross domestic product per capita with a coefficient value of (-0.78083).

However, the outcomes of the regression demonstrate that the imports (IMP) and foreign direct investment (FDI) are not significant at ($\alpha = 0.05$) and they have no statistical significant influence on gross domestic product per capita.

5.2.2.2. Fixed Effect Model (FEM)

The fixed effect model is the differences across cross-sectional units that can be captured in differences in the constant term and the intercept term of the regression model varies across the cross sectional units. A fixed group effect model examines individual differences in intercepts, assuming the same slopes and constant variance across individual (group and entity). Since an individual specific effect is time invariant and considered a part of the intercept.

This fixed effect model is estimated by least squares dummy variable (LSDV) regression (OLS with a set of dummies) and within effect estimation methods. The fixed effects model can be formulated on As follows:

$$Y_{it} = \alpha_0 + \alpha_1 \delta_{1it} + \alpha_2 \delta_{2it} + \dots + X_{it} \beta + \varepsilon_{it}$$

Where:

Y: denotes the dependent variable,

i: denotes the study sample (the number of countries),

t: denotes the number of years of study,

δ_{jit} : the dummy variable of country i, while the value of this variable is equal to one when $i = j$, whereas, it is equal to zero when $i \neq j$,

β : slope coefficient, in this model the value of these coefficients is assumed to be constant for all countries and over time (**Johnston & Dinero, 1997, p. 397**).

The results of fixed effect model estimations are demonstrated in the following table:

Table (5.6): The Results of Fixed Effect Model (FEM) Estimation

$LOG\ per\ capita\ GDP_t = \beta_0 + \beta_1 \log FDI_t + \beta_2 \log Im_t + \beta_3 \log EX_t + \beta_4 \log GCF_t + \varepsilon_t$				
Number of Observations = 439 , T = 29 , n = 20				
Variables	Coefficient	Std. Error	t-Statistic	Prob
LOG(FDI)	0.015273	0.0061974	2.46	0.014
LOG(IMP)	-0.0019613	0.0034521	-0.57	0.570
LOG(EXP)	0.3067755	0.0295864	10.37	0.000
LOG(GCF)	0.2176082	0.0290855	7.48	0.000
C	-1.732699	0.132505	-13.08	0.000
R-Square: Within = 0.8374, Between: 0.1522, Overall: 0.2006, Prob > F = 0.0000				

Source: prepared by the researcher using Stata 15

The results presented in **Table (5.6)**, indicate that all the independent variables have a statistically significant impact on gross domestic product per capita (GDP per Capita) in MENA countries for the period 1990-2018 at ($\alpha = 0.05$), except imports (IMP) which has no significant effect on the dependent variable .

Where, Export (EXP) has the highest coefficient with (0.3067755), while it has a statically significant positive effect on gross domestic product per capita (GDP per Capita). Accordingly, any increase in export leads to an increase in gross domestic product per capita.

Likewise, gross capital formation (GCF) has also a statically significant positive effect on gross domestic product per capita (GDP per Capita) with a coefficient of (0.2176082). On the other hand, the (GDP per capita) is positively

affected the by the changes in foreign direct investment with a coefficient of (0.015273).

5.2.2.3. Random Effect Model (REM)

The rationale behind random effect model (REM) is that, unlike the fixed effect model (FEM), the variation across entities is assumed to be random and uncorrelated with the independent variable included in the model. If the individual effects are strictly uncorrelated with the regressors, then it might be appropriate to model the individual specific constant terms as randomly distributed across-sectional units. This view would be appropriate if we believed that sampled cross-sectional units were drawn from a large population (**Greene, 2008, p. 410**).

According to (**Gujarati, 2004, p. 647**) the basic idea of random effect model is to start with:

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + u_{it}$$

Instead of treating β_{1i} as fixed, we assume that it is a random variable with a mean value of β_1 . Thus, the intercept value for an individual company can be expressed as:

$$\beta_{1i} = \beta_1 + \varepsilon_i \quad i = 1, 2, \dots, N$$

Where ε_i is a random error term, with a mean value of zero and variance of σ_ε^2 .

What we are essentially saying is that the four firms included in our sample are a drawing from a much larger universe of such entities and that they have a common mean value for the intercept ($= \beta_1$) and the individual differences in the intercept values of each entity are reflected in the error term ε_i . The random effect model (REM) is presented as follow:

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + \varepsilon_i + u_{it}$$

$$= \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + w_{it}$$

The results of the random effect model (REM) estimations are summarized in the following table:

Table (5.7): The Results of Random Effect Model (REM) Estimation

LOG per capita GDP_t = $\beta_0 + \beta_1 \log FDI_t + \beta_2 \log Im_t + \beta_3 \log EX_t + \beta_4 \log GCF_t + \varepsilon_t$				
Number of Observations = 439 , T = 29 , n = 20				
Variables	Coefficient	Std. Error	t-Statistic	Prob
LOG(FDI)	0.0149311	0.0062837	2.38	0.017
LOG(IMP)	-0.0019951	0.0035042	-0.57	0.569
LOG(EXP)	0.3190669	0.0298668	10.68	0.000
LOG(GCF)	0.2044457	0.029338	6.97	0.000
C	-1.74429	0.1600273	-10.90	0.000
R-Square: Within = 0.8373, Between: 0.1609, Overall: 0.2081, Prob > F = 0.0000				

Source: prepared by the researcher using Stata 15.1

The results reported in **Table (5.7)** show that FDI, EXP, and GCF are significantly and positively influence EG ($\alpha = 0.05$), in MENA countries for the period 1990-2018. Where, they have the following coefficient values respectively (0.0149311), (0.3190669) and (0.2044457). Besides, IMP has no significant impact on EG in MENA countries during the period of the study.

5.2.2.4. Breusch-Pagan Lagrange Multiplier (LM) Test

Breusch and Pagan's (1980) Lagrange multiplier (LM) test examines if individual (or time) specific variance components are zero. The LM statistic follows the chi-squared distribution with one degree of freedom. The LM takes the following equation (**Park, 2011, p. 12**):

$$LM = \frac{nT}{2(T-1)} \left[\frac{\sum_{i=1}^n (\sum_{t=1}^T e_{it})^2}{\sum_{i=1}^n \sum_{t=1}^T e_{it}^2} - 1 \right]^2 \sim \chi^2$$

The LM test is employed to decide between a random effects regression and a simple OLS regression. The null hypothesis in the LM says that variances across entities are zero so, there is no a significant difference across units (i.e. no panel effect). If the null hypothesis is rejected, we can conclude that there is a significant random effect the panel data, and that random effect model is able to deal with heterogeneity better than does the pooled OLS. The test results are shown in the following table:

Table (5.8): The Results of Breusch-Pagan Lagrange Multiplier (LM) Test

loggdppercap[countrynum,t] = Xb + u[countrynum] + e[countrynum,t]		
	Var	Sd = sqrt (var)
LOG (GDP per capita)	0.3067404	0.5538415
e	0.0068259	0.082619
u	0.1490222	0.3860339
Chibar2 (01)	3104.94	
Prob > chibar2	0.0000	

Source: prepared by the researcher using Stata 15.1

Based on the results reported in **Table (5-8)**, the probability is less than 5% therefore; we reject the null hypothesis and accept the alternative one, that is, random effect model is more appropriate rather than pooled regression. Hence, a significant difference across countries is found.

