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Assessing the Dutch Disease Impact on the Equilibrium Real Exchange Rate′s Performance in Algeria 1990−2016

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Acknowledgements

List of Tables

List of Schemes

List of Figures

List of Inserts

List of Acronyms

CHAPTER 01: THEORETICAL APPROACH TO DUTCH DISEASE AND ITS IMPACT ON THE ECONOMY

CHAPTER 03: ASSESSING THE DUTCH DISEASE IMPACT ON THE EQUILIBRIUM REAL EXCHANGE RATE'S PERFORMANCE IN ALGERIA OVER THE PERIOD 1990- 2016

List of Tables

List of Schemes

List of Figures

List of Inserts

List of acronyms

ACF - PACF	Autocorrelation Function - Partial Autocorrelation Function.
ADF	Augmented *Dickey-Fuller* Test.
AIC	*Akaike* Information Criterion.
ARDL	Autoregressive Distributed Lags.
BEER	Behavioural Equilibrium Exchange Rate.
BPs	Balance of Payment.
CEMAC	The Central African Economic And Monetary Community.
CR	Coverage Rate.
DD	Dutch Disease.
DEER	Desired Equilibrium Exchange Rate.
DR	Dependency Rate.
DZ	Algeria's currency –Dinar.
EMP	Share of Employment in the Informal Sector.
ER	Exportability Rate.
EREER	Equilibrium Real Effective Exchange Rate.
FDI	Foreign Direct Investment.
FEER	Fundamental Equilibrium Exchange Rate.
FER	Foreign Exchange Reserves.
FOREX	Foreign Exchange Market.
GDP	General Domestic Product.
GLS	Generalized Least Square.
GS	Government Spending.
IMF	International Monetary Funds.
KPSS	*Kwiatkowski-Phillips-Schmidt-Shin* Test.
NATREX	Natural Real Exchange Rate.
NCF	Net Capital Flows.
NEER	Nominal Effective Exchange Rate.
NER	Nominal Exchange Rate.
NRC	Natural Resource Curse.
OCA	Optimum Currency Areas.
ODA	Official Development Assistance.
OECD	Organization for Economic Cooperation and Development.
OLS	Ordinary Least Squares.
ONS	National Office for Statistics of Algeria.
OPEC	Organization of the Petroleum Exporting Countries.
OPEN	Trade Openness.
PEER	Permanent Equilibrium Exchange Rate.
PP	*Philips Perron* Test.
PPP	Purchasing Power Parity.
PR	Import Penetration Rate.
Prod	Productivity
REER	Real Effective Exchange Rate
REM	Remittances.
RER	Real Exchange Rate.
RPPP	Relative Purchasing Power Parity.
SIC	Schwartz criterion.
SDRs	Special Drawing Rights.
SYS-GMM	System Generalized Method Of Moments.
T - NT	Tradables – Non-Tradables.
ToT	Terms of Trade.

General Introduction

Introduction

T he natural resource durability and profitability problems are not recent. There are several oil countries that exploited the natural resources since the Sixties for large and enormous industrialization policies benefit, however, the results did not show any advantage, conversely, there were negative effects of income on the growth, such as deindustrialization and international competitiveness loss in particular in oil countries, which evoked the reconsideration of the policies to deal with these effects.

Algeria has the 10th largest reserves of natural gas and 16th largest oil reserves as considered 06th largest gas exporter worldwide. Therefore, the economy of Algeria is one of the most dependent economies on exports of oil, gas and related products that dominate the process of economic development of which we cannot analyse any strategy without returning to the oil sector reinforced with each rise of their prices. Indeed, after the crisis of 1986, many dangerous indicators on the local economy appeared following the disorders on the macro-economy level, in particular since 2007, in spite of the significant reserves of derived foreign currencies from increased oil prices that reached $113.3 billion in 2016 (against $194 billion in 2013 according to the World Bank) that remains high even though the decline of more than 40 per cent since 2013, the Algerian economy in general, and the industrial sector, in particular, showed neither great change nor improvement.

In fact, the natural resource abundance and lack of non-hydrocarbon industries forced the Algerian economy to be strongly dependent on income derived from oil production (oil industry) in order to satisfy its needs of goods, services and even of capital. This phenomenon has been reflected in a strong ratio of oil resources, generating more than 96 per cent of total export earnings in 2017 and roughly, 60 per cent of the budget revenues as it is responsible for 30 per cent of gross domestic product (GDP). However, the diversification in manufacturing industries has been little developed since independence in 1962, in spite of the high volume of incomes derived from oil and gas. That is shown by a growth rate of 2.9 per cent in 2015 according to the IMF, with a slight decrease compared to 2014 (3.8 per cent); while non-hydrocarbon GDP growth reached 1.3 per cent in 2017 (against 5 per cent in 2015) under the expenditure effects as a result of declining oil prices since 2014 that made the government under pressure to reduce spending and its ability to use state-driven growth to distribute rents and fund generous public subsidies. In addition, Algeria's government has reduced the fiscal deficit in 2016 while inflation rose from 4.8 per cent in 2015 to 7.7 per cent in 2017.

At this stage of our work, we will interpret the Algerian experiment using the theoretical literature that provides us with a multitude of approaches, in particular, the Dutch disease theory to treat the relation between flows derived from oil and the equilibrium exchange rate. Indeed, the strong dependence of oil receipts has its advantages and its disadvantages; certain literature affirms that the

Introduction

incomes of oil and gas play an important role in economic and social development. For example, the study's results of (*Brunnschweiler, A. 2006*) showed that the natural resources and in particular, mineral resources have a positive empirical association with the real GDP growth (economic growth) but they adversely affect the quality of institutions. *(Buccellato, T. & Alesandrini. M. 2009)* concluded that the natural resources themselves represent a positive factor for the economically developing countries, (by reducing the production costs or supporting the international trade incomes). However, they can lead to unequal distribution of income within countries and in spite of that, the rich economies in natural resources have known a slower growth than the other economies, and they persist in many cases, in a state of the poverty trap. *(Mideksa, T. M. 2012)* noted that the impact of natural resource endowment on growth varies from year to other, but it remains positive and very high.

As there is some literature about the inverse effect. For example, *(Sachs, J. D. & Warner, A. M. 1997),* explained their results by the Dutch disease phenomenon that appears in countries dependent on natural resources and noted that there is a negative relationship between the natural resource intensity and the subsequent growth. The authors also concluded in *2001* that countries with a great wealth of natural resources tend nevertheless to grow more slowly than the resource-poor countries. *(Gylfason, T. 2004)* Noticed that the natural resources entail several risks such as the reduction of the economy's openness to trade and to foreign investments, the excess of trust in natural resource abundant countries, the weakening of various institutional arrangements of the society, the strong dependency of natural resource allocation that tends to be directly linked to corruption, inequality and the political oppression that tend to hinder the economic growth; The intensity of natural resources is conversely linked to the financial depth, the development of a wrong feeling of security and become careless about the accumulation of foreign, social, human, physical and financial capital.

(Neumayer, E. 2004) summed up the results of his study in two main proposals, underlining that the natural resource intensive countries really suffer from a resource curse as well as they are weaker in terms of real income growth than GDP growth.

(Arezki & Van der Ploeg, 2007) found a significant direct negative impact of natural resources on the per capita income, besides a significant indirect effect on institutions. However, the trade policies oriented toward a greater openness can make the resource curse less severe and can even transform it into blessing so the bad policies, in general, are likely to aggravate the resource curse while the good ones can transform a natural resource boom into a blessing.

(Erwin, H. B. & al. 2004) revealed that the natural resource abundance does not have a direct effect on the various indicators of development (human development, human poverty index and life

Introduction

expectancy) as well as the income and governance levels and generally, the resource abundance does not have a significant impact on the development. It is the indirect impact of resources on the development that occurs only by the institutional quality channels. Similarly, *(Aoun, M.C. 2008)* concluded that the discovery and exploitation of the petroleum resources have an indirect impact on the main determinants of growth, such as investment, education, trade openness and institutional quality, as well as oil revenues, are rather a curse and Dutch disease is not the main factor of curse and the decline in exporting countries' growth is mainly related to the deterioration of governance and widespread corruption. Furthermore, *(Rocha, F. 2010)* concluded that the problem with natural resource curse is probably associated with the slow growth of exports outside hydrocarbon and countries that are specialized in this kind of resources grow more slowly because their export base shows a weaker growth.

Further studies assert that relying on oil and gas revenues leads to a real appreciation in the exchange rate, which in turn leads to the loss of competitiveness and has disruptive effects on the industrial structure and accordingly a delay of economic growth. For example, *(Magud, N. & Sosa, S. 2010)* concluded, on one hand, that the Dutch disease exists and causes the real exchange rate to appreciate. According to them, there is a reallocation of factors and the production passes far from manufacturing, on the other hand, the exchange rate volatility slows down and reduces the economic growth. *(Lama, R. & Medina, J. P. 2010)* noted that the tendency to an appreciated exchange rate can prevent ineffective loss of tradable outputs but at the cost of the production and poor allocation of resources to other sectors of the economy.

Without any doubt, the exchange rate is determined by the interaction of supply and demand for foreign currencies. Thus, it is an equilibrium price determined by considerations of supply and demand. It is, therefore, important to determine if the exchange rate level is compatible with equilibrium or not to assess the extent to which the national economy is affected by Dutch disease.

Although the empirical studies on Dutch disease and its impact on the exchange rate and thus the economic growth, in general, are available, however, the econometric studies about this phenomenon in Algeria are few, amongst which, for example, *(Derbal, A.E.K. & Dekkiche, M. 2011)** focused on the real exchange rate and resource movement, then concluded that the existence of some symptoms of Dutch disease does not mean that this last exists, thus the Algerian economy is not affected by this phenomenon. Therefore, this study aims to add a reference more to the existing literature on the influence of Dutch disease on the equilibrium exchange rate performance in Algeria.

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*عبد القادر دربال ومختار دقيش .(2011) .العلّة الهولنديّة: نظرية وفحص تجريبي في الجزائر الفترة 1986-2006 .مجلّة العلوم الاقتصاديّة وعلوم التسيير، (11)11)، ص ص 111-124.

Introduction

The problem statement:

How to assess the Dutch disease impact on the equilibrium real exchange rate performance in Algeria?

In order to answer the main question, some sub-questions can be asked, as follows:

- What are the most important theories explaining the exchange rate performance?
- What is the relationship of Dutch disease with the real exchange rate and foreign trade?
- Is Algeria suffering from Dutch disease? And how this disease can affect the economic balance and especially exchange rate balance?
- What is the role of the state in controlling the impact of international market fluctuations?

Hypotheses:

In attempting to attain our goal, two hypotheses have been formulated as follows:

H0: There exists a relationship between Dutch disease and the performance of equilibrium real exchange ERER in Algeria, i.e. Shocks that affect the ERER do refer mainly to this disease;

H1: There is no relationship between Dutch disease and the performance of equilibrium real exchange ERER in Algeria, i.e. Shocks that affect the ERER do not refer to this disease.

The objective of the study:

The main objective of this study is to identify the determinants of exchange rate fluctuations and to verify the theoretical link between the latter and Dutch disease in Algeria, as to empirically evaluate to what extent this phenomenon could affect the performance of equilibrium real exchange rate, especially during the last decade within which oil price fluctuated and the dollar appreciated against the other currencies.

Importance of the study:

This research draws its significance from the importance and place occupied by both Dutch disease and exchange rate in influencing the economic development and the role played by hydrocarbon sector, that has often been controversial among economists, especially around oil-producing countries. When the unstable internal economic conditions in the Algerian economy significantly simulate the Dutch disease symptoms. This is what makes us wonder about the future of our country in such conditions and what drives us to test the existence of such a phenomenon in Algeria and to assess its impact on the equilibrium exchange rate performance.

Introduction

Limitations of the work:

The impact of Dutch disease on the performance of Algeria's equilibrium exchange rate during the period of 1990-2016 is studied through this work. Here, Algeria was found suitable because of its large proven oil rent that, according to the World Bank, accounted for about 14 per cent as a share of GDP in 2016 and more than 96 per cent of total exports in accordance with the National Office for Statistics, ONS in the same year. Furthermore, the selected period was of importance, basically, due to the major economic events at the time, especially the related ones with the hydrocarbon sector, as to the availability of data that was derived from reliable national and international sources, including the World Bank, the International Monetary Funds, and the National Office for Statistics ONS.

The methodology used:

During our research, apart from the introduction and conclusion, various methods and techniques have been used, including a theoretical approach by presenting the explanatory theories of the studied phenomenon, so-called "Dutch disease" and empirical methods to analyze its relation to the equilibrium exchange rate in Algeria.

Our work is arranged in three chapters: the first one is about Dutch disease as a channel of the natural resource curse and describes its symptoms and effects besides its explanatory models, its transmission channels and how different policies are responding to this syndrome. Thereafter, the second chapter is entirely dedicated to generalities on the exchange rate and its related regimes highlighting the advantages and disadvantages of each one, as it provides more details about the balance of payments and its relationship with the exchange rate; while the third and last chapter, is interested in the case of Algeria after providing a theoretical overview of such a phenomenon. It highlights the reality of the Algerian economy as explains data and methodology used and accordingly presents the estimation results and interpret them to draw conclusions. In short, a descriptive approach is used to help us analyze data to understand many related phenomena, in addition to using the Autoregressive Distributed Lags, ARDL model to assess the contribution of Dutch disease in influencing the equilibrium real exchange rate's performance. Finally, the last stage is dedicated to the conclusion and research outlook.

The Encountered difficulties:

The greatest difficulties encountered in this study are the inaccessibility to certain documents and the impossibility of finding certain data.

Chapter 01 :
Theoretical Approach to the Dutch Disease and its Impact on the Economy.

Introduction to the chapter:

Many people believe that the natural resources of any country are a source of wealth and if they are distributed equitably to people, it will make them rich, as is the case in the oil-rich Gulf countries, whose citizens have achieved a standard of living comparable to that of the rich countries; but the bitter reality that many people neglect is that the dependency of natural resource revenues causes significant damages to the economic, social and political structure of any rentier country in which the majority of people have become semi-unemployed because they receive their salaries from the sale of natural resources regardless of the importance of the services they provide. The government that holds the money is interested only in expanding their circle of followers by increasing the size of the army, police and public service to absorb unemployment, and at the same time, it absorbs its direct income without developing its productive sectors. Of course, any government that distributes money to its citizens without giving anything in return does not build a real economy, at the same time a government that expects from these citizens, that has provided them with various jobs, to obey without no accountability or at least do not oppose.

The governments that derive their resources from the income of the raw materials do not give much importance to the opinion of their citizens, as they do not rely on them to finance their projects and agencies, while governments that depend on taxes collected by citizens are accountable to taxpayers for how their money is spent, taxpayers are also seeking out how their money is spent, and they are investigating spending sections and how to reduce the tax burden on their shoulders. Oil is often considered an economic poison since it generates fabulous profits for modest investments and quickly amortized. This develops a rentier economy, as can be observed in most of the producing countries that depend on this unique resource. As the price of raw materials increases, exporting countries receive higher sums from importing countries. Inevitably, the value of their currency increases, making their products, in other sectors especially in the manufacturing sector, much less competitive. This chapter is entirely dedicated to the theoretical background of the Dutch disease.

Section 01: The Natural Resource Curse (NRC):

Some economists perceive the abundance of natural resources as a blessing, as was the case during the Cold War, others as a curse and a source of inequality and poor development that affects economic performance, the risk of civil war and the functioning of institutions and governance. The curse of resources does not affect all commodity-rich countries, but the problem becomes clearer when we look at development indicators, especially when the exploitation of Commodities - especially oil - represents the main source of foreign exchange and tax revenue for countries. Most recent studies show that the exploitation of these resources is often associated with the misery of the local populations, the degradation of the environment and bad governance and tends to weaken the economic tissue and political institutions of the producing countries; all these factors hurt the economy and cause disease.

Through this section, we are interested first in the natural resource curse and will show the main concepts related to this phenomenon.

I. General Concepts of the Natural Resource Curse (NRC)

1. The Notion of the NRC: The curse is expressed in many ways; first of all, it is the phenomenon that captures rent and annuitant behaviour.

1.1. On the purely economic level, the possession of oil resources is accompanied by perverse incentives that hinder diversification, innovation and development;

1.2. On the societal level, the rent increases inequalities and tensions. It also makes it more difficult for a middle class to emerge as a result of the development of a diversified productive fabric;

1.3. On the institutional level, it fuels the corruption and weakens institutions;

1.4. On the political level, it fuels the conflicts between rival groups or countries and bears a major part of the responsibility for the persistence of conflicts that undermine the African continent.

Beyond the rent, the exploitation of oil is also accompanied by a "Dutch disease", well-known by economists. It implies a sort of implicit tax on other sectors of the economy by attracting resources. It is, in fact, leading to higher costs and a loss of economic competitiveness that hinder the development of other activities and aggravates the trade dependence on the outside world. This syndrome, whose empirical importance is debated, adds to the behavioural risk, mentioned above,

to enhance the difficulty of any diversification approach. Paradoxically, therefore, oil resources provide a potential fuel for development but make ignition particularly difficult.[1]

The Curse of Natural Resources or Dutch disease is a chronic overvaluation of a country's exchange rate caused by its exploitation of abundant resources, whose commercial production is consistent with an exchange rate well below the average exchange rate that paves the way for tradable economic sectors using state-of-the-art technology. It is a structural phenomenon that causes deindustrialization, while the Dutch syndrome will be a market failure; the curse will result from corruption and rent-seeking. The appreciation of the abundance of such resources in countries with backward societies and weak institutions and corruption problems exist in all countries, but more aggravated in poor countries, rich in natural resources.[2]

2. Explanation of the Natural Resource Curse: [3] The hypothesis of the natural resource curse is based on the observation that resource-rich economies grow more slowly, on average than resource-poor economies, for example, many resource-rich countries, such as Nigeria, Venezuela, Angola and Ecuador have failed to prosper over the past decades, while resource-poor countries in Asia have experienced rapid economic growth. In a well-known article, *Sachs & Warner (1995)* report a strong negative relationship between real GDP per capita growth and the ratio of resource exports to GDP in a sample of 97 developing countries over the period 1970-1989. This surprising result has been shown to contain a variety of measures of resource abundance and to be robust to control for other possible determinants of growth, such as initial income per capita, trade policy, government efficiency, and investment rates.

2.1. A first possible explanation for the natural resource curse is that the wealth of resources tends to give rise to a struggle over existing resources, which in turn, leads to poor quality of institutions and low development. The argument here is that the large rents that can be obtained from natural resources create incentives for governments and private agents to commit to the behaviour of rent-seeking, "voracity", the corruption, and even the civil war, thereby removing entrepreneurial activity and other growth-enhancing activities. Incentives for rent-seeking arise when the net gains expected to engage in unproductive activities to appropriate existing wealth (for example, (corruption, conflict) exceed the net gains from engaging in productive activities to create wealth;

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[1] Jacquet, P. (2005). Le Pétrole en Afrique. *The letter from the economists of the French Development agency AFD, N° 8,* p01.

[2] Luiz Carlos Bresser-Pereira. (2008). The Dutch Disease and its Neutralization: A Ricardian Approach. *Brazilian Journal of Political Economy, 28 (1)*, p06.

[3] Oomes, N. & Kalcheva, K. (2007). Diagnosing Dutch Disease: Does Russia Have the Symptoms?. *IMF Working Paper, WP/07/102,* pp05-08.

2.2. A second explanation for the resource curse is that resource rents tend to be volatile. Part of this volatility stems from the fact that natural resources generally have a low elasticity of supply. The volatility, in turn, has been shown to be negatively correlated with growth and investments, including investments in education, Hausmann & Rigobon (2003) argue that the main reason for this negative effect is the existing imperfections in the financial market, due to the volatility that leads to higher cost of capital, lower investment, and lower well-being.

2.3. A third explanation for the resource curse, which is the so-called "Dutch Disease" hypothesis making a return to *Corden (1982)* and *Corden & Neary (1984)*, the Dutch disease hypothesis is briefly summarized as the idea that an exogenous increase in resource prices or outputs results in a real appreciation of the exchange rate and a decline in the manufacturing sector, under certain conditions, this may lead to lower growth in the long-run.

To explain the basic pattern of Dutch disease, goods produced by the economy, are grouped into three categories: natural resources (oil), the non-resource tradable goods (manufacturing), and non-tradable goods (services). By definition, the tradable goods (oil and manufacturing) are subject to international competition, hence their prices are determined by global demand and supply, and it is assumed that the country is small enough not to be able to influence these prices. Services, on the other hand, are not covered by international competition, therefore, their prices depend only on demand and domestic supply.

II. The Role of Oil as a Strategic Product to Influence the Economy

1. The Importance of Oil in the Development of Nations' Economies: Today, the ever-growing demand for natural resources provides substantial foreign exchange earnings to the producing countries, which have enabled them to finance roads and telecommunications' infrastructures, to favour many activities, and to finance the agricultural and industrial projects. For many of these countries, oil occupies a prominent place in the total value of their exports; for example, for the 13 OPEC countries, oil exports represent 87% (in 1972), 92% (1980), 73% (1988), and 74% (in 1992) of their total exports; showing sufficiently the importance of the black gold in the economy. The rational use of this natural resource can enable the country to initiate sustainable economic and social development, but this supposes the existence of a real will of the country through the implementation of a development strategy. At a certain point, the increase in the oil prices (1973) by the OPEC member countries, and Arab oil-exporting countries' organization by first raising the prices to 70%, then to 130% beginning to have disruptive effects on the global economy. These effects have resulted in the balance of payments' problems, inflation and growth regression. These upward price movements continued in 1973-74, 1979/80

and finally in 1990 and had given rise to abundant literature to try to determine the causes and consequences.