5.2.2.5. Hausman Test

The question here is: how do we know which effect (fixed or random) is more relevant and significant in our panel data?

The Hausman specification test compares fixed and random effect models under the null hypothesis that individual effects are uncorrelated with any regressor in the model (Hausman, 1978). The formula of Hausman test is as follow (Park, 2011, p. 14):

$$LM = (b_{LSDV} - b_{random})' \hat{W}^{-1} (b_{LSDV} - b_{random}) \sim X^2(K)$$

The formula says that a Hausman test examines if the random effect estimate is insignificantly different from the unbiased fixed effect estimate. If the null hypothesis of no correlation is rejected, you may conclude that individual effects μ_i are significantly correlated with at least one regressor in the model and thus the random effect model is problematic. Therefore, we need to go for a fixed effect model rather than the random effect counterpart (Greene, 2008, p. 209).

The outcomes of Hausman test are demonstrated in the following table:

Table (5.9): The Results of Hausman Test

Variables	Coefficients		Difference (b-B)	sqrt(diag(V_b-V_B)) S.E
	(b) fe	(B) re		
LOG(FDI)	0.015273	0.0149311	0.0003419	0.0003215
LOG(IMP)	-0.0019613	-0.0019951	0.0000337	0.0000633
LOG(EXP)	0.3067755	0.3190669	-0.0122914	0.0031994
LOG(GCF)	0.2176082	0.2044457	0.0131625	0.0033553
Chi2 (4) = 16.82 , Prob > chi2 = 0.0021				

Source: prepared by the researcher using Stata 15.1

According to the outcomes in **Table (5.9)** the probability value is statistically significant at 5% level, therefore, the null hypothesis should be rejected and the alternative one should be accepted. Accordingly, the fixed effect model is more appropriate than random effect model.

5.2.2.6. Modified Wald Test for GroupWise Heteroskedasticity

The results shown in **Table (5.3)** dictated that the heteroskedasticity is found within the model. Moreover, the fixed effect model is chosen as an appropriate model rather than random effect. Consequently, the Modified Wald test for groupwise heteroskedasticity in fixed effect model is employed to ensure the existence of heteroskedasticity problem in the model. The results are revealed in the following table:

Table (5.10): The Results of Modified Wald Test for GroupWise Heteroskedasticity in Fixed Effect

Chi2 (20)	4112.66
Prob > chi2	0.0000

Source: prepared by the researcher using Stata 15.1

The null hypothesis is that the variance of residuals homogeneous or constant. According to the findings stated in **Table (5.10)** the probability is less than 5%, so that, we reject the null hypothesis and accept the alternative one. The heteroskedasticity problem is detected in fixed effect model.

5.2.2.7. White's Robust Standard Errors

Cross-sectional dependence constitutes a problem for many (micro-econometric) panel datasets as it can arise even when the subjects are randomly sampled. The reasons for spatial correlation in the disturbances of panel models are manifold. Therefore, these standard error estimates are robust to very general forms of cross-sectional and temporal dependence (**Hoechle, 2007**).

The following table summarizes the results after resolving the heteroskedasticity using robust standard errors:

Table (5.11): The Results of Fixed Effect Model with Robust Standard Errors Option

LOG per capita GDP_t = $\beta_0 + \beta_1 \log \text{FDI}_t + \beta_2 \log \text{Im}_t + \beta_3 \log \text{EX}_t + \beta_4 \log \text{GCF}_t + \varepsilon_t$				
Number of Observations = 439 , T = 29 , n = 20				
Variables	Coefficient	Std. Error	t-Statistic	Prob
LOG(FDI)	0.015273	0.0124503	1.23	0.235
LOG(IMP)	-0.0019613	0.0072318	-0.27	0.789
LOG(EXP)	0.3067755	0.0624539	4.91	0.000
LOG(GCF)	0.2176082	0.0691097	3.15	0.005
C	-1.732699	0.3790396	-4.57	0.000
R-Square: Within = 0.8374, Between: 0.1522, Overall: 0.2006, Prob > F = 0.0000				

Source: prepared by the researcher using Stata 15.1

Relying on the results revealed in **Table (5.11)** FDI and IMP have no statistically significant effect on EG at 5% level in MENA countries during the period of the study. However, EXP and GCF are dictated a statistically significant positive impact on EG at 5% level. The coefficient value of EXP is the highest one with (0.3067755) which reflect the variation happen in EG according to the variation in EX. Thus, an increase in EX by 1 leads to an increase in EG by 0.3067755. Likewise, a raise in GCF by 1 leads to a raise in EG by 0.2176082.

5.3. Data Analysis for Algeria

After analyzing the data for MENA countries, in the next section the data for Algeria will be analyzed.

5.3.1. Statistical Analysis

The descriptive statistics and different diagnostic test are conducted for data of Algeria over the period 1990-2018.

5.3.1.1. Descriptive Statistics

The following table reports the most important descriptive statistics for the sample of study. It contains the mean, maximum, minimum, and the standard deviation of all the variables tested.

Table (5.12): Descriptive Statistics of the Variables of the Study

Variables	Number of Observations	Mean	Std. Deviation	Min	Max
GDP per cap	29	3099.582	1441.232	1499.143	5574.507
FDI	29	9.96e+08	9.16e+08	-5.38e+08	2.75e+09
IMP	29	3.11e+10	2.15e+10	1.03e+10	6.83e+10
EXP	29	3.63e+10	2.40e+10	9.59e+09	8.20e+10
GCF	29	4.19e+10	2.40e+10	1.08e+10	9.74e+10

Source: prepared by the researcher using Stata 15.1

The results presented in **Table (5.12)** show a deviation in GCF observations which has the highest Mean value with 4.19e+10 USD, the highest Min value with 1.08e+10 USD, and the highest max value with 9.74e+10 USD . Another deviation is observed in EXP which has the highest value of standard deviation with 2.40e+10 USD. Besides, a deviation is dictated in GDP per capita where it has the lowest Mean values with 3099.582 USD, the lowest standard deviation with 1441.232 USD, and the lowest Max value with 5574.507 USD. Additionally, the observations of FDI show a deviation too; it has the lowest Min value with -5.38e+08 USD. Conversely, IMP values do not show any deviation during the period of the study in Algeria.

5.3.1.2. The Optimal Lag

The question here is: how many lags should be used in the model? There is no hard and fast rule on the choice of lag length. Additionally, it is an empirical issue,

there no priori guide as to what the maximum length of the lag should be (**Gujarati, 2004, p. 474**).