The oil producing and exporting countries realized that this raw material, indispensable to the economy, could be used as a weapon against American imperialism that supported Israel in the conflict with the Arab countries, from where the need for being the master of the steering wheel in pricing and supply by nationalizing the major oil companies in Algeria, Iraq, Libya,...etc. However, distortions have quickly appeared within the cartel because it could no longer control the supply and that each country determined its own oil policy and the major consumer countries like the United States, Canada and France, starting by looking for alternative sources of energy and thinking about a rational use of energy and oil in particular in order to reduce their dependence on Arab countries producing black gold. Accordingly, the global recession in 1981 resulted in a decline in oil demand. By the end of the century, world oil consumption accounted for 35% of all energy needs, compared to 40.1% in 1992. There is no doubt that oil has played an important role as a source of energy, and continuing to be used in asphalting roads, lubricating oils and its derivatives are often used in pharmaceuticals, cosmetics, candles, ... etc. that is, it is still an essential and irreplaceable product in the current state of affairs even though it is competing with energy sources such as gas, coal or electricity. So, the producing countries took advantage of these different oil-shocks to have resources that allowed them to support their trade balances. But the downside is that these resources have had adverse effects (Dutch disease) in the economy of these oil producing and exporting countries.[1]

2. The Oil Boom effects on the Economy: [2] *« Oil sufficient to create problems, but not enough to solve them! » (Gelb, 1986, p01).*

2.1. We will now try to analyse the impact of the discovery of a natural resource on some key variables of the economy that are the level of production, the allocation of human resources through the labour market, the movements of people between the different poles of attraction, in other words the management of rural-urban migration and finally the situation of the trade balance that will be appreciated through the different analyses. It should be noted that any expansion, whether an 'enclave' or not depending on the degree of integration of different sectors of the economy, has two negative effects on other sectors of the economy, namely, a resource movement effect and a spending effect. The mobility of the factors of production

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[1] Ndoumtara, N. (2010). *Boom Pétrolier et Risques d'un Syndrome Hollandais au Tchad: Une Approche par la Modélisation en Equilibre Général Calculable.* Thesis for obtaining the grade of Doctor in economics, Faculty of Economics and Management, University of Auvergne Clermont - Ferrand I. France. pp. 53-54.

[2] Ibid. pp. 73-85.

appears as an essential element in the analysis according to whether one is in the short term or the long term.

2.2. Boom Effect when Labour is the only Moving Factor: Before analysing the effect of the boom when the labour appears as the only moving factor, it is important to describe the framework of the analysis considering the case of a small open economy producing three goods relating to three sectors of the economy of which two goods are tradable called energy *Xe* belonging to the flourishing sector so the boom, and *Xm* the manufacturing products of the lagging sector and the third non-tradable good- services *Xs*. The analysis is made considering relative prices, given that the country's domestic production and expenditures are equal, so that trade is balanced, although trade in one of the two tradable goods does not need equilibrium. Finally, the economy is in a full employment state because the real wages are flexible and all goods are assumed to use for final consumption;

2.3. The Boom Effects on the Labour Market and Income Factor: The purpose of this sub-section is to identify and analyse the effects of the expansion of the energy sector in the labour market, on the income distribution and on the profitability and the size of the industrial sector. Since we said that one factor is assumed mobile (short-term) labour, the other factors of production are specific to each of the three sectors.

Figure n° 01- 01: The Expansion Effect on the Labour Market
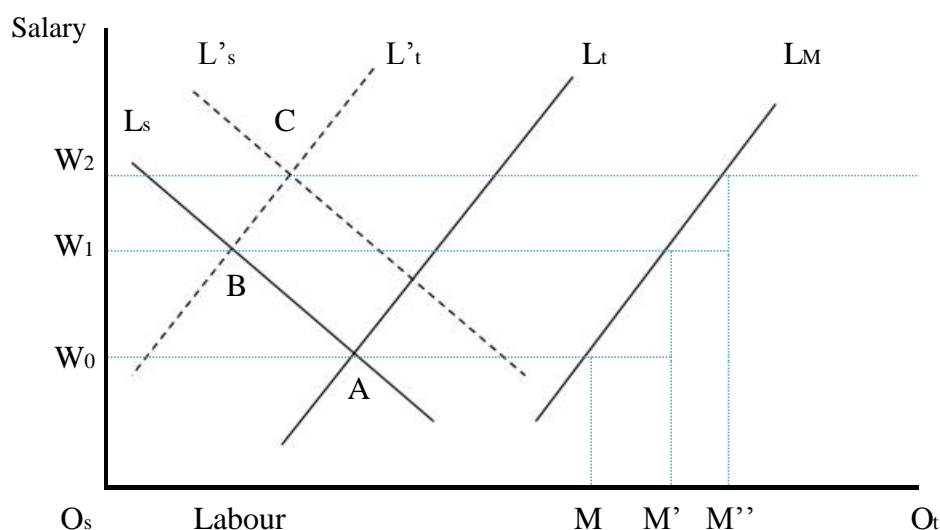
Source: Ibid. p74

The vertical axis figures the labour market and wage rate in terms of manufactured products. While the horizontal axis O_sO_t measures the total labour supply in the economy. Labour in services (non-tradable goods) is measured by distance from O_s and from O_t from right to left measures labour in both energy and manufactured goods (tradables). Examining the model

hypothesis, labour demand is a decreasing function of the real wage rate of the sector. So, we have *Lm* the labour demand curve of the manufacturing sector, *Ls* the services and *Lt* the labour demand curve of the energy and manufacturing sectors. The point of intersection A between the curve *Lt* and that of *Ls* corresponds to the initial equilibrium situation of full employment before the expansion whose initial wage rate is *W0*. The expansion can come from a variety of sources: it can be in the form of neutral technical progress, an increase in the price of energy or discovery of natural resources. Thus growth in the energy sector will produce two distinct effects: a resource movement effect and a spending effect (*Corden 1984*). So, how does the resource movement effect influence the different sectors?

In the previous Figure, the expansion improves the marginal productivity of labour value in the energy sector, therefore a salary increase in this sector. These results in an upward shift of the curve *Lt* to *L't*, therefore, a new equilibrium *B* is reached with a corollary wage increase from *W0* to *W1*. This movement drains some labour resources that are mobile, to the detriment of other sectors (manufacturing and services), resulting in a decrease in the production in the manufacturing sector whose price is set in the international market, and a rise in the relative prices of the service sector; which lowers the demand for manufacturing labour from *OtM* to *OtM'*. Thus, the resource movement effect has caused direct deindustrialization.

What about the spending effect? Given that economic expansion also creates income in the energy sector, in other words, the expansion causes a massive inflow of currencies into the economy, so the holders of these incomes be it the economic agents or the State, will be required to consume more services if the elasticity - income from the demand for services is positive, so there will be an increase in the price of services relative to other goods, and the curve of the demand for labour services goes up *Ls* in *L's*. The definitive balance is at point *C* with a salary increase going to *W2*. As a result, the labour factor shifts from the manufacturing sector to the service sector, which translates from *OtM'* to *OtM'' and this* translates into indirect deindustrialization.

The rise in service prices also led to an appreciation of the real exchange rate. Thus, both effects led to an increase in the relative price in the services sector, while the overall impact on the volume of production in the services sector, it will depend on the behaviour of demand, especially that the resource movement effect tends to reduce the production of services and spending effect tends to increase it. On the other hand, On the other hand, the effect on the manufacturing sector is clearly negative as both effects contributed to the decline in employment in this sector. It appears that the development of one sector (energy) has caused

the weakening of another sector of the economy (manufacturing sector): it is the "Dutch disease".

2.4. The Boom Effects on Production: We will try to analyse the impact of an expansion of the energy sector on the manufacturing sector's production, using a variant of *Salter*'s "Dependent Economy" model (1959), developed by *Warner Max Corden* and *J. Peter Neary* in 1982. We consider Figure n° 01-02 that shows the tradable goods on the y-axis and the non-tradables on the x-axis. *TS* represents the curve of production possibilities before the energy boom and *on* is the consumption curve and *a*, is the initial equilibrium point, according to a real exchange rate where the indifference curve is tangent to the curve *TS*.

Figure n° 01-02: The Effect of Expansion on the Product Market.
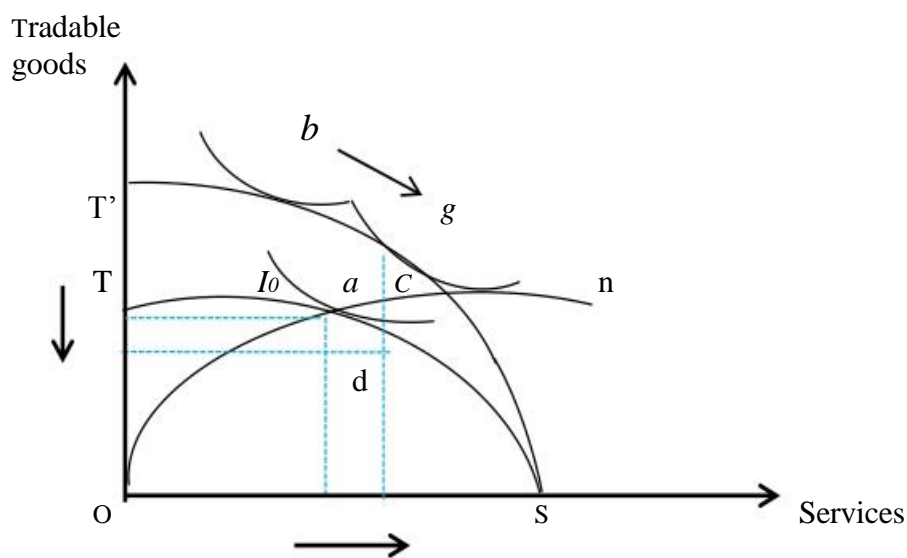
Source: Ibid. p78.

Under a boom effect of production in the manufacturing and energy sector increases from oT to oT', that is, the shift of the production frontier from Ts to $T's$, but leaves the production of services unchanged OS. Given that the real exchange rate remains constant, the effect of the movement of resources moves the point *a* to a new equilibrium point *b* which results in a decrease in the production of services because the resource movement effect acts to the detriment of the service sector. We consider the spending effect that results in an increase in income, will cause an excess of demand on the offer, therefore, the price of service goods will increase, the relative price will fall and the appreciation of RER will lead to an increase in the production of service goods and a decline in manufacturing output, leading to a deterioration in the trade balance of the manufacturing sector. The combination of the two effects will result in a decline in the production of manufactured goods and a rise in that of services compared to

the initial point, which results in the displacement of *b* to *g,* as a new equilibrium point (the resource movement effect tends to reduce the production of services while the spending effect tends to increase) which corresponds to the point *d,* on the initial possibility curve. Thus, the shift of the production of manufactured goods from *a* to *d* is described as de-industrialization by *Corden & Neary*. This result obtained in the short term where only the labour factor is mobile has highlighted the vulnerable nature of the manufacturing sector, therefore, of the industrial sector in front of an expansion that may come from a technological change or a significant discovery of a natural resource.

2.5. The Boom Effect When the Capitals are Mobile between Two Sectors: We will consider the expansion effect on the production and prices of services, as well as manufacturing production and this over a slightly longer period namely the medium term. There is capital mobility between manufacturing and services sector. On the other hand, the energy sector retains its specific factor, but the workforce retains its perfect mobility, what makes this economy comparable to that of *Hecksher-Ohlin*:

Figure n° 01-03: The Effect of Expansion When Capital is Mobile between Manufacturing Industry and Services.
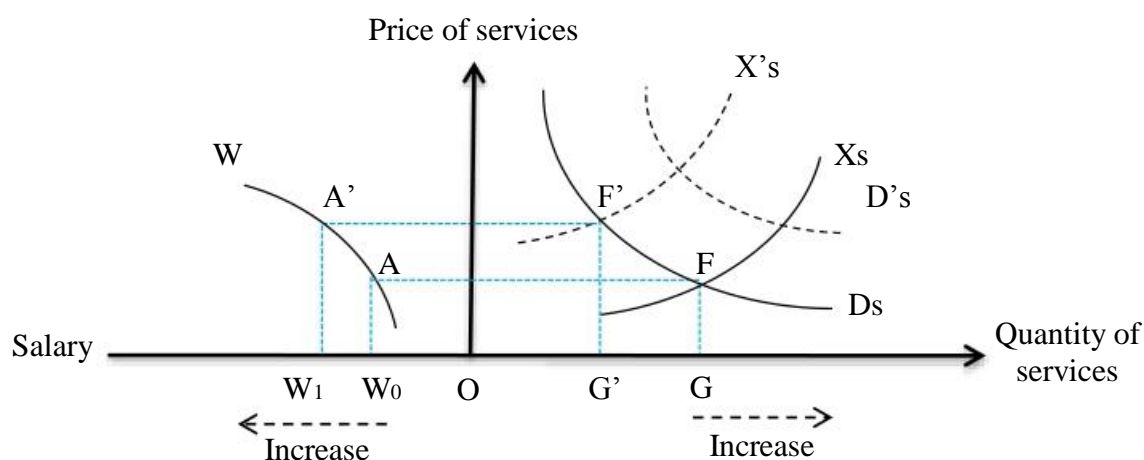
Source: Ibid. p80

According to the factorial endowment between the manufacturing sector and services, there is a unique relationship between the wage rate and price of services that are always measured in terms of tradable goods. This relationship is not affected by the expansion but depends on the technology used in both sectors reflecting the upward trend of the *W* curve (*Stolper - Samuelson effect*) on the left side of Figure n°01-03 showing that the manufacturing industry is supposed to be more capitalistic than the production of services. The equilibrium is represented

by the points *A* and *F*, i.e. a situation before the oil boom, where *Ds* represents the demand curve assimilated to the production curve for any given price since it is assumed that the expenses are equal to income.

Finally, the supply curve *Xs is the* consequence of the redistribution of resources, manufacturing industries and services, and the movement of the labour force between the two sectors and the energy sector. Now, because of the expansion, there are two effects as we have seen in the sections above, namely the resource movement and spending effects. Examining the resource movement effect, the same results as *Rybsczynski* has been obtained. There is a shift in the service supply curve from *Xs* to *X's*. There is a decline in the production of the services of *OG* to *OG'*, but this results in an increase in the production of manufactured goods (since the manufacturing sector is more capital intensive). The price of services increases and the wage also increases from W_0 to W_1. So, the new equilibrium of the service sector is at point *F'*. What will happen when the manufacturing sector is less capital intensive than services? There will be an increase in the number of services (*Rybsczynski*'s Theorem) which will be accompanied by a decrease in manufacturing goods and a fall in the price of services. It leads to the deindustrialization.

The shift of *Ds* curve to *D's* is due to the effect of boom spending, which leads to an increase in production and prices of services, whereas manufacturing production contracts, regardless of the factor intensity (relative intensity of the factor of production) of both sectors. As for the wage level, it is a function of the relative intensity of the factor of production. For example, a high price for services can be associated with a high wage if the manufacturing industry is more capital intensive, but if it is less capital intensive than services, there will be a high price for services, but wages will fall. We can note that the nature of the effects that may occur in the economy depends on the difference in factor intensity between manufacturing and services. Thus, if the manufacturing sector is labour intensive, the resource movement and spending effects will contribute to a de-industrialization (Dutch disease), but in the case where the manufacturing sector is capital intensive, the resource movement effect can produce a pro-industrialization.

2.6. The Effect of a Boom when Capital is Mobile between the Three Sectors:

Considering the mobility of capital and labour among all three sectors, it is in the long-term perspective. What is the particularity of this model compared to the other models analysed above and how service prices and wages will behave as a result of the expansion? The illustration of this model is made in Figure n° 01-04 of *Corden & Neary (1982)*. It should be pointed out that at this level the spending effect no longer works because prices are independent of factor endowments and demand structure. In addition, the wage rate and prices of services are determined by technology and the prices of tradable goods by international prices (since the prices of energy and manufactured goods are already determined by outside).

Figure n°01-04: The Effect of Expansion on Prices when Capital is Mobile across all the Three Sectors
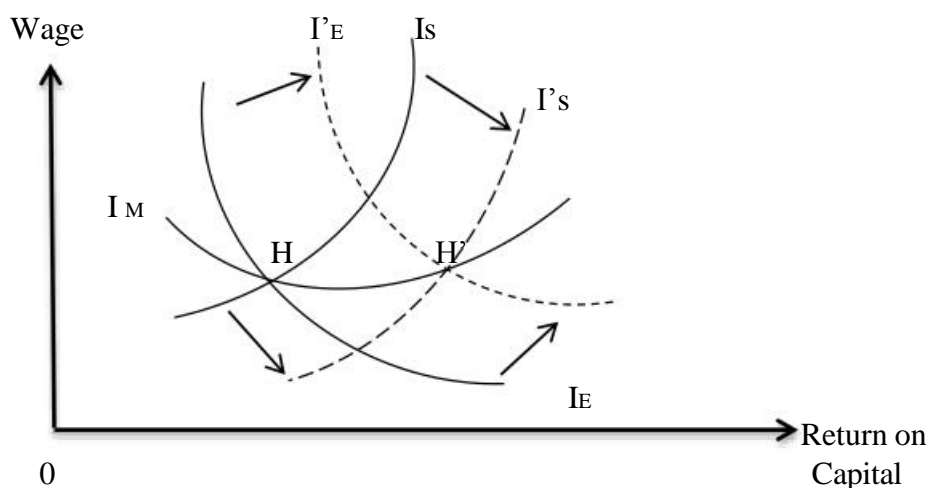
Source: Ibid. p83

Each sector is presented by an isocost curve that shows the different combinations of the prices of the production factors of which the Profit is null. The energy sector is represented by the curve *Ie*, that of the factories by *Im* and finally the services by *Is*. The *H* point is the balance before the expansion where the manufacturing sector is more capital intensive than the service sector but less than the energy.

Under the effect of expansion, energy curve changes from *Ie* to *I'e* because the sector is able to cover its costs and to deal with the income regulations of the two factors. Given the consistency of the manufacturing price and technology state, the *Im* curve remains unchanged and the new equilibrium is at *H'*. On the other hand, the expansion of the relatively capital energy sector decreases the real wage and this results in a decrease in the prices of services from *Is* to *I's* to go through the point *H'*.

Four possible cases emerge from this analysis, according to *Corden & Neary*, of variation of price, services and salary:

- There is an increase in the price of services and in real wages when the manufacturing sector is more capital-intensive than energy and services;

- There is an increase in the price of services, but a fall in the real wage when the manufacturing sector is less capital-intensive than energy and services;

- There is a decline in the price of services and real wages when the manufacturing sector is less capital intensive than energy but more capital intensive than services; and

- Finally, the prices of services fall, but on the other hand, wages increase when the manufacturing sector is more capital-intensive than energy but less capital-intensive than services.

3. The Impact of a Boom on the Profitability of Manufacturing Sector in the Short-run: [1] The short-term impact of a boom on the profitability of a productive sector can be apprehended by the impact it has on the yield of the specific factor, i.e. the capital, of the considered sector. If de-industrialization is measured in terms of declining production and employment in this sector, then we can conclude that a boom, whatever it is, leads to de-industrialization through the effects of spending and moving resources. In addition, absolute profitability in this sector is decreasing.

Finally, the trade balance of the manufacturing sector is in a deficit, since production is decreasing and demand is increasing following the boom; if the manufacturing goods are normal following a positive external shock, the profitability of the manufacturing sector, therefore, decreases absolutely. But more than the absolute levels, it is the relative levels of profitability that are crucial to the allocation of resources in the medium / long term. In the case of a windfall, with only a spending effect, the profitability of the manufacturing sector decreases relative to the non-tradable sector. On the other hand, during a sectoral boom, it is not certain that the relative profitability of the manufacturing sector is reducing. One of the determining criteria is part of the different factors in production. For example, if the share of the labour factor in production is lower in the manufacturing industry than in the services' sector, and if the resource movement effect dominates the spending effect, then the boom may lead to an increase in the profitability of the

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- [1] Djoufelkit, C. H. (2003). *Booms de Ressources Exogènes et Développement Manufacturier en Egypte: L'illusion du Syndrome Hollandais.* Thesis for obtaining the grade of Doctor in economics. Faculty of Economics and Management, University of Auvergne Clermont-Ferrand I. France. p24.

manufacturing sector relative to that of the service sector. On the other hand, if the capital intensity is higher in the manufacturing sector than in the booming sector, and the spending effect dominates, then it is possible that the profitability in the manufacturing sector decreases less than that of the booming sector. Thus, a boom, whatever its nature, induces a short-term decline in the absolute profitability of the manufacturing sector. In the case of a windfall, relative profitability also decreases. In the case of a sectoral boom, its relative profitability may increase in the short term. It all depends on the relative capital intensity of the manufacturing sector and the dominant effect of the boom, the spending effect or the resource movement effect.

III. Dutch Disease

1. History of Dutch Disease: The term Dutch disease first appeared in the English magazine called *"The Economist"* in the 1970s, more exactly in 1977, when the Netherlands recorded a sharp rise in income after the discovery of huge deposits of natural gas from the Slochteren deposit in the North Sea. Unexpectedly, this apparently positive development has had serious repercussions on important sectors of the Dutch economy: the florin has increased in value and non-oil exports have therefore lost their competitiveness.

Indeed, *"The Economist"* was trying to describe this strange phenomenon that the Dutch economy was facing after the first oil shock. It described this phenomenon by writing that Holland, which had been performing well for several years, is now facing a recession and while most European countries have suffered from rising oil prices, on the other hand, Holland was, more than any other European nation, particularly affected by this rise in prices: industrial production has not increased since 1974 and private gross investment has fallen below 15%. The share of profits in the national income that has reached the threshold of 16.8% on average per year between 1965 and 1970, amounts to only 3.5% on average per year in the last five years, following the first oil shock. The unemployment rate that amounted to only 1.1% in 1970, is currently 5.1%, while employment in the manufacturing sector has fallen by 16% since 1970. However, in terms of foreign trade, the Netherlands is performing well: the current account, whose annual deficit was $130 million between 1967 and 1971, improved significantly after the first oil shock to reach a surplus of $2 billion per year between 1972 and 1976. This contrast between, on the one hand, an internal economic situation that is rather recessionary and, on the other hand, a large surplus of external accounts, concluded *'The Economist'*, is indicative of the symptoms of a Dutch disease whose Holland would have suffered as a result of rising oil prices. In parallel with the notion of Dutch disease, highlighted in the Netherlands, the so-called 'Booming Sector' models were born in Australia and supposed to illustrate a number of historical episodes characterized by sectorial

booms with adverse effects on other sectors of the economy. In an article published in 1976, *Gregory* highlighted the structural changes in the Australian economy as a result of the large-scale development of the mining sector. In particular, it showed that the development of the mining sector in Australia had been accompanied by a relative decline in manufacturing. These conclusions are similar to those of the English Review *'The Economist'* according to which the discovery of a natural resource paradoxically ends up impoverishing the country that benefits from it. Whether the phenomenon observed in the Netherlands and Australia has been analysed in terms of Dutch disease or booming sector models, it necessarily translates into the relative decline of the marketed or productive sector.[1]

2. The Dutch Disease (DD) Notion:

The resource curse and Dutch disease are in many cases used interchangeably. Although the terms have a similar meaning, the resource curse hypothesis is broader than DD's in terms of political elements and a wide range of economic theories that can lead to poor economic performance.[2]

In fact, this disease describes the adverse impact on the Dutch industry of the income's appreciation associated with the discovery of natural gas in the Netherlands, mainly through the appreciation of the Dutch RER.[3]

The economists use the term *"Dutch disease"* to describe the reduction in the performance of a country's exports as a result of exchange rate appreciation after the discovery of a natural resource such as oil; the large foreign exchange profits from the export of gas leads to a change in price and exchange rate so that the competitive exporters previously lost their shares, and the production of these exports fell. [4] i.e. DD is the real exchange rate increase of a country that suddenly receives a large influx of foreign exchange earnings; it refers to a temporary disease that hinders exports of manufacturing goods

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[1] Koutassila, J. PH. (1998). Le Syndrome Hollandais: Théorie et Vérification Empirique au Congo et au Cameroun. *Centre for Development Economics, Montesquieu University-Bordeaux IV-France.* pp. 03-04.

[2] Hiroshi Ueno, PH. (2010). *Can Dutch Disease Harm the Export Performance of Brazilian Industry*?. paper to be presented at the summer conference on opening up Innovation: Strategy, Organization and Technology, Imperial College London Business school, June 16-18, London-UK: *DRUID,* p09. Retrieved from the web site:

http://www.ieo-imf.org/ieo/files/completedevaluations/05172007ERP_background3.pdf

[3] Mwanza, N. (2004). Aid and the Dutch Disease in Low-Income Countries: Informed Diagnoses for Prudent Prognoses. *IMF Working Paper, 04/49,* pp. 06-07.

[4] Owen B. (2006). A Policy-makers Guide to Dutch Disease What is Dutch Disease, and Is It a Problem?. *Center for Global Development RePEc Working Paper, 91*, p04.

The most accepted definition of Dutch disease is that it describes the reduction in a country's export performance as a result of an appreciation of the real exchange rate after a rapid increase in export and/or the price of a natural resource. The overvalued exchange rate makes the country's exports relatively expensive, imports cheaper, and thus puts pressure on the country's current account. [1]

Traditionally, this phenomenon has been associated with the discovery of natural resources, indeed the term is originally subject to the discovery of natural gas deposits in the North Sea, that has caused, unprecedented, an increase in the country's export earnings, the appreciation of the Florin ("Gulden" the national currency at the time) and a decline in competitiveness of traditional exports. Thus, Dutch disease refers to a set of adverse effects created in an economy by the expansion of the sector that produces the natural resource. *"It involves sudden shifts in resource allocation, with a contraction of sectors producing tradable goods and an expansion of sectors producing non-tradable goods"*. A relative price movement would be at the centre of these sectoral distortions.[2]

Corden & Neary, in 1982, tried to explain such a paradoxical phenomenon of the appreciation of wealth by writing an article on Dutch disease, in their models, there are three sectors:

- The boom sector 'B' (such as oil, gas or other important resources);
- The lagging sector 'L' (typically, tradables i.e. manufacturing);
- The non-tradable sector 'N' (services, finance, insurance and real estate).

The initial visible effect of a boom in the first sector is the appreciation of the overall incomes of the factors initially employed in the booming sector, then the authors showed the presence of two other important effects, the spending and that of resource movement effects, the first causes an increase in prices of NT non-tradable goods relative to the prices of those tradables T and thus a real exchange rate appreciation occurs drawing resources out of booming and lagging sectors in the NT sector as well to transfer the demand law of the latter to the booming and lagging sectors provided that the income elasticity of NT's demand is positive, such an effect occurs because some parts of the extra income in the booming sector are spent on goods produced by the NT sector (either directly by the owners of factors or indirectly through the payment of taxes to be spent later by the government, in turn, supply in the NT sector is fairly rigid because of various factors, as well as the limited land availability in the real estate sector.

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[1] Lo Bue Maria, C. (2011). *Sources of Dutch Disease: Evidence from Transition Economies 1990-2007*. rethinking development in an age of scarcity and uncertainly: new values, voices and alliances for increased resilience. Sep.19-22nd, EADI New York University. pp. 06-07.

[2] Ndoumtara, N. op.cit. p58.

On top of that, the marginal product of labour (in current prices) is appreciating in the booming sector as a result of the new discovery or the increase in resource prices, so at a constant wage in terms of T, therefore at a constant salary in terms of T, the demand for labour in this sector is appreciated, inducing a shift of labour out of lagging sector and that of NT. This resource movement effect tends to cause direct deindustrialization, which does not require the market for the NT, so this real appreciation is not required. Such a sub-effect is visible in the fall in output of the lagging sector because of the labour movement in the booming sector that occurs even out of the NT sector at a constant real exchange rate by shifting the supply curve inward and creating an excess demand for NT assets that in conjunction with that created by the spending effect, causes an additional real appreciation of exchange rate movement of labour away from sector lagging behind that of the NT. The result of such a combined effect could be labelled as indirect deindustrialization: it reinforces the previous direct de-industrialization, resulting from the movement of labour from the lagging sector to the booming sector.

Table n° 01-01 highlights two paradoxical situations within the Dutch economy during this period. The first situation is characterized by an unfavourable internal economic situation and the second presents excess external accounts. The Economist concludes that this situation presents signs of a Dutch disease due to the oil shock.

Table n°01-01: Evolution of some explanatory indicators of the Dutch disease.

Description	Before the oil-shock of 1965-1970	After the oil-shock of 1971-1977
The profit growth in national income.	16,8%	3,5%
The unemployment growth	1,1%	5,1%
The annual balance of the current account	- 130 million dollars	+2 milliards dollars

Source: Ndoumtara, N. op.cit. p58

The Dutch disease is not always applied for oil-exporting countries, some historical examples of Dutch disease are:

▪The consequences of the influx of American gold in the sixteenth century on the Spanish economy;

▪The gold discoveries in Australia in the 1850s;

▪The Natural Gas discoveries in the Netherlands in the 1960s that caused an appreciation of the exchange rate and a decline in export industries;

▪The technological boom in Japan's manufacturing sector in the 1960s that negatively affected Japan's agricultural sector;

▪The discovery of oil in the North Sea in the 1970s that affected the British manufacturing sector by a real appreciation of the British pound; and

▪Norwegian expansion of oil sector has caused an appreciation of the krone, has raised the level of wages in other sectors of the economy and has affected the traditional national sectors.

In this context, this situation has led to serious influences on the Dutch economy and caused the phenomenon of Dutch disease, export earnings from mining sector products provided externally financed financing flows and an increase in domestic expenditure that caused the general price level to rise, especially natural resources. Among the main causes of the decline in growth, mentions the increase in Lebanon's production costs compared to foreign countries, this increase is reflected in the rate of real effective exchange rate (Domestic real rate = Domestic nominal rate*domestic price/ foreign price), the real effective exchange rate rose by 55% between 1993 and 19981 and rose again by 22% between 1998 and 2000, a percentage of 77% for the period 1993-2000, was a symptom of the slowdown, then of the end of the Lebanese economic growth.

The Dutch syndrome has been the subject of many works of literature that have been increasing in recent years due to the renewed interest in the exploitation of natural resources and mainly oil in many countries in the world because this exploitation provides the country concerned with substantial wealth; as we hear "the Dutch disease is a loss of competitiveness induced by an appreciation of the real exchange rate following the discovery of natural resources"; what should be an opportunity, a windfall for a harmonious and sustainable development for the producing and exporting countries of the black gold, ends up being a double-edged sword, because the revenues generated from exploitation affect negatively the structure of the economy through certain sectors of production and the distribution of income. Indeed, from *Gregory model (1976),* through *W. Max Corden & JP Neary (1982)*, all have tried to provide theoretical instruments for a better understanding of the phenomenon, which will make it possible to look for mitigation solutions because the problem of Dutch disease is to show the adverse effects of a sudden or massive increase in export earnings. This ends up masking the debate over confiscation or the monopoly of rent by multinational oil and mining companies, which, a certain moment, opposed them to the host countries; and the real debate is highlighted around the transformation of oil exploitation revenues into a productive system in order to cope with the post-petroleum period.[1]

All these notions of Dutch disease, Dutch syndrome designate the same thing to explain the difficulties encountered by the Netherlands in managing the exploitation of its natural gas

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[1] Ndoumtara, N. op.cit. p04.

Slochteren deposit. Table n ° 01-01highlights two paradoxical situations within the Dutch economy during this period. The first situation is characterized by an unfavourable internal economic situation and the second one presents surplus external accounts and 'the Economist' concludes that this situation presents signs of a Dutch disease due to the oil shock.[1]

The Dutch syndrome observed in the framework of the natural gas exploitation in the Netherlands or the 'booming sector' theory that was deepened by *Gregory* to explain the Australian mining boom of the early 1970s. The main idea that emerges is that the exploitation of a natural resource in a given sector following a discovery provides revenues that increase the purchasing power of the recipient country and lead to an increase in wages and imported goods, a surge in internal prices and costs that block the development of other sectors.

The phenomenon can be translated as "de-agriculture" or "de-industrialisation". Thus, there is a "hyper-specialization" that is poorly controlled and becomes dangerous and macroeconomic dysfunctions that are characterized by an inflationary overheating and an appreciating exchange rate. It is important to note that the appearance of Dutch disease in the case of exploitation of natural and other resources, is not inevitable for the country concerned, but rather a completely logical reaction of the economy in front of an external shock to detect the manifestations and the origin of the inherent distortions in this economy in order to design and develop economic policies for the stabilization, reduction or elimination of this evil. On the other hand, when the disease does not appear in an explicit way, either because it is weak or because it has been masked by the structure of the economy (the dominance of the informal sector, disarticulation of the economy). In this last case, it is likely that the disease will reappear later and in a sharper form. Therefore, the Dutch syndrome in these countries can be observed too, through the impact of the economic policies implemented in the context of the management of the exploitation of the natural resource, i.e. the redistribution of the gains of the boom in relation to their allocation towards productive projects.[2]

3. Shocks of International Trade and Dutch Disease: International trade relations represent an important and a leading tool among the economic development tools in various fields so it is one of the main supports for all countries either advanced or developing countries as it is an instrument for growing national income and thus appreciate the standard of living and it serves to divide work in addition to international specialization, exploitation of wealth and transfer of

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[1] Ibid. p57.

[2] Ibid. pp58-59.

technology, then the international trade sector is not far from the other economic sectors, it even reflects the power or weakness of them

The international economy has undergone profound changes in the last decades of the last century, affecting growth opportunities and their limitations around the world, especially in developing countries; the most important development is perhaps the degree of exchangeable dependence between the different countries that have associated themselves accordingly with an intensive network of commercial, financial, monetary and technological relations, and that has its meaning in two points: [1]

▪The huge benefit that a country can receive from international foreign trade;

▪Increasing the degree of opposition to external economic crises as a large proportion of each country's economic activity relies heavily on what occurs in the outside world, for example what happened to the oil importing countries when their prices are increased in the seventies and early nineties of the last century, thus, what happened to oil exporting countries when their prices were lowered in the mid-eighties and what has been learned in several countries when international interest prices are appreciated, in all these cases the countries concerned have faced shocks from abroad, without being able to control them.

There are two types of shocks, internal and external:

3.1. Internal Shocks: This kind of shocks is mainly related to the internal politics of the country such as the crises that train in the financial sector because of the pursuit of unsuitable policies for the interest prices, which influences the flight of the national capital, thus the inflation resulting from the increase of demand that returns sometimes to economic and social factors such as the debate on the distribution of the income and also to political factors such as the instability of the political system and their impact on the flight of investments, that is, all the factors that positively or negatively influence the economic situation and balance in a country.[2]

3.2. External Shocks and their Types: The term of external shocks has been associated with the term Dutch disease that analyses the impact of external shocks that an economy confronts, on the reallocation of elements of production between sectors of this economy, thus, on the relative prices and real exchange rate, the Dutch disease theory also analyses the association between appropriate external shocks (the discovery of new resources or appropriate exchange rates) and deindustrialization.[3]

[1] سيد طه بدوي. (2010) *مبادئ العلاقات الاقتصادية الدولية* .مصر: دار النّهضة العربية . ص140.

[2] Ibid. pp 141-142.

[3] Ibid. p152.

External shocks are external events that cannot be controlled or dominated and have a strong influence on the income level of the country. They train by emerging events with an intense and casually evolution that the state faces without being able to escape from adopting in order to benefit from their pros and avoid their cons.[1]

The concept of external shocks includes many factors such as the international business cycles and what their pursuit of fluctuations in economic activity, the level of international demand, and the price appreciation of some major goods such as oil and what their pursuit of fluctuations in inflation rates and radical changes in interest rates, fluctuations in exchange rates of major currencies resulting from fluctuations in the value of currencies in developing countries, changes in the volume of external donations, changes in the value of employees' transfers abroad, the discovery of certain new sources and changes in the volume of foreign investment.[2]

Economic shocks do not only mean economic developments with negative impacts, as influences from abroad can be positive, helping to appreciate development rates, depreciate inflation rates and increase employment levels, while inappropriate reverse-economic shocks such as the decrease in foreign exchange returns and the increase in payments to the outside world are an important focus for policymakers in developing countries. These shocks can be divided into: [3]

3.2.1. Export shocks: They are emerging in the goods' market, either exports or imports; reverse the impact of exports is influenced by economic cycles and fluctuations in the level of activity in the major industrial countries importing exports from developing countries, including raw materials. These shocks affect the volume of exports and prices of goods to be exported, they can be trained due to the protection policies of the producers of goods, the high costs in the local economy of the countries and the increase of the substitute of goods;

3.2.2. Import shocks: Many developing countries are sensitive to the import component, that is, the development of domestic production and standard of living depends largely on the import power and, therefore, if the prices of imported goods increase, this will lead to economic shocks in the domestic economy;

3.2.3. International Trade Rate Shocks: The final result of export and import shocks represented in the evolution of the international exchange rate (the average of export prices to import prices), is inappropriate for the majority of developing countries that have only to confront it either by increasing the volume of exports, or by lowering the volume of imports or even borrowing from abroad, which can produce capital market shocks;

[1, 3] Ibid. pp 141-142.

[3] Ibid. pp 144-146.

3.2.4. Capital Market Shocks: The main elements in this area are the borrowing cost, the inflation rates and the conditions imposed on borrowing operations, where the majority of countries borrow in main currencies from the major industrial countries, in particular, the dollar, noting that the cost is influenced by the borrowing conditions then a fixed or floating interest rate will be defined? And when will the loan be recovered? If, for example, the interest rate is floating and it tends to appreciate, this will produce an increase in the cost of borrowing and, therefore, an increase in interest rates; this case represents a reverse economic shock from the capital markets, it must be confronted by the increase in exports, the decrease in expenditure or the increase in foreign borrowing, as is the case of the deterioration of the exchange rate;

3.2.5. Exchange Rate Shocks: Exchange rate movements between countries with major currencies have significant impacts on the prices of exports and imports in the developing countries and the trend of influence depends on the currency used in the quotation, if the dollar is valued against the European currencies, the prices of exports and imports will depreciate relatively in the event that they are measured by the dollar, but they will be appreciated in the event that they are measured by the European currencies. Some research indicates that, with the appreciation of the dollar, the import prices depreciate by a rate lower than that of the depreciation of export prices, and this will not be advantageous for the international exchange rate of developing countries.

4. Summary of Reasons for the Appearance of Dutch Disease: *".. the disease may be caused by several sources of foreign currency supply shocks that act simultaneously…" (TanJa, B. & Dubravčić, D. (2011), p48);* Traditionally, this disease has been associated with the discovery of natural resources, indeed, the term is originally aimed at the discovery of natural gas deposits in the North Sea by the Netherlands in the 1960s that caused an increase in revenue of the country, the appreciation of the Gulden (the national currency at the time) and the decline in the competitiveness of traditional exports. Economists have diagnosed the rise of the resource sector as a source of Dutch disease for many reasons that are:

4.1. The loss of the market share in the non-resource sector (manufacturing) and it is difficult to find this action because of a loss of competitiveness that horns as a consequence of the Dutch disease. The difficulty in regaining market share could be due to lack of technology, inefficient management and lack of certain skills;

4.2. The economies of nations suffering from Dutch disease are more likely to have a less diversified export basket. This question of diversification is very important, especially when the exportable natural resource is subject to exhaustion. Diversification is very important for

their future economic development when the natural resource runs out, otherwise, nations have nothing else to offer to global markets;

4.3. Oil is like most other Ming industries because it does not use a large labour force. In other words, it is capital-intensive, required by the governments of these countries to create a production base that uses unemployed labour force;

4.4. The national welfare of the economy is not only determined by the allocation of resources, but also by the distribution of income. The resource boom can also introduce inequalities to the economy. The first attempt to explain such a paradoxical effect of increasing wealth was made by *W. M. Corden* & *P. Neary in 1982*, who wrote a pioneering article on the "Dutch Syndrome". In their model, there are three sectors:

- Boom sector *'B'* (such as oil, gas or other important natural resources);
- Lagging sector *'L'* (generally tradable goods, namely manufacturing);
- The non-tradable sector *'N'* (services, finance, insurance, real estate).

The first visible effect of a boom in the first sector is that of the increase in overall incomes of the factors initially employed in the booming sector. Subsequently, the authors show the presence of two other important effects: a spending effect and a resource movement effect. The first one causes an increase in the price of non-tradable goods *NT* relative to the prices of tradable goods *T*, so that the real appreciation of the exchange rate occurs, by pulling on the resources of the booming sector and the lagging one as well as changes in demand from the latter towards the booming sector and the lagging one. Provided that the income elasticity of demand for *NT* is positive, such an effect stems from the fact that part of the income supplement in the booming sector is spent on goods produced by the non-tradable goods' sector (either directly through proprietary factors or indirectly through the payment of taxes recently spent by the government). In turn, the supply in the non-tradable sector is quite rigid due to various factors, such as the limited availability of land in the real estate sector.

In addition, it can be shown that the marginal product of labour (in current prices) rises in the booming sector due to the discovery or increase in resource prices, so that at a constant wage in terms of tradable goods, the demand for labour in this sector is increasing, inducing a change of labour outside the lagging and tradable sector. This resource movement effect tends to cause direct deindustrialization that does not involve the *NT* market so that the real appreciation is not necessary; such a sub-effect is visible in the fall of production the lagging sector because of the labour movement in the booming sector.

Such a movement of the labour force in the booming sector occurs even from the non-tradables *NTs* at a constant real exchange rate, shifting the supply curve inward and creating an excess demand for *NT* goods that conjuncts those created by the spending effect, causes a further real appreciation of the exchange rate and a possible change of some works away from the lagging sector in the *NT* sector. The result of such a combined effect could be labelled as indirect de-industrialization: it reinforces the previous direct de-industrialization, resulting from the movement of lagging sector employees to the booming sector.[1] This disease usually goes hand in hand with the discovery of natural resources; it can result from any development.