With annual data, the number of lags is typically small, one or two lags in order not to lose degree of freedom. With quarterly data, one to eight lags is appropriate, and for monthly data, six, twelve, or twenty four lags can be used given sufficient data points (**Jeffrey, 2018, p. 8**). The following table presents the optimal lag for each variable:

Table (5.13): The Optimal Lag for Each Variable

Lags	variables	d.f	P-value	FPE	AIC	HQIC	SBIC	Optimal Lag
1 2 3 4	LOG(GDP per capita)	1	0.078	7.42606* (1)	4.84249* (1)	4.86853* (1)	4.93769* (1)	1
1 2 3 4	LOG(FDI)	1	0.067	72.2302* (1)	7.11735* (1)	7.14339* (1)	7.21552* (1)	1
1 2 3 4	LOG(IMP)	1	0.025	55.5995* (1)	6.85566* (1)	6.88171* (1)	6.95383* (1)	1
1 2 3 4	LOG(EXP)	1	0.000	85.4834* (0)	7.28615* (0)	7.29917* (0)	7.33524* (0)	0
1 2 3 4	LOG(GCF)	1	0.107	69.1643* (1)	7.07397* (1)	7.10002* (1)	7.14791* (0)	1

Source: prepared by the researcher using Stata 15.1. **Note:** FPE: Final Prediction Error, AIC: Akaike's Information Criterion, HQIC: Hannan and Quinn Information Criterion, SBIC: Schwarz's Bayesian Information Criterion

Most researchers prefer to employ Akaike information criterion (AIC). Though, others like better to select the criterion with the smallest value in order to ensure the model will be stable. Relying on the outcomes shown in **Table (5.13)** the optimal lag for GDP per capita, FDI, and GCE is 4, where AIC, FPE, and AIC

respectively are the smallest ones with the same order -2.79655, 0.749081, and -3.17534. All the values are significant at 5% level. On the other hand, IMP and EXP optimal lags are 3 and 1 correspondingly. AIC is chosen based on the smallest value criterion. The values are also significant at 5% level.

5.3.1.3. Augmented Dickey Fuller Test (ADF) for Stationarity

Testing the stationarity of data is very important in research where the underlying variables relied on time. Additionally, the kind of data plays a significant role in deciding to check stationarity or not (**Mushtaq, 2011**).

(**Granger & Newbold, 1974**) were the first researchers, who give the idea that the macroeconomic data as a rule contained stochastic trends, and this data is characterized by unit root. They also suggest that using these variables in econometric models may lead towards spurious regression. So testing for stationarity is very important because the whole results of the regression might be fabricated.

The null hypothesis states that variables have unit root or not stationary, but, the alternative one states that variables have no unit root or stationary. If the absolute value of t-statistic is greater than 5% critical value we should reject the null hypothesis and accept the alternative one. For more details see Appendices (**5.13 to 5.17**).

Table (5.14): The Results of Augmented Dickey Fuller Test for Stationarity

Variables	Level				1 st Difference			
	Constant		C + Trend		Constant		C + Trend	
	T-Statistic	5% Critical value	T-Statistic	5% Critical value	T-Statistic	5% Critical value	T-Statistic	5% Critical value
LOG(GDP Per Capita)	-0.891	-2.994	-1.455	-3.592	-3.370	-2.997	-3.715	-3.596
LOG(FDI)	-4.710	-2.992	-4.662	-3.588	-4.259	-2.997	-4.129	-3.596
LOG(IMP)	-199.919	-2.992	-186.051	-3.588	-3.867	-2.994	-3.785	-3.592
LOG(EXP)	-1.176	-2.994	-1.570	-3.592	-3.724	-2.994	-3.648	-3.592
LOG(GCF)	-1.595	-3.000	-2.370	-3.600	-3.898	-2.994	-3.855	-3.592

Source: prepared by the researcher using Stata 15.1

According to the results reported in **Table (5.14)** the dependent variable GDP Per capita is stationary at first deference (I_1), where the absolute values of t-statistics (3.370) and (3.715) are greater than 5% critical values (2.997) and (3.596). Accordingly, we reject the null hypothesis which states the existence of unit root.

On the other hand, the independent variables are stationary at level and in the first deference. FDI is stationary at level (I_0) but IMP, EXP, and GCF are all (I_1). The presence of a unit root implies that a time series under consideration is non stationary while the absence of it entails that a time series is stationary. The results in details are presented in Appendices (5.18 to 5.37).

5.3.1.4. Cointegration Examination Using ARDL Bounds Test

Economic analysis states that there is a long-term relationship between the variables considered as stipulated by the theory. Therefore, the properties of the long-term relationship are perfect. In other words, the means and variations are constant and do not depend on time. However, most empirical research has shown

that constancy of means and variances are not satisfied when analyzing time series variables. In case of solving this problem, most of the Cointegration techniques are applied, estimated and interpreted. One of these techniques is the Autoregressive Distributed Lag (ARDL) Cointegration or bound Cointegration technique (**Emeka & Aham, 2016**).

The autoregressive distributed lag (ARDL) is distinguished from other models in that it deals the measurement of long-run relationships and co-integration and which relies on vector autoregressive models (VAR). this test is developed by (H. Pesaran & Shin, 1999; M. H. Pesaran et al., 2001). Moreover, it has been widely used in experimental models while its characteristics. It can be employed in the analysis of non-co integrated time series of the same degree. In this case, and after the stationarity test is made, we found some variables are stationary at level, however, others are stationary in the first difference. Consequently, the study investigates whether a Cointegration is found among the variables or not.

The null hypothesis of this test states that there is no co-integration among the variables, though; the alternative one states the presence of co-integration among the variables. The co-integration test should be performed on the level form of the variables and not on their first differences. The data is transformed into log-form as we mentioned before.

If the calculated F-statistic is greater than the critical value for the upper bound (I_1), then we can reject the null hypothesis and conclude there is co-integration. That is there is a long-run relationship. If the calculated F-statistic is lower than the critical value for the lower bound $I(0)$, then we conclude that there is no Cointegration, hence no long-run relationship. The null hypothesis should not be rejected. Consequently, we estimate the short run model which is the autoregressive distributed lag (ARDL) (M. H. Pesaran et al., 2001).

Table (5.15): The Results of Cointegration Examination Using ARDL Bounds Test

Critical values	1%	2.5%	5%	10%
Upper Bound I(1)	5.06	4.49	4.01	3.52
Lower Bound I(0)	3.74	3.25	2.86	2.45
F- Statistic	0.602			
Result after Comparison	significant	significant	significant	significant
Decision	Accept H_0	Accept H_0	Accept H_0	Accept H_0

Source: prepared by the researcher using **Stata 15.1**

According to the results demonstrated in **Table (5.15)** the F-statistic value is lower than all the I(0) values. Therefore, we accept the null hypothesis which states that there is no long-run relationship among the variables. The following table reveals the outcomes of ARDL estimation.