4.5. Expansion in the Primary Resource Sector;

4.6. Foreign Aid and Remittances (Foreign Exchange Flows): The impact of exchange rate flows on the RER depends mainly on whether these inflows are spent on the consumption of local or foreign goods and how this could affect the relative price of non-tradable goods. The aid is usually a currency transfer, allowing the recipient country to be activated to import goods and services without having to produce and sell the export to pay for them. So, in this case, the aid is 'absorbed' allowing savings to invest and consume more, by financing an increase in imports or a decrease in exports. The recipient country may choose to manage this type of 'gift' in foreign currency in different ways, for example by allowing a shift in production from exports, since these can be reduced while imports remain constant, which frees up productive resources to increase the production of additional NT commodities that are then consumed locally. The recipient country may also shift the production of import substitutes, which means goods and services can be imported instead of being produced locally, therefore also to release domestic resources for the production of additional non-tradables to be consumed locally;[2]

4.7. Foreign Direct Investment: Dutch disease can also come from a massive exogenous inflow of foreign direct investment into an economy which can lead either to an appreciation of the national currency, i.e. a loss of competitiveness, or to its appreciation; and

4.8. Technological Progress.

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[1] Lo Bue Maria C. op.cit. p07.

[2] Ibid. p07.

Section 02: Explanatory models of Dutch Disease and its Transmission Channels

Through this section, we will first show the main models that explain the Dutch disease, then the empirical studies that deal with this phenomenon.

I. Basic Models of Dutch Disease:[1] Following the surge in oil prices in the 1970s, many specialists focused on the impacts of these revenues on the economies of exporting countries. For it appeared a paradoxical phenomenon in the economy of these beneficiary countries by the appearance of perverse sectorial effects that result in declines in industries exposed to international competition. Among the elaborate Dutch syndrome models, we will present those of, *Salter & Swan*, and that of *Gregory.*

1. The Model of *Salter & Swan (SS)*: The *Salter & Swan (SS)* model developed in the 1950s is the underpinning of the models of *Corden & Neary* that they have deepened and developed. The foundation of the SS model is based on the difference between tradable and non-tradable goods and services on the international level and in price formation. All goods and services produced by a country are considered tradable. On the other hand, those that are non-tradable internationally are those that never cross borders (land, housing, buildings...).

It is a model that is based on a number of assumptions. The country is considered to produce three types of goods: exportable (x), importable (m) and non-tradable on the international level (n); the prices of tradable goods (P_x and P_m) are determined by world markets and converted into national currency prices according to a fixed nominal exchange rate. The price of non-tradable good (P_n) is determined according to the law of supply and domestic demand; importable and non-tradable goods are intended for only final consumption and exportable goods are fully exported. The terms of trade (P_x/P_m) are constant since external prices are constant. However, in this case, a product that is both exportable and importable can be considered a fully tradable compound *(t)* whose price is P_t $(P_t = P_x/P_m)$. Finally, the markets of products and factors of production (labour and capital) are totally competitive and economic production is at its maximum limit, the mobility of the two factors appears in the short term for the labour force and is linked to a sector and in the long-run for capital.[2]

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[1] Ndoumtara, N. op.cit. pp. 67-72.

[2] Ibid. p67.

Figure n°01-05: The Model of *Salter & Swan* due to an Excess of Solvable Demand.

Tradables

H

E

C

* F

t1

A

t2

A'

O

n1 n2 B   D   G

Non-
tradables
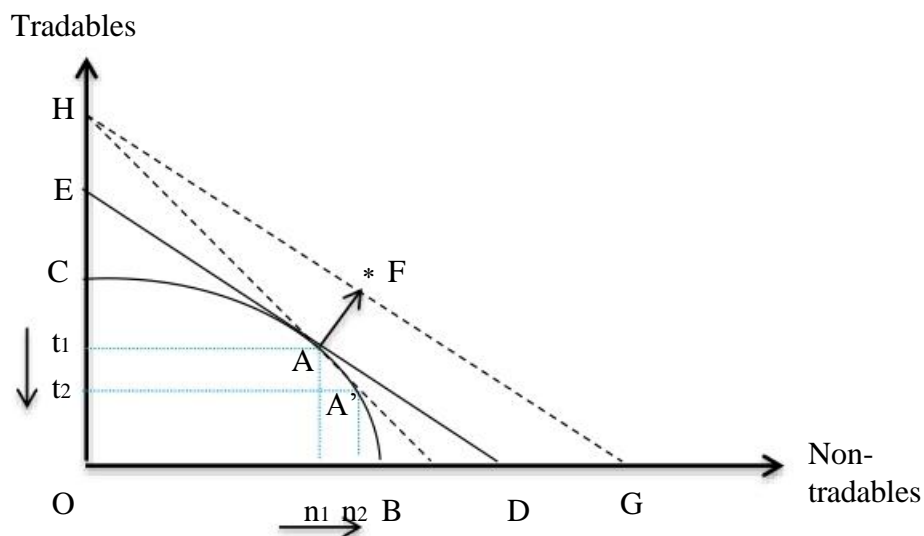
Source: Ibid. p68.

Let us analyse the effect of an expansion (money issue, for example) in this economy where *BC* represents the transformation curve of production. The point *A* corresponds to the only combination for which the line of the selected budget cuts the *BC* curve or to the country's maximum satisfaction. The produced quantities of tradable goods and non-tradable goods are respectively equal to *t* and to *n*. The *DE* line is the right of the budget, i.e. the combination of internationally tradable and non-tradable goods that can be purchased for a given income level and at a given price of tradable (t) and non-tradable goods (n). Also, the slope of the line *DE* is determined by the terms of trade *Pt /Pn*. The monetary expansion is reflected in Figure n° 01-05 by the increase in creditworthy demand from *A* to *F*, which leads to price increases only for non-tradable goods and the line *DE* is translated upwards at *GH*. At this level, any demand that falls on a point on the *GH* line would constitute an excessive demand for tradables and non-tradables. The excessive demand for non-tradable good causes a rotation of the line *GH* around point H to give the line *HJ* with a new equilibrium point at *A'*.

As a result, the prices of non-tradable goods increase relative to the prices of tradable goods; production of non-tradable goods increased at the expense of tradable goods, which declined. Thus, the maintenance of the exchange rate leads to a decline in the export sectors and to inflation in the non-tradables sectors reflecting the symptoms of Dutch disease, as the fall in Dutch export competitiveness following the discovery of the Groningen gas fields in the early 1970s. The *SS* model provided explanations for the underlying structural imbalances and formed the basis of the philosophy of the World Bank and IMF philosophy for their structural adjustment policy.

2. The Model of *Gregory*: The effects of the development of Australian mining sector in the 1970s on other sectors of the economy in general and on the manufacturing sector in particular, were developed and presented in a simplified model by *Gregory* in 1976, clarifying changes in this economy. Its model has mainly attempted to show the effects of local prices on foreign trade and to study the role of the real exchange rate in the effects of a boom on the export supply and import demand, and this is the problem with this model.

As *Jean-Paul Azam* has shown, it is important to distinguish between the real exchange rate and real effective exchange rate, since the latter is a statistical concept and generally used by the IMF to show that a fall in this rate is a depreciation while the first is a theoretical concept that expresses the opposite, that is to say when the real exchange rate rises, *Gregory* emitted a hypothesis that states that the price of goods consumed by the rest of the world is independent of the Australian economy. It held two prices: the prices of internationally tradable goods and prices of the non-tradable goods. Thus, the model can be translated as follows: The export supply increases following the exploitation of a newly discovered mining wealth. This increase results in a balance of payments surplus, which does not remain without consequences for the country's economy. Indeed, two situations can arise; either, there will be an appreciation of the domestic currency; or, there will be inflation in the country. As a result, prices of non-tradable goods will tend to adjust to the prices of internationally tradable goods that will have adverse consequences for the traditional industrial structures. His model shows that the discovery of a mineral resource necessarily results in an increase in the export supply, which results in the external accounts, as a balance of payments surplus. The illustration of *Gregory's model* is made through Figure n° 01-06. The prices considered in the model are the prices of internationally tradable goods, imports and exports are considered relative to the prices of domestic (non-tradable) goods and the Australian economy cannot influence world prices (the assumption of a small country).[1]

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[1] Ibid. p70.

Figure n° 01-06: The model of *Gregory*
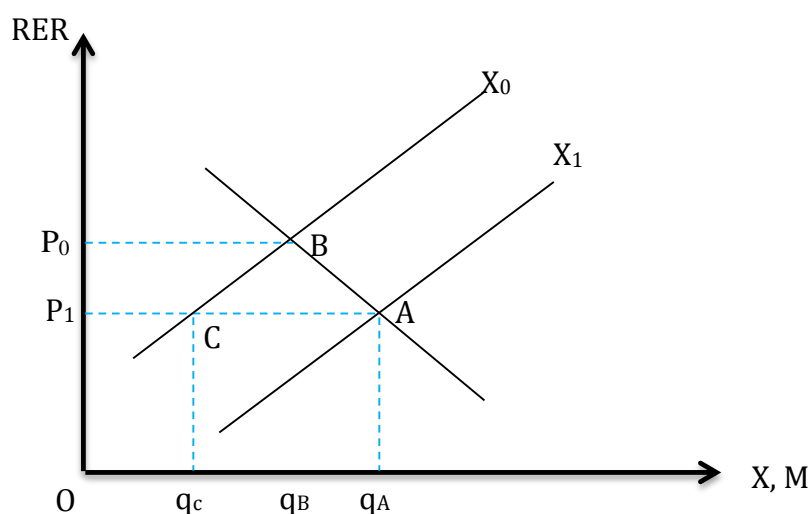
Source: Ibid. p71.

The real exchange rate ($RER = P_T / P_N$) is on the y-axis with PT = prices of tradable goods and P_N = prices of non-tradable goods. Export X and import M volumes are on the x-axis. The author makes two hypotheses to explain the position of X and M on the same axis. The first is that the terms of trade are constant and the second is that the units of X and M are chosen so that the terms of trade are equal to unity. The analysis is performed on the trade balance by neglecting the movements of capital. X_0 represents the export curve of the agricultural product; X is the aggregate export supply curve of the manufacturing and mining sectors. At equilibrium, we have $X_0 + X_1 = M_0$ that supposes a reduction of the surplus of X by a rise of M out of the booming sector. Thus, the readjustment must be done by the movement of the nominal exchange rate, i.e. a quantity of international currency per unit of the domestic currency.

The decline in the real exchange rate produces two simultaneous effects that translate firstly into an increase in the volume of imports and a decline in exports out of the booming sector; hence the shift from qB to qC is from B to C. So, *Gregory* concludes that the mining boom is reducing the size of industries producing import substitutes and export industries and increasing imports. This results in a deficit corresponding to the trade balance (*Salter and Swan 1950*) from which the rebalancing can be done, either by devaluation, or by international aid or international loans, but experience has shown that this last mean gives very mixed results.

3. The Model of *Corden & Neary (1982)*: It is a model intended to apprehend the impact of the Dutch syndrome, elaborated in 1982 by two authors, *W. Max Corden* and *J. Peter Neary*. This model assumes the existence of a small economy that produces two tradable goods at a given price and a non-tradable good at a flexible price. Mining and manufacturing goods, on the one

hand, and services, on the other, represent, respectively, the two categories of goods. They are intended only for final consumption. This model only takes into account the relative prices of tradable goods and ignores monetary factors. Each sector has a mobile factor (labour) and a specific factor (capital). The question is about the impact of the boom in the mining sector on the non-mine tradables sector.

According to the model, the latter produces two distinct effects: a resource reallocation effect and a spending effect. In an economy where there is complete mobility of the labour factor, the expansion of the mining sector leads to a resource movement towards this booming sector and the non-tradable goods' sector. The demand for labour is growing at the same pace in these two sectors, which is absorbed by a large supply. This shift in the labour force leads to a decrease in production in the tradable goods' sector, resulting from the lack of labour.

The boom in the mining sector will produce a surplus in the balance of payments, which means an overall increase in income. This increase will result in a price increase in the event that all income is spent and the demand for non-tradable goods increases. This mechanism is completely independent of any reallocation of resources. As a result, there will be an appreciation of the real exchange rate that will lead to a growth in the production of non-tradable goods and a decline in the production of tradable goods excluding mine. This is followed by a deterioration in its trade balance.

The mechanism of the model can be illustrated in the following figure n° 01-07. The booming sector B and lagging sector L confronted with world prices, and the non-tradable goods sector N produces non-tradable goods whose prices are fixed in the local market. Production in each sector is a function of labour and a factor that is specific. The labour factor is supposed to be mobile between the three sectors equalizing wages between the three alternative works. Measured in terms of L, the wage is W and the three revenues Rb, RI and Rn .

Figure n° 01-07: *Corden & Neary* **Model**
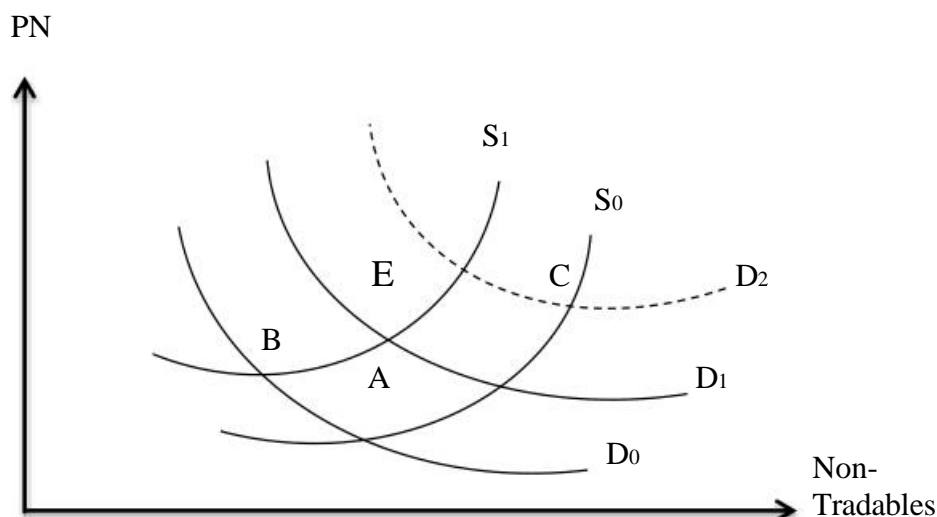
Source: Marc-Antoine, A. (2003). *La Maladie Hollandaise: Une Étude Empirique Appliquée à des Pays en Développement Exportateurs de Pétrole*. Montreal University, p10.

The main point of *Corden*'s article (1984) is the study of the expansion effect of B, initially causing an increase in aggregate income from the factors employed in the sector, on the other sectors of the economy. The origin of the boom may result from: (a) an exogenous technological change in B that remains confined to the country concerned; (b) An important discovery of natural resource; (c) An exogenous increase in the price of the product B on the world market that has two distinct effects: a spending effect and a resource movement effect. On the graph above, we find on the vertical axis, PN, the price of N relative to that of L, and on the horizontal axis is the volume of non-tradable goods. The spending effect is represented through the sliding of the demand curve from D_0 to D_1 that increases PN, transferring L resources to the benefit of N. Then the resource movement effect; following the boom in sector B, the marginal product of labour in this sector increases, so that at constant wage in terms of tradable goods, the demand for labour in B grows, hence the transfer of L and N to the profit of B.[1]

II. The Dutch Disease Theory and its Transmission Channels:

The Dutch syndrome represents the real appreciation of the national currency through the appreciation of the relative prices of non-tradable local goods and this occurs when the state uses this appropriate appreciation to buy more local goods which lead to expanding the sector of local goods to the detriment of the commercial sector, especially the industrial sector producing a harmful disease. According to the literature, These changes usually reflect two main impacts or channels, the spending

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[1] Ibid. p11.

And resource movement effects: the former refers to the reallocation of factors from different sectors of the economy (for example, manufacturing or other lagging sectors) to the natural resources export boom sector. It shows the effect of the increase in national income on the economic structure in the country which leads to high levels of demand for tradable and local goods, and while the progressive demand for goods could cope through increased import demand, the progressive demand for local goods will lead to the appreciation of prices, and then the relative appreciation of prices of local goods against the prices of tradable goods will, in turn, lead to an appreciation of real exchange rate. On the other hand, if the local and tradable goods sectors use the same elements of production, the price appreciation of local goods and their profitability will encourage the transfer of these elements from the less attractive sector (tradable sector) to the more attractive sector (local goods sector), (*The resource movement effect*)**.** [1]

According to *Corden & Neary (1982)* and *Corden (1984)* show that is due to the increase in marginal factor remuneration in the export boom sector. For example, if labour is mobile across the productive sectors, higher wages would cause a movement of labour in the export booming sector, lowering the output of the lagging sector. This reallocation of resources is usually labelled "direct de-industrialization" because it does not involve an exchange rate appreciation. However, resource allocation can also lead to an increase in the real exchange rate as a second-round effect. The relative loss of production factors in the non-tradable goods sector would result in excess demand for non-tradable goods, resulting in an increase in the prices of the non-tradables and real exchange rate, since the price of tradables is exogenously determined in the international markets. [2] The underlined theory of the "Dutch disease" model of deindustrialization is mainly concerned with the booming sector effects on the structure of the economy through the resource movement and spending effects. The booming sector was defined by *Corden (1984)* as follows: [3]

- There was, once for all, an exogenous technical improvement in the resource sector, represented by a favourable transfer in the production function, this improvement being confined to the country concerned;

- It was a windfall of new resources (i.e. An increase in the supply of the specific sector);

- The resource sector produces only for exporting, with no sale at home, and this has had an exogenous increase in the price of its products on the world market compared to the price of imports.

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[1] سيد طه بدوي. مرجع سابق. ص 153.

[2] Eugenio, C. & Mansilla, M. (2008). Bolivia: The Hydrocarbons Boom and the Risk of Dutch Disease. *IMF Working Paper, 08/154*. p09.

[3] Matallah, K. & Ghiat, C. (2003). Analytical Limitations of the Forsyth and *Kay* Model as Applied to Algeria. *Le chercheur, 02*, p360.

1. The Resource Movement Effect: This occurs when the boom in the natural resource sector (oil) and non-tradable goods sector (non-tradable services and construction) attracts capitals and labour at the expense of other sectors of the economy. Production declines in the tradable goods sector, where prices are set at the level of the world market. Since the resource sector (petroleum) can only absorb a small proportion of the labour force, the largest proportion is looking for an employee in the non-tradable goods sector.[1] So, this effect can be defined as a movement of the production means between the economic sectors. The development of any sector of the economy requires the use of the means of production, i.e. labour, land and capital. Assuming that the economy is in a state of full employment and work abroad, land and capital are not available, the boom in the new sector could attract some of the production means of the other sectors. The boom in the resource sector increases the marginal product of labour and attracts the labour force of the manufacturing sector and as well the service sector.

The movement of the labour force away from the manufacturing and service sectors in the booming sector can be divided into two parts. First, the shrinking manpower in the manufacturing sector would result in a decline in output, and this would lead to 'a direct de-industrialization'. Secondly, as illustrated by *Corden (1984),* the shift of labour out of the service sector into the booming sector creates an excess demand for the supplementary services' sector to that created by the spending effect. In other words, the price of outputs of the services sector increases. This leads to a further movement of work outside the manufacturing sector in services, reinforcing the de-industrialization resulting from the spending effect.

The resource movement effect tends to diminish the performance of the service sector; while the spending effect tends to decrease it. If combined, then it would be anticipated that if the resource movement effect is stronger than the spending effect, the performance of the service sector will be lower than the initial return. However, if the spending effect is stronger than the resource movement effect, the service sector return will be greater than the initial return.

This effect appears when a sectoral boom emerges. If this sector is not an enclave and uses factors of production common to other sectors of the economy, then its rise, induced by the boom, can deprive others of a part of their production factors; it depends a lot on the production structure of the economy. Among the specifications examined in the economic literature, that of the specific factor model used by *Corden & Neary (1982)*, which stipulates that each sector uses a single specific factor and that only the work factor is common. This specification is the most relevant on

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[1] Bategeka, L. & Matovu, J. M. (2011). Oil Wealth and Potential Dutch Disease Effects in Uganda. *Economic Policy Research Centre EPRC, 81.* p07.

a short-term horizon. This effect is unlikely to occur in the case of a windfall unless one thinks that it will, in turn, cause a boom in a productive sector. The resource movement effect is evident in the markets of goods and of factors:[1]

1.1. The Resource Movement Effect on the Market of Goods: We are now backing to a three-sector economy. Two of them produce tradable goods, the non-booming sector *M,* and booming sector *B.* The third produces non-tradable goods *N.* A positive external shock in *B* has the effect of increasing the price in this sector PB. For the same total volume of production of tradable goods *(B + M = T),* and if PB increases, then the total value of tradable goods will increase and the exchange rate between tradables and non-tradables will be more important.

That is to say that with a unit of tradable good T, we will obtain more non-tradable goods N. The production frontier will, therefore, change as shown in Figure n° 01-08. The resource movement effect, at a constant exchange rate, is represented by the movement of production from the equilibrium point *A* to point *B*. The decline in employment in the non-tradables sector (described below) results in a decrease in production in this sector. Assuming that the income elasticity of the demand for non-tradable goods, is null, so as to leave aside the spending effect, then the consumption-income curve is a horizontal line passing through *A*, cutting the production frontier in *D*.

At the initial exchange rate, the resource movement effect, therefore, results in excess demand in the non-tradable goods sector. There must be a real appreciation to restore balance; the price of non-tradables must increase to eliminate the excess demand in this sector. The new real exchange rate is represented by the line *V′U′*. The new equilibrium output will, therefore, be at a point between *B* and *D*, at point *E,* where the production of non-tradable goods will be lower than the initial production.

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[1] Djoufelkit, C. H. (2003). Op.cit. pp. 20-23.

Figure n°01-08: The Resource Movement Effect on the Production Structure
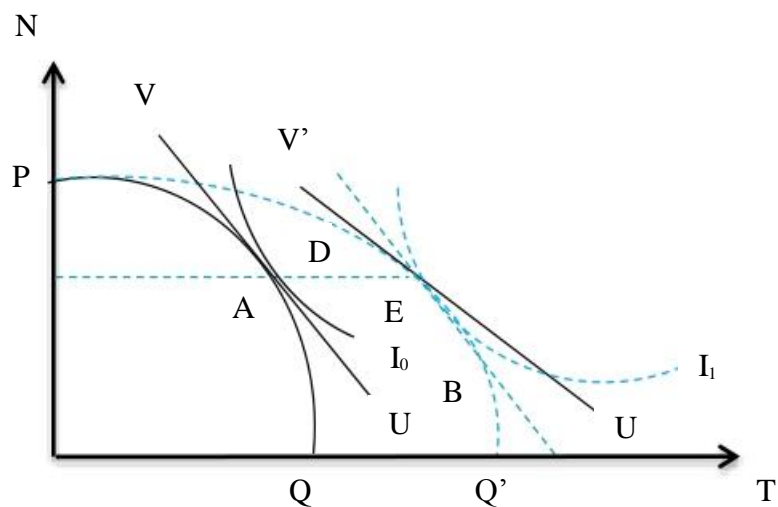
Source: Ibid. p22

1.2. The Resource Movement Effect on the Market of Factors: In the labour market, the resource movement effect is shown in Figure n° 01-09. The x-axis carries over the total labour supply, the cost of labour expressed in terms of tradable goods. Before the boom, the balance of the labour market is in *A*. This balance determines the allocation of labour in the three sectors. Since the labour market is competitive, the w_0 equilibrium wage is the same in each sector, and the labour demand is equal to its marginal apparent productivity. The boom will have the effect of increasing the price of the booming sector.

The demand for work will increase since the labour cost in relation to the price of this sector will decrease, while it increases in the other two sectors. There will be a movement effect of the labour factor from the services and manufactured goods sectors to the booming sector. The new equilibrium is therefore in *B*, and the new equilibrium wage is W_1. The labour costs of the services and manufacturing sectors, expressed in their respective prices, are increasing, and employment in these sectors is decreasing.

Figure n° 01-09: The Resource Movement Effect in the Labour Market
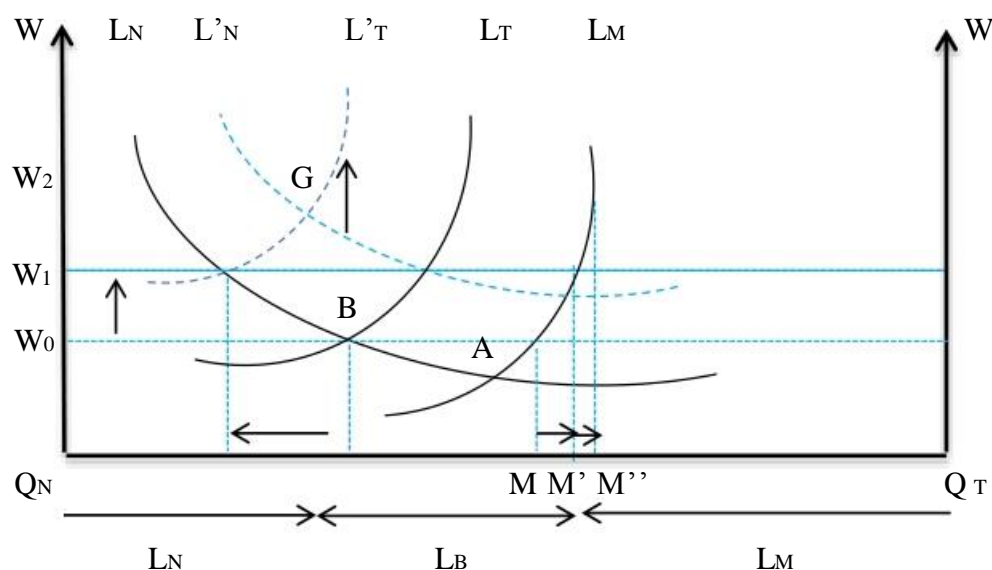
Source: Ibid. p23

In the market for goods, the resource movement effect leads to a decline in the production of services and manufactured goods. However, since these goods are normal, at unchanged relative prices, there will be an excess of demand in the sectors producing them. The real exchange rate must be appreciated eliminating excess demand in the sector of services (P_T being fixed at the international level, excess demand leads to an increase in imports).

The increase in the price of services will have the consequence of improving the demand for labour in this sector. In Figure n° 01-09, the L_N curve moves to the right, to reach the final equilibrium at point G. As a result, the real wage in terms of manufactured goods increases again to reach w_2. The amount of work in the manufacturing sector is declining from O_TM' to O_TM''. The real wage, expressed in terms of the price of all sectors, will also tend to increase as a result of the resource movement. The resource movement effect, therefore, leads to an appreciation of the real exchange rate and de-industrialisation. This occurs directly as a result of the movement of the labour factor from O_TM to O_TM' and indirectly during the final adjustment in O_TM''.

2. The Spending Effect: The spending effect is related to the appreciation of the real exchange rate, it is the additional income of the booming sector on non-tradables NT that is spent either directly by the owners of the factors, or indirectly through the collection of taxes by the government. The boom, that may be due to technological progress, price increase, or a new

discovery, leads to additional spending on the service sector, which raises the price of its output, and draws the manufacturing labour force into services.[1]

Identifying the sector that realizes the majority of spending is essential for determining the strength of the spending effect. The propensity to consume non-tradable goods and services is generally higher in the case of government. In general, the spending effect leads to an ambiguous appreciation of the exchange rate, and the volume of this appreciation is a function of the number of additional resources spent in the non-tradables sector.

The spending effect comes into play when the high income of booming natural resource sector stimulates demand and expenditure by the public and private sectors leading to higher prices and output in the sector of non-tradable goods (non-tradable services and construction). However, for the non-natural tradable resource sector (manufacturing and agriculture), prices are set at international levels and profits are squeezed by the rise in the wages of the economy which, in combination, make the tradables less competitive in international markets. The increased demand is increasingly met by rising imports, so imports are becoming cheaper.[2]

This effect analyses the macroeconomic impact of the increase in income generated by an external shock. However, a sectoral boom implies an initial increase in production in the tradable sector, which does not imply a windfall. The modelling, therefore, differs slightly, although the final effect is the same. Bearing in mind that the windfall takes the form of a unilateral transfer boom without any counterpart, we first present the spending effect on the goods market and then on the factor market: [3]

2.1. The Spending Effect on the Market of Goods: The impact of a transfer on the production and consumption of tradable goods relative to non-tradable goods is modelled using the global equilibrium diagram of international trade theory presented in the Figure n° 01-10. As the terms of trade are assumed to be constant, tradable goods can be aggregated into a single composite tradable good. So, the economy has two sectors here, that of tradables and of non-tradables. The production frontier is *PQ*. The initial equilibrium relative price *RS (Pt / PN)* gives the optimum levels of production and consumption at point *A*. The *Engel ICC_0 curve*, of income-consumption, is plotted in such a way that the income elasticity of demand for non-tradable goods is greater than unity, and therefore, their share in consumption increases with income.

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[1] Matallah, K. & Ghiat, C. op.cit.

[2] Bategeka, L. & Matovu, J. M. op.cit. p06.

[3] Djoufelkit, C. H., (2003), op.cit. pp. 17-20.

Figure n° 01-10: The Impact of a Transfer on the Production and Consumption Structure

Source: Ibid. p18.

Now we consider the impact of an *AB* transfer on the economy. This takes the form of a gift of tradable goods. The consumption will increase to initially reach point *B*. However, this point is not a point of equilibrium. On the initial level of relative prices, the boom will have the effect of increasing demand for non-tradable goods, since these are normal goods. The desired level of consumption is *E*. There is, therefore, an excess of demand for non-tradable goods, and therefore an excess supply of tradable goods. To restore equilibrium, the relative price of non-tradable goods must increase relative to that of tradable goods. The new relative prices are represented by the *UV* line, and the production reaches point *C*. The new equilibrium of the economy is in *C*. There is, therefore, no ambiguity about the impact of a transfer boom on the structure of production: that of non-tradable goods increases and that of tradable goods decreases.

The effect on consumption is less clear. In Figure n°01-10, the new consumption equilibrium is found in point *D*. The increase in the relative price of non-tradables leads to the shift of the *ICC0* curve downwards in *ICC1*. While the movement of the income-consumption curve tends to redirect consumption towards tradable goods (the price effect), the movement along the curve (passage from point *A* to point *D*), because of its convexity, favours consumption of non-tradable goods (income effect). The impact of a transfer on the structure of consumption is therefore ambiguous (the absolute level of consumption must increase for both goods). To see which one prevails, the price effect or income effect, we can draw a straight line through the origin and by A. If *D* is on the right (on the left) of it, it is that the share of tradable goods will have increased (decreased) in total consumption.

2.2. The Spending effect on the Market of Factors: The spending effect on the factors' market, the labour market here, because it is the only moving factor, is shown in Figure n°01-08. On the x-axis is the total labour supply, and on the y-axis, the labour cost expressed in terms of tradable goods. Since the labour market is competitive, the demand for labour is equal to its marginal productivity in value (*PiX'* i=N, T, X, = H, F). Before the boom, the balance of the labour market that determines, for given prices, the allocation of labour between the two sectors, is in *A*. The equilibrium wage is *wo*. In the goods market, the boom will lead, at the initial relative price level, to an increase in the demand for non-tradable goods. In the short term, as the supply is not flexible, their *PN* price will increase to restore the equilibrium.

The apparent marginal labour productivity *(PNH')* in the non-tradables sector equals the demand for labour will therefore also increase. Moreover, the cost of labour expressed in terms of non-tradable goods will decrease. The total supply of labour, *L=LT + LN*, being fixed, the non-tradable goods sector will drain the labour force of the tradable goods sector. The new equilibrium point is reached in point *B*. At this point, the cost of labour has increased in terms of tradable goods and decreased in terms of non-tradable goods. The overall effect may, therefore, be an increase or a decrease in the real wage according to the respective share of the two types of goods in consumption. The larger the share of non-tradables, the more the real wage will tend to decline as a result of an exogenous resource boom.

Figure n° 01-11: The Spending Effect on the Labour Market
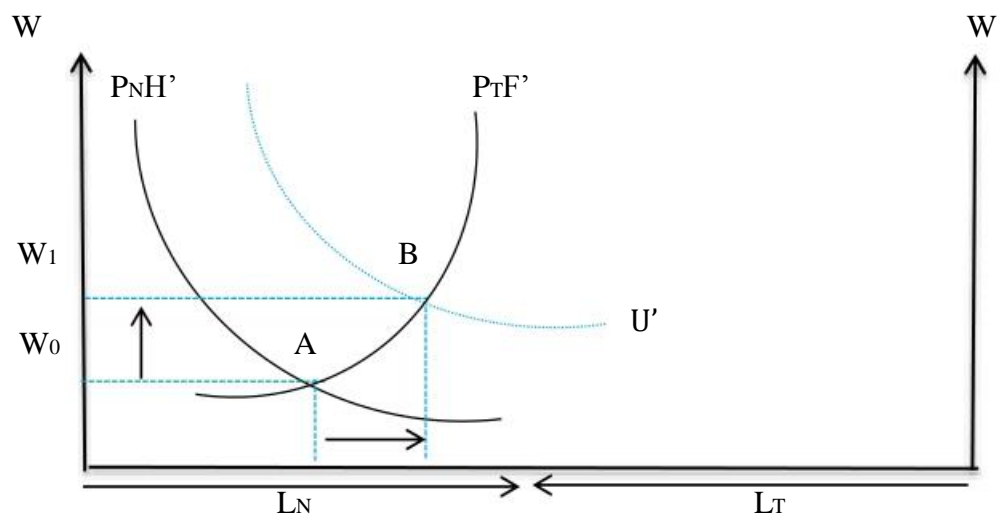
The spending effect, linked to the increase in disposable income, thus leads to an increase in demand that induces an appreciation of the real exchange rate *(P$_T$ / P$_N$)* Labour demand in the sector of non-tradable goods will increase and labour supply is fixed, this sector will drain part of the labour force from tradable goods. The latter therefore sees its production decline and its cost of labour in terms of tradable goods increase. If the tradable goods' sector is the manufacturing sector, then an external shock induces, through the spending effect, a de-industrialisation. It should also be noted that the demand for tradable goods, generated by the spending effect when these goods are 'normal', cannot be satisfied by local production. The country will, therefore, see its net imports of tradables increase.

3. **The Combination of both Effects:** the Dutch disease hypothesis generates four predictions:[1]

3.1. Given that the relative price of services increases, the real exchange rate appreciates;

3.2. There is an ambiguous decline in manufacturing output and employment, reflecting both direct and indirect de-industrialization;

3.3. The combined effects on production and employment in the oil and services sectors are ambiguous because the spending and resource movement effects are pulling in opposite directions here. However, if the oil sector employs relatively few workers or if the labour mobility is low as in Russia, it is to be expected that the spending effect will dominate the resource movement effect, in this case, we also expect to see an increase in production in the service and employment sectors;

3.4. If labour is mobile, the overall wage level will increase. It is not obvious; however, that Dutch disease can explain the curse of natural resources.

During the periods of high oil prices, it is natural, and in fact optimal, for resources to get out of the manufacturing sector and enter the oil and services sectors. If the oil prices were to remain high forever, wouldn't it be optimal to specialize in oil and eliminate the manufacturing sector? A reason for which de-industrialization can lead to lower growth, it implies increased volatility. As *Hausmann & Rigobon (2003)* point out, the more the manufacturing sector, more difficult for the economy to absorb shocks through labour. To simplify, it is assumed that skill levels in all sectors are similar so that under perfect labour mobility, wages in all sectors are always equal to the mobility of the equilibrium.

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[1] Oomes, N. & Kalcheva, K. op.cit. pp. 09-10.

In the extreme case, if the sector does not employ the labour force and manufacturing sector disappears forever, the service sector will be the only employer, and all shocks will have to be absorbed by the change in spending and unemployment, which implies increased volatility; and also weaker growth as long as the financial markets are imperfect. However, it does not explain why growth will sustainably be lower. That is why the manufacturing sector should not be rebuilt during periods of low oil prices?

The main reason for which Dutch disease can lead to sustainable lower growth is that manufacturing sectors tend to be more competitive and innovative than other sectors and are characterized by technological spillovers.

▪Due to the lack of large rents, the manufacturing firms generally have low ratios if the concentration and face competition than natural resource companies, which improves their efficiency;

▪Due to the nature of the manufacturing process, it is more extensive for the non-manufacturing technological progress than for the extraction of resources or services (with the possible exception of the information technology and financial services).

▪Finally, the manufacturing sectors tend to include more vertical and horizontal spillovers (within and between firms) of technological progress than do the natural resource sectors. Without the existence of these technological spillovers, such as "learning by doing", it would be difficult to explain why a temporary contraction in the manufacturing sector could have permanent effects on growth.

4. Volatility as a Transmission Channel: Dutch disease can lead to a high concentration of exports in products with high price volatility statistically higher than those of manufacturing. Natural resource prices and incomes tend to be volatile because of the low elasticity of supply of natural resource outflows in the short term. If the government expenditures are closely tied to natural resource revenues, it will also become more volatile. The spending volatility, in turn, will cause volatility in the real exchange rate (through the spending effect described above). A lot of empirical work documents the negative impact of economic volatility on investment and growth. Among other types of volatility, is that the real exchange rates are often found to have a negative impact on economic performance particularly clear.[1]

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[1] Brahmbhatt, M. & al. (2010). Dealing with Dutch Disease, Poverty Reduction and Economic Management (PREM) Network. *World Bank Working Paper, 16*, p04.

Typically, the beginning of the effect of Dutch disease is characterized by a rise in foreign exchange sales due to a substantial increase in capital inflows, which by definition also implies an increase in the terms of trade ToT. The extra foreign currency is converted into domestic income, which leads to an increase in the exchange rate (currency effect). The additional demand drives the demand for domestic and imported products (the spending effect) and the exchange rate increase reduces the price received from all internationally tradables. This becomes a disadvantage to exports and the competing sectors of imports that are contracting while capital and labour are attracted by non-tradable sectors and booming domestic sectors (the resource movement effect).

It is noteworthy that the evolution of the international trade rate has an effective impact on the equilibrium real exchange rate of any country in the long term, where the improvement (deterioration) of the international trade rate of the country, that is, the increase in the prices of exports (imports) compared to import prices (imports) will cause an appreciation (depreciation) in the real equilibrium value of the long-term currency as well as an increase in the prices of exports relative to imports because of the significant increase in the demand for goods from this country, then the improvement of the current account necessitates the increase of the real value of the currency in the long-run in order to make the current account at its previous level and similarly, the rise in prices of import goods over exports is training due to a disruption in the supply of major and essential import goods such as oil; this deterioration in the international exchange rate leads to a deterioration in the balance of the current account, which produces pressure to depreciate the real value of the national currency; there are three main channels through which international exchange rate shocks influence the equilibrium real exchange rate:[1]

4.1. The evolution of the trade rates of goods that occurs through the evolution of international relative prices of imports or through the use of policies that influence on local prices such as tariffs, leads to the substitution between commodities, this is called the temporal substitution effect;

4.2. If the relative prices of imports increase during the period (0), the real interest rate will also appreciate because of the current and temporary deterioration of international interest rates (the appreciation of the relative prices of imports in the period (0) will lead to the appreciation of the price index in the same period, while the price index in period (1) is fixed because the relative prices of imports in the period (1) are assumed fixed and since the proportion of the price index in the period (0) to that in the period (1), the cost of current consumption compared to consumption in the future will increase, which pushes to the substitution of global

[1] سيّد طه بدوي. مرجع سابق. ص ص 167-169

expenditure from the period (0) to period(1), this increase in future consumption and a decrease in current consumption is due to relative changes between periods assuming that other factors remain as they are, and that's what's called the timeless substitution effect; The increase in the relative prices of imports during the period (0) leads to a depreciation of the well-being that their effect depends on the volume of exports at the first international trade rates.

The following Scheme illustrates the main transmission channels and effects of the Dutch disease:

Scheme 01-01: The Transmission Channels and Dutch Disease Effects

Resource Discovery, Oil Booming sector			
	(1) Spending effect	a.Tradable sector **Outputs: negative** Price: constant (world Price)	**Contraction** of tradable sector
		b. Non-tradables sector Output: Positive **Price: Appreciation**	**Appreciation** of REER
	(2) Resource movement effect	a.Tradable sector **Outputs: negative** Price: constant (world Price)	**Contraction** of tradable sectors
		b. Non-tradable sector **Output: Negative** **Price: Rise**	**Contraction** of non-tradable sectors, Appreciation of
	(3) Volatility effect	**c.** Government revenue Government spending correlates to oil revenues	**High Volatility of REER**

Source: Kablan, S. A. & Loening, J. (2012). Is Chad Affected by Dutch or Nigerian Disease?. *Munich Personal RePEc Archive MPRA Working Paper, 39799*, p11.

The original model of *Corden & Neary (1982)* of Dutch disease considers a small country with full and effective use of factors of production in both tradables and non-tradables sectors where there is a transferable mobile factor of production between sectors and a perfectly elastic demand for tradable goods.

▪ Significant resource boom inflows lead to increased overall spending on tradable and non-tradable goods, thus influencing the real effective exchange rate (REER). An increase in demand for non-tradable goods, induced by financial flows, translates into an upward shift in demand for non-tradable goods (services and contraction sectors) as well as an increase in their prices. Since the price of tradables is fixed, the REER appreciates, which discourages their production It is the effect of expenses;

- In the non-tradable goods sector, as long as the marginal product of labour increases accordingly, there is a reallocation of labour from tradable to non-tradable sectors. This is the effect of movement of resources; and

- Finally, the appreciation of the REER is troublesome to buy non-tradable goods. This is the effect of changing expenses (the volatility channel).

In addition, if the relationship between natural resource exports is correlated with government spending (or government revenues), the movement of a real effective exchange rate will be volatile through the spending effect

5. Dutch Disease: Five Secondary Effects of a Commodities Boom:

5.1. A real appreciation of currency: in the form of a nominal appreciation of the currency if the exchange rate is floating or in the form of financial windfall, credit and inflation if the exchange rate is fixed;

5.2. An increase in public spending: in response to the availability of revenue or fiscal penalties;

5.3. An increase in the prices of non-tradable goods relative to internationally tradable goods;

5.4. A change resulting from production outside manufactured goods;

5.5. Sometimes, a current account deficit of booming countries attracts capital flows, thereby incurring international debt that is difficult to repair when the boom ends.