The ARDL Cointegration approach is developed by **(Pesaran & Shin, 1999)** and **(Pesaran et al., 2001)**. This model has three features in comparison with other traditional methods. The first one is that the ARDL does not need that all the variables under study must be integrated of the same order and it can be applied when the primary variables are integrated of order one, order zero or fractionally integrated. The second benefit is that the ARDL test is reasonably efficient in the case of small and finite sample data size. The last advantage is that by employing the ARDL technique we might achieve unbiased estimates of the long-run model **(Harris & Sollis, 2003, p. 29)**.

Table (5.16): The Results of ARDL Estimation

$LOG\ per\ capita\ GDP_t = \beta_0 + \beta_1 \log FDI_t + \beta_2 \log Im_t + \beta_3 \log EX_t + \beta_4 \log GCF_t + \varepsilon_t$					
Variables	Lags	Coefficient	Std. Error	t-Statistic	Prob
LOG(GDPPerCap)	Level	0.3694786	0.1753214	2.11	0.049
LOG(FDI)	Level	-0.0640348	0.1753214	-0.95	0.353
	L1	0.0249026	0.0564787	0.44	0.665
LOG(IMP)	Level	0.0385887	0.1175627	0.33	0.747
	L1	-0.2921978	0.1063875	-2.75	0.013
LOG(EXP)	Level	0.1942459	0.0492496	3.94	0.001
LOG(GCF)	Level	0.0133406	0.0991961	0.13	0.095
	L1	0.180217	0.0990661	1.82	0.086
C	/	0.779201	0.5438982	1.43	0.169
R-Squared = 0.6604, Adjusted R-Squared = 0.5095 Prob > F = 0.0000					

Source: prepared by the researcher using Stata 15.1

The findings in **Table (5.16)** show that FDI in level and the first lags has no statistical significant effect on EG at 5% critical value in Algeria for the period 1990-2018. The first lags of GCF has a statistical significant effect on EG at 10% level, yet, it has no statistical significant influence at level. Besides, EXP at level, the first lags of IMP and also at level have a statistical significant impact on EG at 5% critical value in Algeria for the period of the study.

5.3.2. Diagnostic Tests

To ensure the result of this study some specification tests should be applied the following table summarizes the outcomes of diagnostic tests:

Table (5.17): The Results of Durbin Watson, Breusch Godfrey, Whit's, and Skewness Kurtosis Tests

Tests	Value	Prob-value
Durbin Watson	1.9098	/
Breusch Godfrey LM Test	0.002	0.9674
Whit's Test	27.00	0.4093
Skewness/ Kurtosis Tests for Normality	0.18	0.9160

Source: prepared by the researcher using Stata 15.1

There are several sources of autocorrelation in time series regression data. In many cases, the cause of autocorrelation is the failure of the analyst to include one or more important predictor variable in the model. The Durbin-Watson tests the null hypothesis that the residuals from a regression are not auto correlated against the alternative one that the residuals are auto correlated.

$$H_0 : P = 0$$

$$H_1 : P \neq 0$$

The null hypothesis of $P = 0$ implies that the error term in one period is not correlated with the error term in the previous period. $P \neq 0$ means the error term in one period is either positively or negatively correlated with the error term in the previous period. The Durbin-Watson statistic ranges in value from 0 to 4. A value near 2 indicates non-autocorrelation; a value toward 0 indicates positive autocorrelation; a value toward 4 indicates negative autocorrelation (**Montgomery et al., 2012, pp. 750–773**).

The Breusch Godfrey LM Test is also employed to check serial correlation problem. The null hypothesis states the absence of autocorrelation. The alternative one states the presence of serial correlation. Accordingly, the heteroskedasticity problem is checked using White's test. The null hypothesis is that the variance of

residuals is homoskedastic against the alternative one, the variance of residuals is not homoskedastic. Finally, Skewness and Kurtosis tests are used to validate the normality distribution of residuals. In this test the null hypothesis states that the residuals are normally distributed, however, the alternative one considers the residuals not normally distributed.

According to the outcomes in **Table (5.17)** the value of Durbin-Watson is (1.9098) near to 2, hence, there is no serial correlation. Moreover, the value of Breusch Godfrey LM Test is (0.002) with a probability of (0.9674) which is more than the critical value 5%. Consequently, we can not reject the null hypothesis. As a result, there is no serial correlation. Likewise, the value of White's test is (27.00) with a prob-value of (0.4093), in that case, we can not reject the null hypothesis. We conclude the absence of heteroskedasticity problem. Skewness/Kurtosis tests for normality in **table (5-17)**, indicate that we can not reject the null hypothesis because prob-value is more than the critical value (5%).then, the residuals are normally distributed and the model performs well.

5.4. Testing Hypotheses

As it is shown in the previous section **(1.2)**, we have four hypotheses to be tested as the number of parameters and variables' effect estimated.

From the results above, mainly the findings demonstrated in **Table (5.11)** and **Table (5.16)**, the t calculated is greater than the t -student tabulated at 5% level, thus, we accept the hypothesis 3 indicating **the existing of the effect of EXP on EG**. Additionally, we accept the hypothesis 4 indicating **the existing of the effect of GCF on EG**. Conversely, the t calculated of the parameter α_0 and α_1 are lower than the t -student tabulated at 5%, hence, we reject the hypothesis 1 indicating **the**

existing of the effect of FDI on EG and the hypothesis 2 indicating the existing of the effect of IMP on economic growth

5.5. Conclusion

This chapter uses different empirical tools to find out the role of FDI in achieving EG in MENA countries and Algeria in particular, during the period of the study 1990-2018. The Panel data models are used to reach the goal of the study in MENA countries, whereas, ARDL model is applied to confirm whether FDI has an influence on EG or not in Algeria. The chapter is come to the following results:

- FDI and IMP have no effect on EG in MENA countries during the period of study;
- EXP and GCF have a positive impact on EG in MENA countries during the period of study;
- EXP has the highest influence on EG in MENA countries with a coefficient value of (0.3067755) in comparison with GCF which has a coefficient value of (0.2176082);
- In Algeria for the period 1990-2018, FDI has no impact on EG measured by GDP per Capita;
- The first lags of GCF has a positive influence on EG at 10% level, while it has no effect in 5% level;
- EXP at level has a positive effect on EG in Algeria for the period of study;
- IMP in first lags has a negative impact on EG measured by GDP Per Capita in Algeria;
- Finally, the first lags of IMP has the highest effect with a coefficient value of (-0.2921978) in comparison with EXP in level and GCF in first lags by (0.1942459), (0.180217) respectively.

Results and discussion are presented in the next chapter.