Section 03: The Analytical Foundation of Dutch Disease:

In this section, we will show the main theoretical foundations of the Dutch disease and highlight its effect.

I.The Analytical Framework of Dutch Disease:

According to *WM Corden*, the term Dutch disease first appeared in an article published by the *Economist* magazine on November 26, 1977. This article reported that the Netherlands had a large surplus in its balance of payments. Payments with a strong florin due to the huge held natural gas deposit, but its domestic manufacturing industries have been extremely inactive and the unemployment rate has been renewed. This was called "Dutch" disease, after the "British" disease, and its symptoms were counted for being "external health but domestic disease". Meanwhile, *Gregory*'s study (about the recently developed mineral resource phenomenon leading to a depreciation of the currency that has undermined traditional export industries or import substitution industries) was discussed in Australia in mid-1970, since then, this problem has been mainly

analysed in the British and Australian literature.[1] There is a lot of analysis that, considering the monetary aspects, discuss this phenomenon and its role in appreciating exchange rates. We will focus on the discussions in real terms, however, following the real exchange rates, or the relative prices of non-tradable goods measured in terms of tradable goods.

1. Case of "Enclave" Type of Resource Exporters Industries: Assuming there is a natural resource exporting sector B in a small country that is quite "enclave" type and does not require a factor of production or only requires a specific factor of production. Assuming, further, that there is no domestic demand for the industry products that are all exported. Locally, the import-substitution industries of tradable goods M and non-tradable goods of manufacturing industries N are engaged in production using full employment capital and labour. It is also assumed that the market is full and that the demand function is given by the income-consumption line n in the Figure 01-12 and the line below is that of PP' price under which consumption is at point E_0, production at P_0, and the export of natural resources measured in terms of M goods is PA_0. M goods imported by the amount E_0P_0, and the balance of payments is in equilibrium. However, supposing that the exportation of this country is extended to A_l for any reason; then, if the income effect of demand on the non-tradable goods is null, consumption is in E_l and the recently acquired export earnings E_0E are fully used for import. Therefore, the point of production remains as it was and it has not moved. However, since no income effect is normally inconceivable, the income-consumption line n in the Figure considered normal properties.

Figure n° 01-12: Resource Exporters Industries of Type "Enclave"
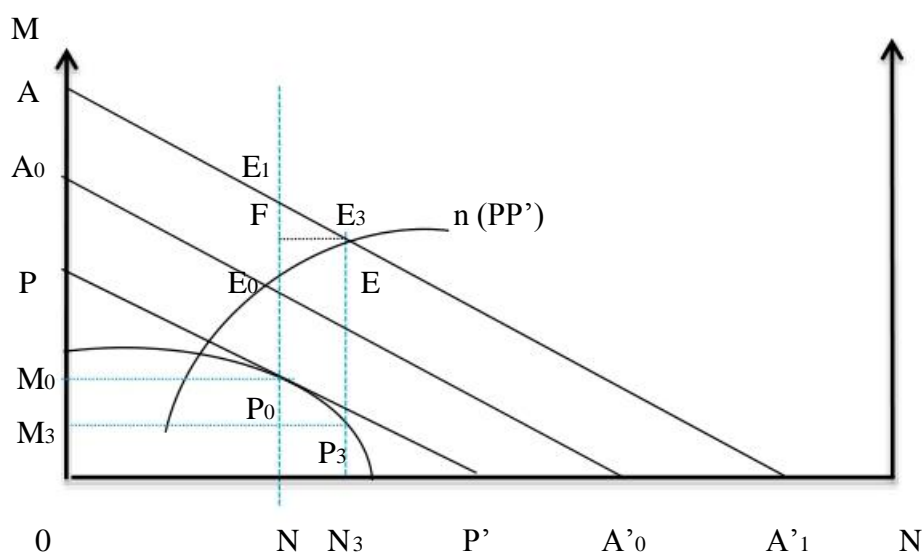
Source: Ibid. p429

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[1] Yokoyama, H. (1989). Export-Led Industrialization and the Dutch Disease. *The Developing Economies, 27(4),* pp. 428- 431.

In this case, point E_2 will be a new point of consumption if the prices do not change. Production, however, takes place at point P_0 in the present, and an excess of the balance of payments by the amount E_1F or an excess demand of non-tradable goods NT by the amount FE_2 is generated. Thus, the market will be subject to a rise in the prices of non-tradable goods, and as a result, the price line will be made to decline more sharply. Therefore, the consumption-income line will move, and the point of consumption will reach a new equilibrium at some point on E_1E_1, or, for a given moment, in E_3. As a result, in a new equilibrium state, the production of tradable goods declines from M_0 to M_3 (de-industrialization), and the production of non-tradable goods increases from N_0 to N_3.

However, the new price line, not drawn in the Figure, becomes sharper, and the relative values measured in terms of tradable goods increase. In other words, the real exchange rate appreciates. In this case, the export earnings created by the expansion of exports are partially used for the import of tradable goods, and the rest creates new demand for non-tradable goods. The factors of production are thus, shifted from the tradable goods industries to the non-tradable goods sector so that the tradable goods sector is reduced and the non-tradable goods sector is expanded. In this way, the relative values become favourable to the non-tradable goods sector, and in terms of the value of the currency, it means that the currency has appreciated. In order to facilitate understanding of the following discussion, the changes outlined above will be classified into two categories according to *Corden & Neary*. Different authors use different terms, but here we will call the change from E_0 to E_3 "expending effects" and the change from P_0 to P_3 "resource movement effects".

2. Case of an Export Industry Employing Labour Force: Assuming that the export industry is not a complete 'enclave' but is tied to the national economy through a labour market. In other words, also assuming that the export industry requires labour as a factor of production like other industries, but that it does not require capital or employ other special factors of production. This case is characterized by the fact that the other two sectors, with the exception of the export industry, constitute a typical case of the *Heckscher-Ohlin-Samuelson* theorem, and also that in this case, it is possible to pro-industrialize instead of de-industrialize. Ignoring the spending effect and assuming that relative prices do not change. If exports, develop the demand for labour force for the production of goods to be exported, develops accordingly and the export industry absorbs the employment of the other two industries. For the other two sectors, up till now, maintaining balance is broken by a total reduction of labour at their disposal. Therefore, according to *Rybczynski*'s theorem, the output of intensive labour industries is declining relatively, and the high capital-

intensive industries are growing relatively, If the tradable industries are more labour-intensive than the non-tradable industries, the output of the former declines and that of non-tradables widens, as explained above.

Conversely, if a tradable goods' industry is an industry of non-tradable goods and intensive capital, the trade sector grows. It is a paradoxical case of pro-industrialization of *Corden-Neary*, however, the prices of the labour-intensive industry products and consequently the wage rate also increases, as in the previous case. Meanwhile, the spending effect is about the same as in the previous case, resulting in the importation by the industry of tradable goods and excess demand from the non-tradable goods industry. So, the relative prices measured in terms of tradable goods are increasing. These effects are not dependent on the intensity of factors, however. When there are changes in relative values, the wage rate increases if the non-tradable goods industry is labour-intensive, according to *Stolper-Samuelson*'s theorem. In contrast, the wage rate declines if the tradable goods industry is labour-intensive.

As the analysis above showed, it is difficult to draw a conclusion simply from the effect of export expansion. It will be particularly clear that in the case of the tradables industry being capital intensive; it is possible that the tradables sector will be encouraged. Needless to say, there are other possibilities than a conclusion similar to that derived from the previous case.

3. Other Cases: It cannot necessarily be said that the two aforementioned cases express a characteristic feature of export goods as natural resources. This is why the assumption is made here that domestic industries require exporting goods as intermediate inputs. In this case, if the tradables industry uses more intensive intermediate resource inputs than the non-tradables industry, the result will be immediately obvious. While If the expansion of exports is due to the rise in export prices of natural resources, the tradables industry using resources as intermediate goods costs more than the non-tradables sector. In addition, as an import-substitution industry in a small country, it is put into an unfavourable position relative to imports and declines. Therefore, if there is already a disease caused by the expansion of exports, the disease will become more serious. However, if the intensity is reversed, the conclusion is not so obvious. For example, *Herberg & Enders*, using a theoretical model say that there is no 'disease' result in this case. This is because the cost restrictions are too great for a non-tradable goods industry, which uses this factor more intensively as an intermediate entry. However, *Bruno & Sacks* show using a model with parameters for Britain, that the "disease" is caused after all. This case is important to the theory of resource-based industrialization.

II. Dutch Disease Symptoms and Political Responses:

1. Summary of Dutch Disease Symptoms: The predictions of the Dutch disease model are summarized in Table n° 01-02 that, following *Corden & Neary (1984),* showed the distinction between the resource movement and spending effects. Assuming that the supply of oil is not perfectly inelastic, an increase in the price of oil increases the demand for labour and capital in the oil sector, which leads to higher wages there and to a higher return on capital. If the factors are mobile, it will trigger labour and capital to move from the manufacturing and services sectors to the oil industry. The output of the oil and employment sectors will, therefore, increase while production and employment in the manufacturing and services sectors will decline. *Corden & Neary* referred to this decline in manufacturing output as "direct de-industrialization"; while the price of manufactured goods does not change because it is determined abroad, the decline in service outputs leads to an excess of demand for services and therefore to an increase in the price of services. The result is an increase in the price of non-tradable goods relative to tradable goods, inducing an appreciation of the real exchange rate.

Table n° 01-02: Summary of Dutch Disease Symptoms

	Output	Employment	Wage	Price
Resource movement effect				
Oil sector	+	+	+	Given
Manufacturing sector	−	−	+	Given
Services' sector	−	−	+	+
spending effect				
Oil sector	−	−	+	Given
Manufacturing sector	−	−	+	Given
Services' sector	+	+	+	+
The combined effects				
Oil sector	Undetermined	Undetermined	+	Given
Manufacturing sector	−	−	+	Given
Services' sector	Undetermined	Undetermined	+	+

Source: Oomes, N. & Kalcheva, K. op.cit. p08.

In general, both effects, spending and resource movement, translate into a decline in the share of production of tradable non-natural resources. As a result, countries suffering from Dutch disease should experience some or all of the following:[1]

- A decrease in import prices and a subsequent increase in demand for imported goods and services;

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[1] Bategeka, L. & J. M. Matovu, op.cit. p06.

- An increase in prices of non-tradable goods (services and construction) due to increased demand and subsequent movement of resources in these sectors (labour and capital), and therefore, more production of non-tradable goods at the expense of tradable goods;

- Disincentives to investment in tradable goods (agriculture and manufacturing);

- The concentration of exports of the tradable goods produced (agriculture and manufacturing) suffers and could be erased due to lack of competitiveness; manufacturing employment shifts to lower-cost countries;

- Mixed results of well-being, especially for those who were originally engaged in the production of tradable goods, and

- Mixed growth results.

2. Policy Response: The real effects of natural resources on the economy would depend, to a large extent, on:[1]

2.1. Fiscal Policy: Highlighting the role of fiscal policy in natural resource boom episodes in the 1970s and 1980s, *Gelb & al. (1988)* concluded that the most important recommendation to get out of this study is that Spending levels should have been adjusted to sharp increases in income levels more cautiously than they actually were 'Fiscal policy is the main instrument for dealing with the negative effects of Dutch disease for the following reasons: is a tool that can involve increasing permanent wealth, it can constrain the effect of spending (the main channel of transmission of negative repercussions in low-income countries), and it allows smoothing out spending to reduce the volatility.

There is empirical evidence that public spending is correlated with rising natural resource revenues. The foreign-recorded revenues and the reduction of overall expenditures will help if we think that the spending effect is one of the main channels of transmission. Smoothing spending during the time would also reduce volatility and its adverse effects on the economy.

The smoothing of expenditures is ensured by a detachment of natural resource revenue expenditure, and the introduction of fiscal rules for how much natural resource revenue can be spent and how much is saved in the natural resource fund. The use of a medium-term spending framework was considered useful for successful implementation of fiscal policy in resource-rich countries.

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[1] Brahmbhatt, M. & al. op.cit. pp. 04-06.

There are many studies on the best institutional arrangements governing non-renewable natural resource revenues. Although the adequate revenue management does not always require the definition of a special fund, a growing number of countries have institutionalized fiscal rules to express their preferences on the management of natural resource revenues through the creation of an explicit natural resources fund, with strict rules governing payments in and on the fund. Depending on the purpose of the fund (reduce volatility, limit the effect of expenses, or invest in future growth), a stabilization fund, savings fund or investment fund may be created. Incorporating natural resource funds into the general budget system helps to make decisions about finding equilibrium to deal with the impacts of Dutch disease and pursue development goals. A fund that is so simple and transparent - it cannot solve complex fiscal problems by itself; it can only help in the implementation of sound fiscal policy.

An adequate fiscal policy would be balanced between the need to implement development goals and the need to limit the spending effect. A fiscal rule called 'the permanent income approach' provides an important benchmark for fiscal policy applied only to exhaustible resources. This approach first recommends calculating the expected net current value of all expected future net revenues from these resources; then calculating the constant real amount (or annuity) that is received, would give the same net current value. The permanent income approach then recommends restricting public spending on these exhaustible natural resource revenues to that one constant amount of rent, while saving the rest abroad. Later, when exhaustible natural resources are depleted, the government would be able to leverage its accumulated financial assets to continue spending the same amount of steady-state rent.

Considering that saving most incomes in order to smooth consumption can be part of the development strategy in some countries, development needs may be too great in other countries (especially, low-income countries). *Collier & al. (2009)* argue that directing all resource revenues to current consumption is useless and inequitable, but postponing consumption in the distant future is also useless and inequitable. They suggest an 'optimal' fiscal rule for a developing country that would allow keeping some revenues (less at the beginning and more at the end of the high-income resource period) and allow for more investment and consumption of natural resource revenues than in the permanent income strategy. The perfect implementation of this approach would require strict budgetary discipline and clear expenditure rules.

2.2. Expenditure and Structural Policies: Spending policies can also help curb the Dutch disease. Directing spending to tradable goods (including imports) rather than non-tradables would help to slow the effects through the spending effect. Improving the quality of expenditure to ensure that productivity in non-tradables sectors increases in line with structural changes

would also be important. If the spending effect also works through private expenditure, general policies to improve the productivity of private firms would help to reduce the impacts. Policies that encourage demand for imports, for example, trade liberalization, will help to reduce the demand pressure on the non-tradable goods sector and, therefore, may be part of the structural policy response to Dutch disease.

To the extent that the country continues to experience some appreciation of the real exchange rate and other negative effects of rising natural resource revenues, there may be a case for directing expenditures in particular towards investments that would contribute to to improve productivity in the non-tradable sector of the economy such as investment in transport and logistics infrastructure, increased investment in education and training to facilitate faster absorption of foreign technology and innovation, and so on. Rural road construction is generally one of the most powerful investments in the fight against poverty, and it could involve more local labour. However, special attention must be paid to ensure that there is sufficient capacity to prioritize and implement public projects, especially in low-income countries.

The country can also undertake other reforms that do not necessarily involve large expenditures but improve economic productivity by improving business regulation, reducing red tape, reducing monopolistic barriers that discourage business innovation, and other improvements in the general business climate. These policies will reduce the regulatory burden on the non-resource economy. Other policies, such as those that promote foreign direct investment, could create conditions for "learning by doing" through spin-off effects.

2.3. Monetary and Exchange Policies: Choosing an appropriate anchor for the monetary policy is particularly important for macroeconomic management in commodity exporting countries. For example, targeting inflation has been an extremely effective instrument, even if it can lead to a monetary policy that is so tight, it exerts a pressure on the exchange rate when commodity prices rise. Recently, it has been a matter of developing more appropriate forms of price targeting in product exporting countries. While the inflation-targeting price index has worked in many countries, it has been less successful in stabilizing tradable / non-tradable relative prices in commodity exporting countries. *Frankel (2009)* showed that the targeting of a more specific price index that has a larger share of export commodity prices and/or production prices (such as the producer price index or the export price index) would have been more appropriate, although more difficult to administer or make transparent to the general population.

2.4. Dutch Disease and Trade Policy:[1] According to the Dutch disease Model (*Corden & Neary, 1982)*, the sharp increase in export earnings in one sector of the economy leads to rapid growth in this sector, and generally to a lesser extent growth in the non-tradables sector, but also a decline in internationally tradables sectors that have not benefited from the boom, such as the manufacturing sector. This regression results from a transfer of labour and capital resources in favour of expanding sectors, and especially from the appreciation of the real exchange rate linked to the increase in export earnings. When the decline in export earnings occurs, there is partly the opposite phenomenon, in other words, a depreciation of the real exchange rate allowing the recovery of the tradables sector, while regressing both the export sector subject to falling international prices and non-tradables production activities.

The fluctuation of the overall product resulting from shock and counter-shock is even stronger as these affect a larger part of the economy, that is, the economy is more open. Moreover, because of the adjustment costs related to the internal reallocation of resources, trade openness increases the negative volatility impact on growth. Several cross-sectional studies show thatthe impact of shocks depends indeed on openness to the outside world. An econometric analysis of the GDP per-capita growth rates in the developing countries over two periods (1970-1980, 1980-1990) has thus served to highlight that the negative effect of the volatility of the terms of trade is all the greater as the economies are more open to the outside world. The same study also suggests that the effect of this instability is the volatility of the real effective exchange rate and volatility of investment rate.

The works on Dutch disease highlights the positive relationship between trade openness and volatility in the growth rate. They also show that it tends to be accentuated by inappropriate industrial protection and exchange rate policies: these policies reduce the inter-sectoral mobility of factors of production and the ability of economies to adapt to the changes in an international environment.

The role of economic policy in the effect of trade openness on the instability of growth, then leads us to distinguish two notions of openness: the first corresponds to the observed situation of the economy, and can be measured by the ratio of foreign trade to the overall product. The second one corresponds to a development strategy that focuses on the search for the competitiveness of the economy, which is likely to favour both export and substitution activities

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[1] Combes, J. L. & al. (2000). Ouverture sur l'Extérieur et Instabilité des Taux de croissance. *Revue française d'économié, 15(1),* pp. 07-08.

rather than on a trade protection policy that favours import substitution activities to the detriment of export activities.

The Dutch disease theory was initially applied to a sharp increase in the volume or value of exports of goods, but it has been extended to other external shocks, and in particular to a sudden capital inflow. As the terms of trade improve, a net capital inflow leads to an expansion of the economy (due to the increase in aggregate demand) and generally an appreciation of the real exchange rate, whatever the exchange regime. In a fixed exchange rate, capital inflows lead to an increase in the money supply and inflation, and in a floating exchange rate system a nominal appreciation of the currency. Insofar as the real appreciation of the currency reduces the competitiveness of enterprises subject to foreign competition, and especially of export enterprises, it can lead to a reversal of capital movements, especially since foreign capital is generally invested in export sectors. There is, therefore, an endogenous instability linked to capital movements. Indeed, the loss of competitiveness linked to the real appreciation of the currency is not inevitable. It depends, to a large extent, on the use of external capital that conditions the productivity growth of production factors. If foreign capital is used for increased consumption, public or private, or finance real estate investments or oversized productive investments, a balance of payments crisis and a recession are probably beginning to take shape in the economy.

Conclusion of the chapter:

Through this chapter, we have tried to highlight the theoretical and analytical framework of the Dutch disease, as we discussed its most important transmission channels and explanatory theories, therefore, we can summarize that although the Dutch disease is a phenomenon that is classically associated with the discovery of natural resources, it can arise from any other development that entails an increase in foreign exchange inflows, including higher prices of primary commodities or increased flows of foreign aid to the state, or increased foreign capital inflows of the state.

Most of the primary-producing countries are single-sided countries that rely on natural resources to finance their budget, which make them suffer from severe problems and crises, especially when oil prices change, if they rise, the industrial and agricultural sectors will become less competitive in the world trade through the appreciation of the local currency value and consumer spending, therefore, welfare; if they decline, they will resort to the austerity policies as it is the case in Algeria nowadays, but does Algeria really suffer from the Dutch disease and how was the Algerian Dinar behaviour? This is what we are trying to answer in the next chapters after providing an overview of both the exchange rate and balance of payments.

Chapter 02:
The Exchange Rate & Balance of Payments BoPs.

Introduction to the chapter:

T he currency has arisen as a means for eliminating the problems caused by barter, At the outset of their use, it has been characterized as a commodity having a value in itself and evolved over time due to the needs of transactions where paper money and bank money appeared. After the advent of the modern State, every country was obliged to have its own currency as one of the demonstrations of their own sovereign state, but through the multiplicity of countries and the establishment of trade between them, the international payments' problems and the use of the currencies of underdeveloped countries to adjust them, have been appeared, as well as the problems of financing became more complicated on the internal plan and external one, particularly in the developing countries, and then the linked problems to the exchange operations that are made in what we call the exchange rate market, one of the financial market components, where the exchange rates' transactions and conversion between different negotiable currencies were made; in addition to several regimes of exchange rate including fixed, floating (flexible) and the one of exchange control, that aimed at supporting the exchange rate stability and the exchange development. In general, It is an important part of economic policy that plays a major role to support the internal and external equilibrium in order to reach certain targets, that all depends on the economic problem suffered by the state: stabilize prices, diminish the inflation, accomplish a stable and lasting development, absorb the unemployment or equilibrate the balance of payments that is an essential part of the economic activity and plays a highly sensitive role regarding the economic development and the identification of the country's position in the map of the international economy. Moreover, the changes in export and import levels and the difference between them (the trade balance) constitutes an important criterion in and outside the country, moreover, they can directly affect a multitude of areas including the financial market, and often to deal with major economic problems; the use of trade measures, such as import restrictions, is required.

Through this chapter, we will, initially, examine the most important concepts related to the exchange rate, where the first section will be dedicated to the market of exchange rate, its conceptual framework and the main exchange rate regimes then, in the next section, we will talk about the theoretical and experimental methods to figure out the exchange rate, However in the third and the last section we will study the balance of payments by showing the general principles, and especially their importance and their utility and economic indicators, in a next step, we will exhibit the position of the trade balance in the structure of the balance of payments then define it and explain its relation to the macro-economy as to exchange rate passing through the theories that have dealt with such a relationship.

Section 01: The Exchange Rate:

The exchange rate mechanism is a necessary and fundamental element in the international economy and could affect all the economic sectors, either directly or indirectly, that is why we should present most of its related concepts.

I.The Foreign Exchange Market:

The markets of exchange rate differ from the rest of the financial markets in terms of transaction modes; they are even considered as the most important since they represent a centre to determine the currency value against foreign currencies and a means to meet the currency needs of economic agents; and thanks to this section, we will try to approach the most important concepts linked to the market of exchange rate, starting with its definition, its most important actors and concessionaires, the established operations of exchange rate and lately the risks arising from the exchange and their hedging techniques.

1. Definition of the Foreign Exchange Market: The foreign exchange market or *"Forex"* is the first concrete demonstration of international reality. Every individual who travels abroad, and every economic agent who loans or borrows in foreign currency, faces immediately an exchange problem. This market does not correspond to a definite geographical place, but to a network that links up banks between them. These operate for their customers' account (firms, individuals) or their own account. The central banks evenly intervene to carry out the orders of their customers (Public Treasury, large companies) or in the context of the monetary policy. The foreign exchange market consists of two compartments:[1]

1.1. The Manual Exchange Market that results from the confrontation of supplies and demands of bank billets or of traveller's cheques, it concerns, especially the tourists and businessmen for their stay abroad;

1.2. The Scriptural Exchange Market that corresponds to transactions made by transfer from account to account between foreign banks, its volume of activity is much greater than on the manual exchange market.

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[1] Mondher, Ch. (2002). *Les Taux de Change, les essentiels de la banque*. Paris: Revue Banque, p27.

The foreign exchange market is the most important financial market in the world. [1] It is probably the only real global market that is able to operate without the slightest interruption.

2. Actors of the Foreign Exchange Market: Several actors intervene in a more or a less important way in the foreign exchange market:[2]

2.1. Commercial and Investment Banks: The financial institutions (banks, financial subsidiaries of industrial groups...) are the most important operators. Banks take charge of foreign exchange transactions for their own account or that of their clients. To facilitate their operations, they have deposits at foreign financial institutions acting as correspondents. The advantage of banks in the foreign exchange market has two origins, the first one is commercial and can be explained by the difference between prices in the inter-bank market while the second is speculative;

2.2. The Brokers: The brokers allow a rapprochement between supply and demand's prices of a currency, especially when the dealers do not want to intervene directly in the market. It is particularly the case when a bank wants to preserve its anonymity in a consultation. Forex dealers are in the permanent link with several brokers who have, Furthermore, the role of gathering bank's quotations with whom they work and announcing regularly to these banks the best price range- the pettiest- for a given currency. Their role is essential because they allow enlarging significantly counter-parties found by the direct participants in the market, insofar as they do only communicate the counter-parties' names when these accept the transaction. They are remunerated on the basis of commissions;

2.3. The Firms: The main reason of firms is linked to the foreign trade and to their strategy of capital investments abroad (Direct investment, portfolio, loans or borrows); Although, the traditional exchange activity has as origin the diversity of billing currencies of imports and exports of goods and services and that of currencies through which international financial transactions are realized. The suppression of exchange controls allows certain treasurers of industrial groups, not only the possibility of covering commercial transactions, but also performing arbitration transaction, or even speculation. In the majority of cases, firms access to the foreign exchange market through banks or brokers. However, some large groups have their own auditorium of the market, what does not prevent them from maintaining regular relations with the financial intermediates at the same time to exchange opinions and to gather information and impressions;

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[1] Plihon, D. (2001). *Les Taux de Change* (3rd ed.). Paris: La découverte & Syros, p06.

[2] Mondher, Ch. op.cit. pp. 35-41.

2.4. The Central Bank: The central bank intervenes in the foreign exchange market to satisfy their customer's orders (treasure, foreign central banks) on one hand, and to control and/or defend its currency value on the other hand. Thus, we can differentiate two extreme cases highlighting that interventions, in the absence of institutional links, are exclusive of discretionary nature and for these, a central bank has several means:

2.4.1. Use of Reserves: whether of the national currency or foreign currency to act on the exchange rate, two situations may arise:

2.4.2. *Demand for National Currency is Lower than its Supply:* In such a case, it buys its own currency and sells the requested currencies. The demand for such created currency allows a return to equilibrium;

2.4.3. *Demand for National Currency is Greater than its Supply:* In such a case, it sells its own currency and buys the supplied currencies. The demand for such created foreign currencies allows a return to equilibrium;

2.4.4. Exchange Control: which allows for the state to restrict or to forbid the convertibility of national currency in foreign currencies;

2.4.5. Interest Rate Action: The interest rates level has an influence on capital investments decisions, particularly when their character is purely speculative. The Central Bank increases the interest rates to make up the exchange rate of its currency or to avoid that it goes down. Conversely, a fall in interest rates lowers the exchange rates; and

2.4.6. The Announcement Effects.

2.5. The Institutional Investors, who are the most important non-bank participants of the foreign exchange market, this set regroups several categories of operators: the pension funds, the insurance companies, investment funds and the commercial banks' departments responsible for the wealth management of their clientele;

2.6. The Private Clientele that does not directly intervene in the foreign exchange market, it regroups three categories of operators: the individuals, the industrial and commercial firms (not financial) and financial institutions.

3. The Exchange Transactions:

3.1. The *Spot* Foreign Exchange Market: The performed transactions relating to the sale and purchase of foreign currencies in the short-term based on the delivery and receipt of the currencies immediately after the completion of the transaction and this Exchange must be during the next 48 hours after the date of the process.[1] The exchange rates are determined by the market thanks to the exchange supply (by sellers of goods and services, investors who convert their local currencies into foreign currencies and donors of borrowing funds in foreign currency), and its demand by (buyers of goods and services in foreign currency, investors abroad, foreign tourists and applicants for loans in foreign currency) where all these flows are calculated in the balance of payments besides other operations, if the purchase and sale of the Exchange are made in cash, it is called Exchange in cash, and if they are made for speculation purposes and taking advantage of the differences in prices in various markets, we call the process: arbitrage, it should be noted that the absence of time differential between the purchase and sale of foreign currencies on the market leads to the absence of risk; [2]

3.2. The *Forward* Exchange Market: This market defines a price of the exchange of a given product for a future date. This formed price by the free confrontation of supply and demand, serves as a signal for many economic decisions such as the production, storage or transformation, where this process is done with a deal on the exchange of one currency versus another one provided that the operation is performed over more than two days, as well as the foreign processes are needed to adjust the various exchange compromises. Noting-here that the future foreign exchange transactions, in the end, become a sort of speculation on the exchange rate since providing for the assessment of the exchange rate or its deterioration in fact leads to an increase in the perception of the increase or deterioration of the exchange rate that leads to the rise or fall before the scheduled time where because of eagerness to hasten to buy or sell, it also leads to an overestimation of the expected impact of the rise or fall more than expected, then when the rise occurs it will be bigger, and if the deterioration is signed it will be more dangerous. [3] So among the features of the forward market, the following:

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[1] موردخاي كريانين. (2007. *(الاقتصاد العالمي مدخل للسّياسات*، ترجمة محمّد ابراهيم منصور ومسعود علي عطيّة. المملكة العربيّة السّعودية: دار المرّيخ، ص276.

[2] مجدي محمود شهاب. (2007. *(الاقتصاد الدّولي المعاصر*. الإسكندريّة : دار الجامعة الجديدة، ص246.

[3] Ibid. p246.

3.2.1. The Transfer of Risk: the forward market allows hedging of price risks existed on the spot market. The hedging is to take a position inverse and equal to that of the spot market. The economic justification of this risk transfer appears in the evolution of spot and forward prices (the basic principle);

3.2.2. The Discovery of Unique Price: The forward market is a centralized market, allowing the general confrontation of supply and demand (unique price at a given moment). This price synthesizes all of the operators' interests (buyers and sellers). It reflects a consensus of the operators on the future value of the product-reference price;

3.2.3. It is a market of last resort for both buyers and sellers. As a buyer of physical products does not find products to meet their needs, he can buy a forward contract term to take delivery on the due date. The reverse is true for a seller of tangible products.

4. Exchange Risks and Coverage Techniques:

4.1. Notion of Exchange Risk: The exchange risk means a risk of capital loss related to future changes in the exchange rate, increased strongly with the currencies floating and the development of international commercial and financial transactions and the operators of the exchange market are responsible for managing this risk; however the central banks' interventions for regulating the exchange rate, aim to reduce the exchange risk supported by private agents.[1]

4.2. The Hedging Techniques of the Exchange Rate's Risk: The purpose of the coverage of exchange rate risk is to know in advance which will be a counterpart in its currency of input or of an output of the currencies target in the future. For a firm, there are two categories of exchange rate risk coverage (of the transaction):[2]

4.2.1. The External Coverage, consisting in observing an exhibition at the exchange rate risk and at covering it, thanks to instruments such as the forwards' contracts, the future contracts, the options, the swaps of the exchange and of the currencies, the coverage on the money market, guarantees given by the organisms of the state or others;

4.2.2. The Internal Coverage, the exchange risk in a more global way. Nevertheless, in many cases, before defining the exhibition at the risk of transaction's exchange, flows in the same currency and of the same term are compensated. To some extent, a method of compensation within internal possibilities is already used.

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[1] Plihon, D. (2001). *Les Taux de Change* (3rd ed.). Paris: La découverte, Repères collection. p14.

[2] Fontaine, P. (2009). *Marchés des Changes*. France : Pearson Education. p132.

4.3. The Internal Management of Exchange Risk and Leads and Lags: Facing risk of the transaction, the treasurers of multinational firms adopted for a long time, a mode of exchange dynamic management which goes well beyond the simple operations of coverage. They are the leads and lags that consist for the firm to seek to modify the terms of their payments linked to commercial transactions in the sense that is the most favourable in a way to eliminate the exchange risk, and in certain cases to take advantage of it. It can take several forms: [1]

4.3.1. Modification of Billing Currency: The exporters seek to label their debts in currencies, of which they anticipate an appreciation, while conversely, importers try hard to acquire that their commitments are expressed in currencies likely to depreciate;

4.3.2. Terms Modification of Purchase and Currencies Cession;

4.3.3. Modification of Habitual Behaviours of Coverage: In good management, exports and imports denominated in foreign currencies are a subject to systematic coverage, but if the currency of a transaction billing is very strong and it is subject to anticipations in increase: the creditor (exporter) who ordinarily covered his exchange risk does not make it any more, while the debtor (importer) has interest in buying the forward or spot currency to protect himself against the exchange risk of exchange rate. If the currency appreciation occurs, the exporter accomplishes a benefit of the exchange.

II. The Conceptual Framework of the Exchange Rate:

The consideration of the currency as an exchange intermediary facilitated the economic and commercial, internal and external exchanges between the economic agents, in particular after the emergence of the purchasing power parity concept that is defined by other foreign currencies giving what we call the exchange rate.

1. The Exchange Rate Notion: The exchange is the operation that allows to acquire foreign currency from a national currency or conversely. The exchange rate is the price of a currency expressed in another currency, i.e. it is the number of monetary units that we can acquire in exchanging a unit of another currency.[2]

The exchange rate of a currency is determined by the foreign exchange market in terms of supply and demand for this currency. It is a planetary market on which transactions in currencies are made (the foreign currencies) and where firms, banks and monetary authorities (the Central

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[1] Plihon, D. (2001). *Les Taux de Change*. op.cit. pp. 16 -17.

[2] Beitone, A. & Ali. (2001). *Dictionnaire des Sciences Economiques*. Paris: Armand Colin's edition. p48.

Banks) mostly intervene. Once the demand of the operators is high, the currency appreciates compared to the other currencies (its exchange rate raises); conversely, when the supply exceeds the demand, the currency depreciates (its exchange rate decreases).

2. The Exchange Rates Functions: The numerous functions of the exchange rate can be summed up shortly as follows: [1]

2.1. The Function of Measuring: The national producers rely on the exchange rate to measure and to compare the internal prices of a particular product with the world market prices, therefore, the exchange rate for them is the link between local and world prices;

2.2. The Function of Development: The exchange rate is used in the particular exports' development towards certain zones across its role in promoting them and it could lead to passing or to deactivating certain industrial branches or to replace them with the importation where the prices of these imported products are less than internal prices. Therefore the exchange rate affects the geographical and productive composition of foreign trade between states;

2.3. Distributive Function: The exchange rate exercises a function of distribution at the international economic level thanks to its association with the foreign trade, which in its turn redistributes the worldwide income and national wealth between the world's countries.

3. Factors Influencing the Exchange Rate: Several factors affect the supply and demand for the exchange rate; they can be divided into technical factors and other fundamentals: [2]

3.1. The Technical Actors: that are:

3.1.1. The Market Conditions: Where the information that arrives at the market regarding the currency prices, the economic standing, the rumours, the official reports and statements, affects the exchange rate, as well as the exchange market's reaction, differs from information to another one, but the poor information affects it faster than the good ones;

3.1.2. The Operators Experience and their Situations: The foreign exchange rates can be affected by the quantities in demand for these currencies and reflect the operators experience in the foreign exchange market around the movement of prices, as well as their capacity of negotiation and the used methods by them in order to run their operations, influencing the sense of exchange rates;

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[1] عرفان تقي الحسيني. (1999) *التّمويل الدّولي* .عمان : دار مجدلاوي، ص281.

[2] سعيد مطر موسى وآخرون. (2008 .*(التّمويل الدّولي)* الطّبعة الأولى). الأردن : دار صفاء للنّشر والتّوزيع، ص ص 48-49.

3.1.3. The amount of Exchange Rate and the Degree of Necessary Fluidity: The exchange rate is determined by the market forces, supply and demand, that is why the amount either required or offered, affects the exchange rates;

3.1.4. The Necessity of Required Currency and the Diversification Extent of Operations: The more required amount of a currency, the more the particular value of this currency is strong and each time the dealers need a particular currency, its value will, in general, increment regardless of whether the provided amounts are equivalent to those required;

3.1.5. Evolutions of the Financial and other Markets, Excluding the Market of Exchange Rates: The high obtained return of a particular currency by the investors in the money market, leads to a higher value owing to the increased demand, as well as the increase in asset prices leads to enhance capital gains and therefore, an increase in the demand for currencies to buy these assets what leads to appreciating the value of the currency.

3.2. The Fundamental Factors: They can be divided into two categories, the factors affecting supply and demand for foreign currencies and the economic policies of the state such as monetary, financial policy and that of the exchange rate.

3.2.1. The Importation and Exportation: Importing is a demand for foreign currencies and a supply for the local currency, thus the value of the foreign currency will increase under constant factors, and the contrary will occur when a foreign trader imports a local particular product, he asks for the local currency and offers the foreign one, and therefore, the local currency's value will rise;

3.2.2. Exportations and Importation of Services: What applies to importation and exportation of goods, applies to importation and exportation of services in terms of its impact on exchange rates, such as following the processing by the local citizens abroad and staying in foreign hotels what pushes them to acquire currencies in order to spend them, shortly the tourists offer their currency and ask for foreign currencies occurring a fall in the value of the local currency and vice versa;

3.2.3. The Benefits of Investments: When the local investors supply their investment returns to buy the local currency, the value of this one will increase in the worldwide markets as well as the foreign investments in a country lead to raising the demand for its currency in order to finance the investment expenses;

3.2.4. The Transfers without Costs: When the local non-residents-citizens transfer some money to their families, they offer foreign currencies in exchange for obtaining the national currencies and therefore the value of the local currency will rise with the survival of other constant factors;

3.2.5. The Foreign Aid: Usually, one of the advanced countries presents material aids to some developing countries, in this case, the currency of the first country is converted to the currency of the second country, often these aids are presented as credits in the banks of donors countries to buy what they need from the market of these countries, noting that the currency of the donor country will appreciate because of the growing demand for their products and therefore their currency, but if these aids take a form of transfers without costs, the supply for foreign currency will appreciate inversely to its value what implicates an increase in the value of the local currency, as well as in the case of the local aids to another country, the contrary will occur and the local currency value will depreciate;

3.2.6. The Transfers of Capitals and Foreign Investments: The investment can be direct or indirect, but both cases at the same time lead to the transmission of the local capitals abroad, which leads, in turn, to appreciate the supply of local currency and the increased demand for the foreign currencies, and therefore, the devaluation of the local currency and the increase in the foreign currency's value;

3.2.7. The International Borrowings: They are granted borrowing by a state to another one, or provided by international financial institutions where, when a state acquires a loan of a certain value of a foreign country, the supply of currencies will increase in parallel with the demand for the local currency. Consequently, the local currency value will appreciate compared to the foreign currencies, but at a later stage, these countries have to pay to get out of debt with interest, which reverses the question!;

3.2.8. The Money Transfer for Speculation Purposes: Any movement of money from a country to the other one in order to benefit from the exchange difference between both countries and to realize capital gains where the country receiving funds will increasingly improve the local currency, simultaneously the value of the foreign currency decreases.

Besides the political and military factors, the exchange rate is influenced by the political disturbances, from the viewpoint of the argument which says that the capital is a coward, any

disturbance will have an impact on the capital flows from and towards the state, and capitals stop moving toward tainted zones by disorders of instability.[1]

4. Types of the Exchange Rate and their Calculation:

4.1. Bilateral Exchange Rate and Multilateral Exchange Rate (Effective):

4.1.1. The Bilateral Exchange Rate: is the exchange rate between two currencies;

4.1.2. The Multilateral Exchange Rate (Effective): is an average of the bilateral rates of the currency weighted by the relative weight of every foreign country in the foreign trade of the considered country.

4.2. Exchange Rate, PPP, is the one that gives no advantage of monetary origin to the different countries in a sense that every currency is supposed to provide the same power of purchase in all countries (the theory of PPP relies on the law of one price according to which identical goods are supposed to be sold at the same price everywhere);

4.3. Spot and Forward Exchange Rate: This typology is made according to the term of real exchange rates of currencies. The spot exchange rate is the price for an immediate transaction (one day or two maximum for the large transactions) then it is the exchange rate prevailing for the same day or for a delivery in the two working days in the case of inter-bank transfers ; is the price for a transaction that will occur at a certain moment in the future, (in 30, 90 or 180 days), it is typically rated in terms of points and it is not an Exchange rate as it is and these points are called "cash" or "swaps" depending on the term, they indicate the difference between the forward and spot rates. The forward quotations can also be expressed in deviations (in %) compared to the spot rate, which facilitates the comparison of premiums (premiums and discounts) with the interest rate differentials corresponding to the term. Quotations in per cent = spread of the forward rate compared to the annual spot rate. The foreign exchange rate (Forex: Foreign exchange) can be quoted or expressed in two ways:

4.3.1. Exchange Rate under Certainty: It is the number of units of foreign currency per a unit of the local currency, and when this exchange rate rises in a sense, the external value of the currency appreciates in the same sense;

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[1] لحلو موسى بوخاري. (2010) *سياسة الصّرف الأجنبي وعلاقتها بالسّياسة النّقدية* .لبنان :دار المكتبة العصرية -حسين للطّباعة، النّشر والتّوزيع، ص26.

4.3.2. Exchange Rate under Uncertainty: It is the necessary number of units of local currency to supply per a unit of foreign currency; the increase in this exchange rate corresponds well to a depreciation of the national currency.

4.4. The Nominal Exchange Rate (NER) and Real Exchange Rate (RER)

4.4.1. The Nominal Exchange Rate (NER): The nominal exchange rate between two currencies is the conversion instrument of a currency's price in another one. For the longest period, its value must guarantee the existence of the worldwide economy's general equilibrium. The long-term determinants of the exchange rate (the fundamentals) are, therefore, of real nature. The nominal exchange rate means the current exchange rate without taking into account its purchase power including goods and services between both countries, it is determined due to fluctuations in supply and demand and in terms of adopted exchange rate system in the country; it changes every day either by deteriorating or by improving where improvement is the rise of the local currency value against the foreign currency while the deterioration is its fall and at the same time an increase in the nominal exchange rate, in fact, the economic agents are not interested in the nominal exchange rate level as much as in its purchasing power, that is, any quantity of acquired goods by the same sum of local currency, this one is called the real exchange rate. [1]

The nominal exchange rate is divided into two classes, the official nominal exchange rate in effect to the official changes and parallel exchange rate that is the applicable rate in the parallel markets, what means the existence possibility of more than a nominal exchange rate at the same time, for the same currency and the same country.