Chapter Six

Conclusion

6.1. Introduction

6.2. Findings and Economic Interpretations

6.2.1. The Case of MENA Countries

6.2.2. The Case of Algeria

6.3. Recommendation

6.1. Introduction

The main objective of this dissertation is to find out the role of FDI in achieving EG, surveying a group of international experiences (more specifically: MENA countries) with emphasis on the case of Algeria over the period 1990 to 2018. In pursuit of accomplishing the above, one major question, four sub-questions, and four hypotheses are formulated in chapter one. An overall understanding of FDI and EG, contemporary debates, as well as recent and relevant literature are discussed in chapter two and three respectively. In chapter four a convenience sampling techniques is used and the comparator countries are selected relaying on the World Bank method. Panel data estimation techniques are performed on four variables of MENA countries, whereas an ARDL model is selected to deal with Algeria's time series data, in addition to that, the empirical findings of the study are all presented in chapter five. In setting the discussion scene, the main results with regards to major theme of this research gained from the data analysis will be presented. Therefore, results specific to each case will be interpreted in so far as they served to answer the research question and hypotheses.

6.2. Findings and Economic Interpretations

As it was discussed, this research has four hypotheses. One was addressed to examine whether changes in FDI affect EG as measured by GDP per capita. The second one is developed to investigate the impact of IMP on EG. The third and the fourth one are structured to explore the influence of EXP and GCF on EG separately on the order.

Using different empirical tools to find out the role of FDI in achieving EG in MENA countries and Algeria over the period 1990 to 2018, different tools are utilized. The results of the study can be summarized and interpreted as follows:

6.2.1. The Case of MENA Countries

Considering a critical value of 5% level, the findings of this study's first model (fixed effect model) show that there is no statistically significant evidence that FDI and IMP has influence on EG measured by GDP per capita in MENA countries over the period 1990 to 2018 as depicted in **(Table 5.11)**. Theoretically, these results do not fit the economic theory, which states that any increase in FDI and IMP will guide to an increase in economic growth.

These findings lead to some observations. Firstly, it is shown that GDP per capita in MENA countries is not associated with FDI. Secondly, these outcomes might be attributed to the lack of attention to the nature of investment inflow and imports. Governments in MENA countries may rely on attracting exploring natural resources investment (exploring natural resources), rather than productive ones. Thirdly, relative to the empirical literature on export and EG, the number of empirical studies on the relationship between IMP and EG is quite limited. Here, it is important to note that these results are in line with the results produced by **(Al-Nasser, 2010)**, **(Goh et al., 2017)**, and **(Bayar & Sasmaz, 2019)** however, it is not consistent with the results of **(Tiwari & Mustascu, 2011)**, **(Kalai & Zghidi, 2017)**, and **(Seyoum et al., 2014)**.

Therewith, many studies concluded that increasing IMP of consumer goods will raise market competition. Greater competition from imports forces firms in the host country to become more competitive by improving quality, cutting costs or both. Consequently, firms adopt efficient techniques and engage in innovation and technological progress which finally leads to positive impact on growth **(Kim et al., 2007)**.

In light of this evidence, the absence of relationship between IMP and EG as measured by GDP per capita in MENA countries can be explained by the inability of local firms to compete, to obtain new technology, to innovate, and to create products that replace imported goods.

In the light of the results of fixed effects model with robust standard errors option presented in **Table (5.11)**, we can also conclude that on the whole, EXP and GCF have an impact on EG as measured by GDP per capita. On average every one dollar of EXP results an increase of thirty dollar in EG. Additionally, each one dollar raise in GCF generates twenty one dollar enhancement in economic growth.

The above findings are consistent with the economic theory. There are strong logical and empirical grounds supporting the hypothesis, rising EXP and GCF affect positively EG. Firstly, emphasis exports helps concentrate investment in the more efficient sectors of the economy, thus rising productivity, efficiency is added further by production for international markets in order to remain competitive. Hence, profitable exports; stimulate additional investment, encourage flow of new technology and managerial skills. To end with, a positive influence on economic growth.

Secondly, the process of GCF is the consequence of compound relationships established within different components (labor market, capital market, and raw materials). Any increase in GCF leads to an increase in investment which finally affect EG. These results are consistent with the findings of **(Kim & Pang, 2008)**, **(Akinlo, 2004)**, **(Logun, 2020)** and **(Tiwari, 2011)** which acknowledged that EXP and GCF had a positive influence on EG.

6.2.2. The Case of Algeria

According to **(Table 5.16)** which illustrated the outcomes of ARDL estimation, it concluded that FDI has no statistical significant impact on EG as measured by GDP per capita. This feature can be attributed to the fact that Algeria economy is still substantially dependent on its hydrocarbon resources and the absence of diversification. Moreover, the poor ranking of Algeria in the investment climate reports due to the bureaucracy, pushing investors to change the direction of their investments, in addition to the absence of free investment zones. These results are in line with the study of **(Belloumi, 2014)**, **(Si Mohammed et al., 2015)**, **(Belloumi & Alshehry, 2018)**, and **(Al-Mihyaw, 2019)**.

It is also shown that IMP has no statistical significant influence on EG. the absence of relationship between IMP and EG in Algeria can be interpreted by the fact that most national exports are oil (hydrocarbon) and raw materials, exports of non-hydrocarbon goods is very weak. Therefore, most of the revenue from exports is used to meet domestic consumer needs instead of using it to import modern technological goods, enhancing productivity and competitiveness, which finally leads to a positive effect on EG. These finding is consistent with the results of **(Bakari & Mabrouki, 2017)** and **(Ebrahimi, 2017)**

However, EXP and GCF have a significant positive impact on EG in Algeria over the period from 1990 to 2018 at 5% and 10% critical value respectively. On one hand, this result demonstrates the significant role that exports play in achieving economic growth in Algeria, where their revenues finance domestic investments. But by examining the structure of Algerian exports, we find that Algeria depends on one resource which is hydro-carbon exports that might negatively affect EG later on. These findings are consistent with the outcomes of **(Arisoy, 2012)** and **(Ahmed & Bouchemal, 2018)**.

On the other hand, GCF naturally plays an important role in the economic growth, this role is confirmed by many researchers such as **(Solow, 1957)**, **(Romer, 1988)**, **(Lucas, 1988)**, and **(Barro, 1990)**. GCF has always been seen as potential growth enhancing player. Thus, this outcome is consistent with the economic theory, theoretical, and empirical studies.

The question, then, what are the policy implications of these findings for the MENA economy and Algeria?

6.3. Recommendations

According to the results found and the economic interpretation the researchers recommend the following:

- The governments of MENA countries and Algeria should give more attention to the nature of foreign and domestic investment. They should direct it to more productive sectors in order to enhance economic growth.
- The economies in MENA countries and Algeria especially, should be diversified to be independent from oil revenues. Incentives can be provided to foreign investors so that they can be encouraged to invest in productive sectors of the economy.
- The governments should create a suitable environment to attract more FDI and encourage non-hydrocarbon exports.
- The study finally recommends future researches to focus on the effect of FDI on EG by sectors to get more accurate results.

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Appendices

Appendix (5.1): Descriptive Statistics of the Variables (MENA Countries)

Variable	Obs	Mean	Std. Dev.	Min	Max
gdppercapita	598	10044.36	14394.28	87.197	101933.1
fdi	609	1.70e+09	4.11e+09	-1.02e+10	3.95e+10
imp	526	3.14e+10	4.75e+10	3.00e+08	2.91e+11
exp	527	3.88e+10	6.86e+10	1.94e+08	4.01e+11
gcf	482	2.56e+10	4.08e+10	6.32e+07	2.42e+11

Appendix (5.2): Variance Inflation Factor (VIF) and Tolerance (1/VIF) for the Regressors

Variable	VIF	1/VIF
logexp	3.63	0.275781
loggcf	3.29	0.303762
logfdi	1.36	0.737356
logimp	1.01	0.990507
Mean VIF	2.32	

Appendix (5.3): The Results of Breusch-Pagan/ test for Heteroskedasticity

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity	
Ho: Constant variance	
Variables: fitted values of loggdppercap	
chi2 (1)	= 6.48
Prob > chi2	= 0.0109

Appendix (5.4): Correlation Matrix among the Explanatory Variables

	logfdi	logimp	logexp	loggcf
logfdi	1.0000			
logimp	0.0722 0.0970	1.0000		
logexp	0.5235 0.0000	-0.1021 0.0190	1.0000	
loggcf	0.4346 0.0000	0.0126 0.7825	0.8428 0.0000	1.0000

Appendix (5.5): The Results of Pooled Regression Model Estimation

Source	SS	df	MS	Number of obs	=	439
				F(4, 434)	=	130.85
Model	73.4494005	4	18.3623501	Prob > F	=	0.0000
Residual	60.9028982	434	.140329259	R-squared	=	0.5467
				Adj R-squared	=	0.5425
Total	134.352299	438	.306740408	Root MSE	=	.37461

loggdpperc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
logfdi	.0001161	.0215481	0.01	0.996	-.0422355 .0424678
logimp	-.0065194	.0151938	-0.43	0.668	-.0363819 .0233432
logexp	1.222715	.0588677	20.77	0.000	1.107013 1.338416
loggcf	-.78083	.0543108	-14.38	0.000	-.887575 -.6740851
_cons	-.9593504	.3230944	-2.97	0.003	-1.594375 -.3243262

Appendix (5.6): The Results of Fixed Effect Model (FEM) Estimation

Fixed-effects (within) regression			Number of obs = 439		
Group variable: countrynum			Number of groups = 20		
R-sq:			Obs per group:		
within = 0.8374			min = 6		
between = 0.1522			avg = 21.9		
overall = 0.2006			max = 29		
corr(u_i, Xb) = -0.1110			F(4, 415) = 534.13		
			Prob > F = 0.0000		
loggdpperc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
logfdi	.015273	.0061974	2.46	0.014	.0030909 .0274551
logimp	-.0019613	.0034521	-0.57	0.570	-.0087471 .0048244
logexp	.3067755	.0295864	10.37	0.000	.2486177 .3649333
loggcf	.2176082	.0290855	7.48	0.000	.1604348 .2747815
_cons	-1.732699	.132505	-13.08	0.000	-1.993164 -1.472234
sigma_u	.50594306				
sigma_e	.08261901				
rho	.97402668 (fraction of variance due to u_i)				
F test that all u_i=0: F(19, 415) = 447.75			Prob > F = 0.0000		

Appendix (5.7): The Results of Random Effect Model (REM) Estimation

Random-effects GLS regression		Number of obs	=	439
Group variable: countrynum		Number of groups	=	20
R-sq:		Obs per group:		
within	= 0.8373	min	=	6
between	= 0.1609	avg	=	21.9
overall	= 0.2081	max	=	29
corr(u_i, X) = 0 (assumed)		Wald chi2(4)	=	2078.28
		Prob > chi2	=	0.0000

loggdppercap	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
logfdi	.0149311	.0062837	2.38	0.017	.0026153	.0272469
logimp	-.0019951	.0035042	-0.57	0.569	-.0088631	.004873
logexp	.3190669	.0298668	10.68	0.000	.260529	.3776048
loggcf	.2044457	.029338	6.97	0.000	.1469443	.2619471
_cons	-1.74429	.1600273	-10.90	0.000	-2.057938	-1.430642

sigma_u	.3860339					
sigma_e	.08261901					
rho	.95620157	(fraction of variance due to u_i)				

Appendix (5.8): The Results of Breusch-Pagan Lagrange Multiplier (LM) Test

```

Breusch and Pagan Lagrangian multiplier test for random effects

loggdppercap[countrynum,t] = Xb + u[countrynum] + e[countrynum,t]

Estimated results:

```

	Var	sd = sqrt(Var)
loggdpp~p	.3067404	.5538415
e	.0068259	.082619
u	.1490222	.3860339

```

Test: Var(u) = 0
      chibar2(01) = 3104.94
      Prob > chibar2 = 0.0000

```

Appendix (5.9): The Results of Hausman Test

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fe	(B) re		
logfdi	.015273	.0149311	.0003419	.0003215
logimp	-.0019613	-.0019951	.0000337	.0000633
logexp	.3067755	.3190669	-.0122914	.0031994
loggcf	.2176082	.2044457	.0131625	.0033553

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

```

Test: Ho: difference in coefficients not systematic

      chi2(4) = (b-B)' [(V_b-V_B)^(-1)] (b-B)
              = 16.82
      Prob>chi2 = 0.0021

```

Appendix (5.10): The Results of Modified Wald Test for GroupWise Heteroskedasticity in Fixed Effect

```

Modified Wald test for groupwise heteroskedasticity
in cross-sectional time-series FGLS regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (21) = 29796.99
Prob>chi2 = 0.0000
    
```

Appendix (5.11): The Results of Fixed Effect Model with Robust Standard Errors Option

Fixed-effects (within) regression		Number of obs	=	439	
Group variable: countrynum		Number of groups	=	20	
R-sq:		Obs per group:			
within	= 0.8374	min	=	6	
between	= 0.1522	avg	=	21.9	
overall	= 0.2006	max	=	29	
corr(u_i, Xb) = -0.1110		F(4,19)	=	63.37	
		Prob > F	=	0.0000	
(Std. Err. adjusted for 20 clusters in countrynum)					
loggdpperc	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]
logfdi	.015273	.0124503	1.23	0.235	-.0107858 .0413318
logimp	-.0019613	.0072318	-0.27	0.789	-.0170977 .013175
logexp	.3067755	.0624539	4.91	0.000	.1760579 .4374931
loggcf	.2176082	.0691097	3.15	0.005	.0729599 .3622565
_cons	-1.732699	.3790396	-4.57	0.000	-2.526038 -.9393602
sigma_u	.50594306				
sigma_e	.08261901				
rho	.97402668	(fraction of variance due to u_i)			

Appendix (5.12): Descriptive Statistics of the Variables of the Study (Algeria)

Variable	Obs	Mean	Std. Dev.	Min	Max
gdppercapita	29	3099.582	1441.232	1499.143	5574.507
fdi	29	9.96e+08	9.16e+08	-5.38e+08	2.75e+09
imp	29	3.11e+10	2.15e+10	1.03e+10	6.83e+10
exp	29	3.63e+10	2.40e+10	9.59e+09	8.20e+10
gcf	29	4.19e+10	3.12e+10	1.08e+10	9.74e+10

Appendix (5.13): The Optimal Lag for Gross Domestic Product per capita

Selection-order criteria								
Sample: 1995 - 2018						Number of obs	=	24
lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-57.6633				7.77396	4.88861	4.90163	4.93769*
1	-56.1098	3.1069	1	0.078	7.42607*	4.84249*	4.86853*	4.94066
2	-55.1438	1.9321	1	0.165	7.45402	4.84532	4.88438	4.99257
3	-55.1114	.06489	1	0.799	8.09469	4.92595	4.97804	5.12229
4	-55.0957	.03138	1	0.859	8.8135	5.00797	5.07308	5.2534

Endogenous: logdgdppc
Exogenous: _cons

Appendix (5.14): The Optimal Lag for Foreign Direct Investment

Selection-order criteria								
Sample: 1995 - 2018						Number of obs	=	24
lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-85.0909				76.4326	7.17424	7.18726	7.22332
1	-83.4082	3.3653	1	0.067	72.2303*	7.11735*	7.14339*	7.21552*
2	-83.0185	.77941	1	0.377	76.0692	7.16821	7.20727	7.31546
3	-82.731	.57494	1	0.448	80.8702	7.22758	7.27967	7.42393
4	-82.5328	.39646	1	0.529	86.7223	7.2944	7.35951	7.53983

Endogenous: logdfdi
Exogenous: _cons

Appendix (5.15): The Optimal Lag for Imports

Selection-order criteria								
Sample: 1995 - 2018						Number of obs	=	24
lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-82.787				63.0814	6.98225	6.99528	7.03134
1	-80.268	5.0382*	1	0.025	55.5995*	6.85566*	6.88171*	6.95384*
2	-80.2123	.11127	1	0.739	60.2076	6.93436	6.97343	7.08162
3	-80.1165	.19163	1	0.662	65.038	7.00971	7.0618	7.20605
4	-78.4615	3.31	1	0.069	61.7714	6.95513	7.02024	7.20056

Endogenous: logdimp
Exogenous: _cons

Appendix (5.16): The Optimal Lag for Exports

Selection-order criteria								
Sample: 1995 - 2018						Number of obs	=	24
lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-86.4338				85.4834*	7.28615*	7.29917*	7.33524*
1	-86.1248	.61811	1	0.432	90.5806	7.34373	7.36977	7.4419
2	-85.9118	.42591	1	0.514	96.8104	7.40932	7.44838	7.55657
3	-85.5706	.68232	1	0.409	102.461	7.46422	7.51631	7.66056
4	-85.3554	.43051	1	0.512	109.72	7.52962	7.59473	7.77504

Endogenous: logdexp
Exogenous: _cons

Appendix (5.17): The Optimal Lag for Gross Capital Formation

Selection-order criteria								
Sample: 1995 - 2018						Number of obs	=	24
lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	-84.1859				70.8808	7.09883	7.11185	7.14791*
1	-82.8877	2.5965	1	0.107	69.1643*	7.07397*	7.10002*	7.17215
2	-82.519	.73739	1	0.390	72.968	7.12658	7.16565	7.27384
3	-81.9625	1.1131	1	0.291	75.8532	7.16354	7.21563	7.35988
4	-80.7999	2.3251	1	0.127	75.0613	7.14999	7.2151	7.39542

Endogenous: logdgcf
Exogenous: _cons

Appendix (5.18): The Results of Augmented Dickey Fuller Test for Stationarity (GDP per capita at Level, Only Cons)

Augmented Dickey-Fuller test for unit root					Number of obs	=	27
Test Statistic	Interpolated Dickey-Fuller						
	1% Critical Value	5% Critical Value	10% Critical Value				
Z(t)	-0.891	-3.736	-2.994	-2.628			
MacKinnon approximate p-value for Z(t) = 0.7910							

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Appendix (5.19): The Results of Augmented Dickey Fuller Test for Stationarity (FDI at Level only Cons)

Dickey-Fuller test for unit root		Number of obs = 28		
Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Interpolated Dickey-Fuller
Z (t)	-4.710	-3.730	-2.992	-2.626
MacKinnon approximate p-value for Z(t) = 0.0001				
.				

Appendix (5.20): The Results of Augmented Dickey Fuller Test for Stationarity (IMP at Level only Cons)

Dickey-Fuller test for unit root		Number of obs = 28		
Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Interpolated Dickey-Fuller
Z (t)	-199.919	-3.730	-2.992	-2.626
MacKinnon approximate p-value for Z(t) = 0.0000				

Appendix (5.21): The Results of Augmented Dickey Fuller Test for Stationarity (EXP at Level Only Cons)

Augmented Dickey-Fuller test for unit root		Number of obs = 27		
Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Interpolated Dickey-Fuller
Z (t)	-1.176	-3.736	-2.994	-2.628
MacKinnon approximate p-value for Z(t) = 0.6838				

Appendix (5.22): The Results of Augmented Dickey Fuller Test for Stationarity (GCF at Level Only Cons)

Augmented Dickey-Fuller test for unit root		Number of obs = 24		
Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Interpolated Dickey-Fuller
Z (t)	-1.595	-3.750	-3.000	-2.630
MacKinnon approximate p-value for Z(t) = 0.4862				
.				

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Appendix (5.23): The Results of Augmented Dickey Fuller Test for Stationarity (GDP per capita at Level, Cons and Trend)

Augmented Dickey-Fuller test for unit root		Number of obs = 27		
Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Interpolated Dickey-Fuller Value
Z (t)	-1.455	-4.362	-3.592	-3.235
MacKinnon approximate p-value for Z(t) = 0.8439				
.				

Appendix (5.24): The Results of Augmented Dickey Fuller Test for Stationarity (FDI at Level, Cons and Trend)

Dickey-Fuller test for unit root		Number of obs = 28		
Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Interpolated Dickey-Fuller Value
Z (t)	-4.662	-4.352	-3.588	-3.233
MacKinnon approximate p-value for Z(t) = 0.0008				

Appendix (5.25): The Results of Augmented Dickey Fuller Test for Stationarity (IMP at Level, Cons and Trend)

Dickey-Fuller test for unit root		Number of obs = 28		
Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Interpolated Dickey-Fuller Value
Z (t)	-186.051	-4.352	-3.588	-3.233
MacKinnon approximate p-value for Z(t) = 0.0000				

Appendix (5.26): The Results of Augmented Dickey Fuller Test for Stationarity (EXP at Level, Cons and Trend)

Augmented Dickey-Fuller test for unit root		Number of obs = 27		
Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value	Interpolated Dickey-Fuller Value
Z (t)	-1.570	-4.362	-3.592	-3.235
MacKinnon approximate p-value for Z(t) = 0.8039				
.				

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Appendix (5.27): The Results of Augmented Dickey Fuller Test for Stationarity (GCF at Level, Cons and Trend)

Augmented Dickey-Fuller test for unit root		Number of obs = 24		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z (t)	-2.370	-4.380	-3.600	-3.240
MacKinnon approximate p-value for Z (t) = 0.3958				

Appendix (5.28): The Results of Augmented Dickey Fuller Test for Stationarity (GDP per capita at 1st Difference, Only Cons)

Augmented Dickey-Fuller test for unit root		Number of obs = 26		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z (t)	-3.370	-3.743	-2.997	-2.629
MacKinnon approximate p-value for Z (t) = 0.0120				

Appendix (5.29): The Results of Augmented Dickey Fuller Test for Stationarity (FDI at 1st Difference, Only Cons)

Augmented Dickey-Fuller test for unit root		Number of obs = 26		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z (t)	-4.259	-3.743	-2.997	-2.629
MacKinnon approximate p-value for Z (t) = 0.0005				

Appendix (5.30): The Results of Augmented Dickey Fuller Test for Stationarity (IMP at 1st Difference, Only Cons)

Dickey-Fuller test for unit root		Number of obs = 27		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z (t)	-3.867	-3.736	-2.994	-2.628
MacKinnon approximate p-value for Z (t) = 0.0023				

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Appendix (5.31): The Results of Augmented Dickey Fuller Test for Stationarity (EXP at 1st Difference, Only Cons)

Dickey-Fuller test for unit root		Number of obs = 27		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z (t)	-3.724	-3.736	-2.994	-2.628
MacKinnon approximate p-value for Z (t) = 0.0038				
.				

Appendix (5.32): The Results of Augmented Dickey Fuller Test for Stationarity (GCF at 1st Difference, Only Cons)

Dickey-Fuller test for unit root		Number of obs = 27		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z (t)	-3.898	-3.736	-2.994	-2.628
MacKinnon approximate p-value for Z (t) = 0.0020				
.				

Appendix (5.33): The Results of Augmented Dickey Fuller Test for Stationarity (GDP per capita at 1st Difference, Cons and Trend)

Augmented Dickey-Fuller test for unit root		Number of obs = 26		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z (t)	-3.715	-4.371	-3.596	-3.238
MacKinnon approximate p-value for Z (t) = 0.0214				

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Appendix (5.34): The Results of Augmented Dickey Fuller Test for Stationarity (FDI at 1st Difference, Cons and Trend)

Augmented Dickey-Fuller test for unit root		Number of obs = 26		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z (t)	-4.129	-4.371	-3.596	-3.238
MacKinnon approximate p-value for Z(t) = 0.0057				

Appendix (5.35): The Results of Augmented Dickey Fuller Test for Stationarity (IMP at 1st Difference, Cons and Trend)

Dickey-Fuller test for unit root		Number of obs = 27		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z (t)	-3.785	-4.362	-3.592	-3.235
MacKinnon approximate p-value for Z(t) = 0.0173				

Appendix (5.36): The Results of Augmented Dickey Fuller Test for Stationarity (EXP at 1st Difference, Cons and Trend)

Dickey-Fuller test for unit root		Number of obs = 27		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z (t)	-3.648	-4.362	-3.592	-3.235
MacKinnon approximate p-value for Z(t) = 0.0260				

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Appendix (5.37): The Results of Augmented Dickey Fuller Test for Stationarity (GCF at 1st Difference, Cons and Trend)

Dickey-Fuller test for unit root		Number of obs = 27		
Test Statistic	Interpolated Dickey-Fuller			
	1% Critical Value	5% Critical Value	10% Critical Value	
Z (t)	-3.855	-4.362	-3.592	-3.235
MacKinnon approximate p-value for Z (t) = 0.0140				

Appendix (5.38): The Results of Cointegration Examination Using ARDL Bounds Test

Pesaran/Shin/Smith (2001) ARDL Bounds Test								
H0: no levels relationship				F = 3.383				
				t = -2.317				
Critical Values (0.1-0.01), F-statistic, Case 3								
	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_4	2.45	3.52	2.86	4.01	3.25	4.49	3.74	5.06
accept if F < critical value for I(0) regressors								
reject if F > critical value for I(1) regressors								
Critical Values (0.1-0.01), t-statistic, Case 3								
	[I_0] L_1	[I_1] L_1	[I_0] L_05	[I_1] L_05	[I_0] L_025	[I_1] L_025	[I_0] L_01	[I_1] L_01
k_4	-2.57	-3.66	-2.86	-3.99	-3.13	-4.26	-3.43	-4.60
accept if t > critical value for I(0) regressors								
reject if t < critical value for I(1) regressors								
k: # of non-deterministic regressors in long-run relationship								
Critical values from Pesaran/Shin/Smith (2001)								
.								

Appendix (5.39): The Results of ARDL Estimation

ARDL regression						
Model: level						
Sample: 1992 - 2018						
Number of obs = 27						
Log likelihood = -53.569258						
R-squared = .66048044						
Adj R-squared = .50958286						
Root MSE = 2.1551075						
logdgdppc	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
logdgdppc						
L1.	.3694786	.1753214	2.11	0.049	.0011419	.7378153
logdfdi						
--.	-.0640348	.0671887	-0.95	0.353	-.2051929	.0771234
L1.	.0249026	.0564787	0.44	0.665	-.0937548	.14356
logdimp						
--.	.0385887	.1175627	0.33	0.747	-.2084013	.2855788
L1.	-.2921978	.1063875	-2.75	0.013	-.5157096	-.068686
logdexp	.1942459	.0492496	3.94	0.001	.0907764	.2977154
logdgcf						
--.	.0133406	.0991961	0.13	0.095	-.1950628	.2217439
L1.	.180217	.0990661	1.82	0.086	-.0279132	.3883471
_cons	.779201	.5438982	1.43	0.169	-.3634867	1.921889

Appendix (5.40): The Results of Durbin-Watson Test

Durbin-Watson d-statistic(9, 27) = 1.909868
--

Appendix (5.41): Breusch-Godfrey LM Test for Autocorrelation

Breusch-Godfrey LM test for autocorrelation			
lags (p)	chi2	df	Prob > chi2
1	0.002	1	0.9674
H0: no serial correlation			

Appendix (5.42): White's Test for Heteroskedasticity

White's test for Ho: homoskedasticity
 against Ha: unrestricted heteroskedasticity

chi2(26) = 27.00
 Prob > chi2 = 0.4093

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	27.00	26	0.4093
Skewness	3.10	8	0.9282
Kurtosis	0.54	1	0.4622
Total	30.64	35	0.6788

Appendix (5.43): Skewness/ Kurtosis Tests for Normality

Skewness/Kurtosis tests for Normality

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	joint Prob>chi2
resid	27	0.7460	0.7906	0.18	0.9160