4.4.2. The Real Exchange Rate (RER): The most important indicator used at the international level in order to study the competitiveness of any economy is RER which is a total index for the macroeconomics. We call the real exchange rate by the nominal exchange rate between two currencies deflated prices. Theoretically, it is the most accomplished but is nevertheless complex to implement empirically; the second approach is macroeconomic, and defines the exchange rate as an indicator of competitiveness; its equilibrium level makes it possible to reach the external equilibrium while being compatible with the internal

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[1] بلقاسم العبّاس. (2003) .سياسات سعر الصّرف. مجلّة جسر التّنمية، *23*. المعهد العربي للتّخطيط، الكويت، ص04.

equilibrium. The empirical calculation, in this case, is easier and is based on the most robust mechanisms in the macro-econometric models.[1]

The RER figures the competitive capacity of domestic products, it shows the number of necessary units of foreign products to buy a single unit of local products and as long as the RER gets closer to the nominal exchange rate, the rate of inflation will diminish, as well as it plays an important role to help the economic operators in making their decisions. When the RER varies, it translates to an increase in the relative price of domestic goods compared to the foreign prices which means that the depreciation of foreign prices expressed in local prices is a true improvement, but the true discount is made by the appreciation of the foreign prices expressed in local ones that is, the depreciation of local prices compared to the foreign prices of goods.[2]

Several calculations of RER are possible, but whatever is the used definition, RER is a non-monetary, but a real indicator. For *Owen Barder*, the exchange rate is the relative price of non-tradable goods and services on tradables and services. When the demand for non-tradable goods appreciates, the cost of these goods and services can rise relative to tradables; this is called an appreciation of the real exchange rate. A country generally experiences an appreciation of its real exchange rate when it is industrializing. As productivity and incomes rise relative to the rest of the world, the relative price of non-tradables to the price of tradables increases.[3] According to *Christian Bialès*, the RER is calculated to take into account the differences between the nominal exchange rate and PPA exchange rate, it measures the relative price of two baskets of goods, of national products compared to the foreign products in national currency; it is, therefore, a competitiveness-price indicator of the country. The RER measures ultimately the external purchasing power of the currency, as follows:[4]

Real exchange rate (under certainty) = Nominal exchange rate (under certainty) / Exchange rate PPP (under certainty)

We can calculate RER on the basis of relative prices to consumption, or from the international terms of trade, or even on the basis of the internal terms of trade. According to

[1] Yamb, E. B. (2007). *Mésalignement et Dynamique de Convergence du Taux de Change Réel, en Zone CFA*. Thesis for obtaining the grade of Doctor in economics. Faculty of Economics and Management, University of Paris 1– Panthéon Sorbonne. France, p05.

[2] بلقاسم العبّاس. مرجع سابق، ص05.

[3] Owen B. Op.cit. pp. 05-06.

[4] *Christian Bialès* is a superior chair honorary professor in economics and management, Montpellier, France.

Luis A.V. Catão∗∗, if E is the nominal exchange rate (NER) quoted under uncertainty (a unit of the foreign currency / the national currency):

$$\lambda = EP_T^*/P_{NT}\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{ (2.1) Where:}$$

P_T^* The price index of tradable goods in foreign currency; and
P_{NT} The price of NT goods.

This RER is called internal terms of trade. It is the best indicator of the national resources' allocation between sectors liable to foreign competition and protected ones. As this allocation evolves slowly over time:

$$\lambda T = EP_M^*/P_X\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots.2.2)\text{ Where:}$$

P_M^* The price index of imported goods in foreign currency;
and P_X The price of exported goods.

This RER is the inverse expression of the international terms of Trade. It turns out that it is more volatile than the internal terms of trade and it reflects further the variations of the short-term nominal exchange rate (examples of both oil crises of 1973 and of 1979). The real exchange rate is the necessary units' number of foreign goods for purchasing a unit of national products expressed in the following equation:

$$RER = eP^*/P\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..\ldots...\text{ (2.3) Where:}$$

e,   The nominal exchange rate;
P^* The foreign price index in foreign currency; and
P   The local price index.

It is the definition the most used in practice. The general index of prices includes both the tradable goods' prices (exportable and importable) and the non-tradable goods. It is from this that the purchasing power parity rule has been stated. [1]

According to the equation (2.3) the real exchange rate is calculated as an indicator of prices, and therefore, its level has no natural explanation, and it is equal to one (=1) in the base-year, what means that the real exchange rate is the nominal exchange rate weighted by the levels of relative prices (there are other measurements that can be used, including the levels of relative wages). Therefore, if the inflation rate in the concerned country is quicker than its equivalent in another country, the nominal exchange rate should increase in order to fix the real exchange rate. It is notable that any decrease in the RER is a real improvement,

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but the real decrease corresponds to the increase in the RER, which means a fall of local goods' prices compared to foreign goods' prices. [1]

It is notable that the non-tradables are goods and services that are not subject to international transactions due to the physical impossibilities (buildings, infrastructures, transport services,... etc.), of national regulations (norms, protectionism), or due to transport costs (heavy goods as cement). The differentiation Tradables/non-tradables is, thereby, founded on the existence or the absence of goods and services in the worldwide markets. However, it is not perfect because some not exchanged goods are potentially tradable, so that their transport costs diminish or that the national regulation became less restrictive, although this differentiation remains useful because it means that the competitive pressure exercised by the rest of the world is stronger for goods and services being the object of international transactions.

Several statistical indicators are used to calculate the real exchange rate, the indicator the most popular bases on the consumer price index, the second indicator is the relative price of tradable goods to the non-tradable ones and the third indicator is the relative value of wages that vary from a country to another one. The real exchange rate is calculated as an indicator of prices, that's why its equilibrium level does not have a natural explanation and it is equal to one (=1) in the basic year, and when the relative prices of the local goods compared to the foreign prices increase that is the reduction of the real exchange rate could be regarded as a real improvement, but the real decrease occurs by the real exchange rate appreciation which means the reduction of local goods in comparison with the foreign prices of goods.[2]

4.5. The Equilibrium Exchange Rate ERER

4.5.1. The Equilibrium Exchange Rate Concept: In fact, having a real exchange rate that approaches to the equilibrium rate is the purpose of all countries by following commercial policies as a tool in order to accomplish it, so the liberalization policy by virtue of its significant effect in reducing the real exchange rate of their currencies, reducing the prices of goods and the possibility of access to the worldwide markets.[3]

According to *Edwards (1989)*, The equilibrium exchange rate is the proportion of the prices of tradables to those of non-tradables; in case of the existence of long-term balanced and ideal

[1] بلقاسم العبّاس، مرجع سابق، ص 05.

[2] بلّحرش عائشة. (2011). سعر الصّرف الحقيقي التّوازني. دفاتر MECAS، 07(1)، الجزائر، ص151.-

[3] حمدي عبد العظيم. (1998). *الاصلاح الاقتصادي في الدّول العربية بين سعر الصّرف والموازنة العامّة*. مصر: دار زهراء الشّرق للنّشر والطّباعة.

values of certain variables, such as the international prices, the taxes, the commercial policy, the capital flows or the technology that will drive to an internal and external equilibrium at the same time wherein the internal equilibrium requires the equilibrium of the market of goods and labour market in the short and long-term, which is assuming accomplished with the realization of an unemployment rate that does not produce the acceleration of the inflation, nevertheless, the external equilibrium requires the compatibility of the actual and future discount value with the long-term anticipated capital flows and able to continue.

The equilibrium exchange rate is asymmetrical notion with the macroeconomic equilibrium, it represents a lasting equilibrium to the balance of payments when the economy increases by a normal rate; therefore it is the dominant exchange rate in a non-dysfunctional environment. [1] In other words, the equilibrium exchange rate is the defined price by the powers of supply and demand when a total equality occurs between the required and supplied amounts for a unit regardless of the speculation effect and unusual movements of capitals, therefore, the equilibrium exchange rate is such as the equilibrium price of any tradable goods in the free markets under a perfect competition;[2]

In the macroeconomic approach, the equilibrium ERER is defined as an exchange rate value compatible with the simultaneous realization of the internal and external equilibrium in the medium-term. The internal equilibrium coincides with the realization of the production's potential level equivalent to full employment. The external equilibrium is defined by the equality of the current account, at an 'equilibrium value', enabling the sustainability of external payments. The current account balance depends on the economic activity of the country (represented by GDP), the economic activity of other countries, the ERER and other exogenous variables. The current account's equilibrium value is obtained when the economic activity (domestic and foreign) and the ERER are both at their equilibrium level. The fluctuations of ERER around the equilibrium value depend on the productivity differentials (which explain the difference between production and potential level of production) and on the difference between the current account and its target value.[3]

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[1] بلْحرش عائشة. مرجع سابق

[2] بلقاسم العبّاس. مرجع سابق، ص ص 07-09.

[3] Gnansounou, S. U. & Verdier-Chouchane, A. (2012). Mésalignement du Taux de Change Effectif Réel: Quand Faudra-t-il de Nouveau Dévaluer le Franc CFA?. *African Development Bank Working Paper, WPS 166,* p17.

Figure n° 02-01: Determination of the Equilibrium Real Exchange Rate. The Basic Approach: Internal Equilibrium does not Depend on the Real Exchange Rate

Real exchange   Internal equilibrium

R*   External equilibrium

CA=CA*

Domestic GDP

Y*
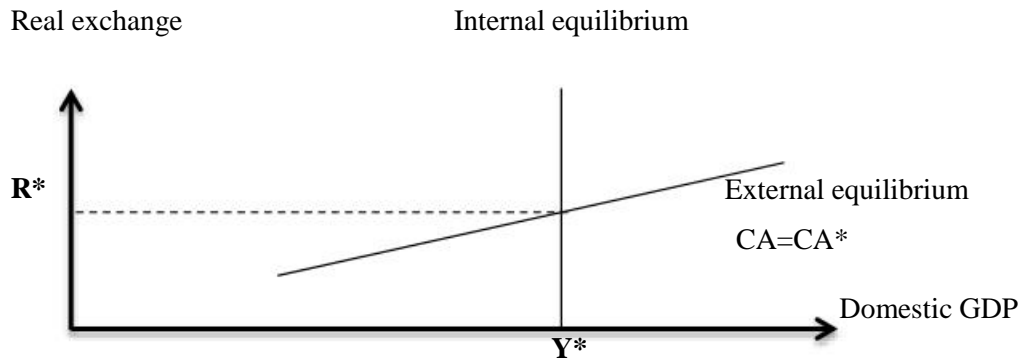
Source: Yamb E. B. op.cit. p60

As shown in Figure n° 02-01, the internal equilibrium is represented by the vertical curve, that indicates the potential level of activity and constitutes the supply curve of the model. The traditional assessments of potential GDP do not generally hold that the offer block depends on the real exchange. In fact, it is based on a NAIRU assessment which is, when the price-wage loops are specified in growth rates as in most macroeconomic models, independent of the real exchange rate level. So, the supply curve is vertical.

The external equilibrium is represented by the increasing curve that shows the combinations of the real exchange rate and activity for which the current account is at a predetermined level and qualified for equilibrium. An increase in domestic demand increases, from a Keynesian perspective, the domestic GDP and degrades, all things being equal otherwise, the trade balance and current account. It must be compensated by a depreciation of the real exchange rate (Figure n° 02-01: The determination of the equilibrium real exchange rate). The basic approach: the internal equilibrium does not depend on the real exchange rate to keep the current account at its equilibrium level. The curve is therefore increasing and describes the influence of real exchange on the demand's block of the model. It should be noted elsewhere that it is parameterized by foreign demand. In this context, the equilibrium real exchange rate is the real exchange rate value that allows achieving a given target for the current account, knowing that the domestic and foreign activities are at their medium-term equilibrium level.[1]

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[1] Yamb, E. B. op.cit.. pp. 60-61.

Among the most important determinants of the exchange rate, the differential between local and international prices (or between local and foreign inflation), if the local inflation is higher than the external inflation, assuming that all things being equal otherwise, the exchange rate will tend to depreciate, and according to the PPP theory, this differential is the main reason for the exchange rate fluctuation. The equilibrium exchange rate can be defined according to the PPP in any year compared to the equilibrium exchange rate in the base year, as follows:

$$e^* = e_0^* \times (P/P_0)/(P^*/P_0^*) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.4), \text{Where:}$$

$(p_0^*, \ p_0)$ the international and foreign prices in the base year;

e_0^* the equilibrium exchange rate in the base year.

By selecting the base year in which the official exchange rate is equivalent to the equilibrium exchange rate, this equation can be used to calculate the equilibrium exchange rate, as well as the $0*$, is determined on a year when the balance of payments is in equilibrium or at a long-term disequilibrium level. Using the real exchange rate definition following the PPP: $RER = (e \times p^*)/p$ and by compensating p and p^*, we obtain:

$$((e_0^* \times p_0^*)p_0) \times (e/e_{PPP}^*) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2.5)$$

This means that the real exchange rate measures the divergence of the equilibrium exchange rate. The decline in the real exchange rate shows that the official exchange rate depreciates to a lower level than its equilibrium level, and this occurs when the local inflation is high and the devaluation of the currency is not sufficient to correct the disequilibrium. However, the real exchange rate remains constant when the nominal exchange rate is equivalent to the inflation differential. The concept of the equilibrium exchange rate following the PPP is limited because it does not take into account the real and nominal shocks that lead to the exchange rate adjustment, such as the trade limits and capital flows.[1]

The exact estimation of the equilibrium exchange rate is essential for all countries that adopt an economic policy management, the theoretical and practical results revealed that the excessive fluctuations of the real exchange rates and the correspondence of the nominal value of official exchange rate with its equilibrium level would involve important costs in the level of the social well-being, Conversely, the countries that avoided the non-correspondence of the nominal value of the official exchange rate with the equilibrium value by maintaining the acceptable real exchange rates to attract the significant rates of the international capital flows,

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[1] بلقاسم العبّاس. مرجع سابق، ص 09.

thus to ameliorate the competitiveness degree of tradable goods sector and on this basis, these countries knew macroeconomic stability and high growth rates along with the improvement of living standard.

The temporary (monetary) nominal shocks influence on the real exchange rate and move it away from its equilibrium level, moreover, real shocks also influence the equilibrium level that is why it is necessary to determine this level and to interpret its sense, but according to *Robinson's* viewpoint, the equilibrium exchange rate is only a fictitious idea where the exchange rate, the interest rate, the level of effective demand or the nominal wages level cannot be identified without each other because each one of these variables interacts and influences on the other.[1]

4.5.2. The Determinants of the Equilibrium Exchange Rate: According to the most widely used approaches in the literature, the equilibrium exchange rate depends on a set of variables or fundamentals that play an important role in determining the equilibrium level. These determinants as stated in the study of *Eugenio, C. (2008)* in particular for the developing countries, are: [2]

4.5.1.1. Terms of Trade: an improvement in the terms of trade tends to require an appreciation of the REER in order to offset the positive impact on the external accounts;

4.5.1.2. Productivity: an increase in productivity in the tradable goods' sector with respect to their commercial partners will appreciate the REER through the well-known Balassa-Samuelson effect. The higher wages in the sector of tradable goods due to an increase in productivity will put high pressure on wages in the sector of non-tradable goods, resulting in the absence of the nominal exchange rate adjustments (an increase in the CPI compared to its partners);

4.5.1.3. The Budgetary Balance: the effect of this variable on the REER is ambiguous. On the one hand, an improvement in the budgetary balance should normally be accompanied by a less significant decrease in private savings, by reducing the total domestic demand and thus increasing the overall national savings. Therefore, the REER would tend to depreciate, on the other hand, an improvement in the budgetary balance could imply an appreciation of the REER if the tightening of fiscal policy had an expansionary impact in the medium term;

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1 بلّحرش عائشة. مرجع سابق، ص152.

2 Eugenio, C. & Mansilla, M. Op.cit. pp. 14-15.

4.5.1.4. Capital Flows: the capital inflows could lead to an appreciation of REER through their effect on the non-tradables sector; and

4.5.1.5. The net foreign assets: Economies with high levels of net foreign assets may temporarily maintain more appreciated REERs, as they can finance the associate trade deficits. Conversely, the debtor countries might need more depreciated exchange rates in order to generate trade surpluses necessary to the external commitments' service. Here, the position of the net foreign asset in the economy is approximated by the net foreign assets of the banking system (including the Central Bank).

III. The Exchange Rate Regimes:

The economic operations performed by each country with the outside world require to have payment means to deal with what could be trained as a result of these operations, and the exchange rate is the way the most important for this where the Monetary Authority may determine it in accordance with the conditions of the economy or leave their determination to the Exchange market through the supply and demand for currencies. In this section, we will show the concept of the exchange rate system and the foundations of their choice as well as the most important factors that affect the latter, then we will discuss the Exchange rate systems and their relationship to the financial, the monetary and the trade policies then we will study the most important theories that addressed the choice determinants of the appropriate exchange rate system.

1. The Concept of the Exchange-rate Regime: The exchange-rate system refers to the principles and rules that organise the framework in which the nominal value of the domestic currency is determined. This value, called nominal exchange rate, could be determined against one or more foreign currencies or against a commodity such as gold or silver. Therefore, the exchange rate system guides the interventions by monetary authorities (the Central Bank in general) on the foreign exchange market and eventually the use of monetary policy to defend or to influence the exchange rate evolution.[1]

2. The Choice of the Exchange-rate Regime: The choice is a strategic decision for all countries and it is of great importance because it affects the economic policy of a country, its margins of manoeuvre and its various macroeconomic adjustments. In this regard, it exerts significant pressure on the balance of payments, the prices and it also determines the conditions of

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[1] Yougbaré, L. (2009). *Effets Macroéconomiques des Régimes de Change: Essais sur la Volatilité, la Croissance Economique et les Déséquilibres du Taux de Change Réel.* Thesis for obtaining the grade of Doctor in economics. Faculty of Economics and Management, University of Auvergne- Clermont-Ferrand I. France, p27.

insertion of economies on the international level while the exchange rate is an essential variable that links the national economy to the international one, so what are the factors that make the decision-makers of a country choose a particular regime of exchange rate?.

"In general, characterizing the best exchange-rate regime is an extremely hard problem because the best regime may have an infinite number of arbitrary features. The difficulty is compounded by the fact that the exchange-rate regime affects, in turn, the strategic behaviour of speculators vis-a-vis the policy-maker and vis-a-vis each other". [1]

The optimal exchange rate regime in a given country has always been a topic of debate among the experts in international economics, since the establishment of the *Bretton Woods* system and the adoption of the second amendment to the IMF statutes; the Member States are free to adopt the exchange rate regime of their choice.

3. The Factors Influencing the Choice of Exchange-rate Regime: The *Mundell*'s works *(1960)* have gone beyond the conclusion of Friedman by emphasizing the important character of capital mobility. They stressed that in the case of capital mobility, the ideal system is the fixed exchange rate regime because the interest rate has a direct influence on the balance of payments. On the other hand, if the capital is immobile, it is preferable to opt for a flexible exchange rate regime.[2]

McKinnon, R. I. (1963) argued that if two regions have a high degree of openness in terms of trade as a per cent of GDP, they would not be disadvantaged by having a rigidly fixed exchange rate, especially that they could benefit from the operation and reduce the costs of participation in a monetary union. The gist of *McKinnon*'s argument is that maintaining both the internal balance (low inflation / high employment level) and external balance is much easier to be achieved with a flexible exchange rate if the economy is relatively closed. However, if the economy is very open, the exchange rate flexibility won't be able to keep up the equilibrium.[3]

Recently, Attention is focusing on the single criterion approach for analysis of shocks affecting economies or regions, since the absorption of shocks is considered combining the net influence of several traditional criteria *Masson & Taylor (1993)*. There are a number of different aspects of this approach: symmetrical or asymmetrical shocks; temporary or permanent shocks; what are the

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[1] Cukierman, A. & al. (2004). The Choice of Exchange-Rate Regime and Speculative Attacks. *Journal of the European Economic Association, 2(6),* p208.

[2] Diop, B. M. & Fall, A. (2011). La Problématique du Choix du Régime de Change dans les Pays de la CDEAO. *Department of Forecasting and Economic Studies DEPE Working Paper, 20,* p04.

[3] McKinnon, R. I. (1963). Optimum Currency Areas. *The American Economic Review, 53(4).*

origins of the shocks, are they real foreign/domestic nominal? Let's first consider the evidence if the shocks are symmetrical or not. The evidence on this issue focused on the extent to which economic cycles are correlated across regions and countries. A strong correlation is considered a prima facie evidence that the shocks are symmetric, while a low correlation is thought to be more representative of asymmetric shocks. A large number of studies have shown that the economic cycles of the European economies in the 1980s have become most associated with the German economic cycle than the U.S. cycle.[1]

Frankel, J. A. & Rose, A. K. (1998) examined the relationship between two optimum currency area criteria: the amount of integration of bilateral trade and the correlation of economic cycles. They find a strong positive association between country pairs' correlation of economic activity and the intensity of the exchange. However, there is another dimension to this argument that relates to the sectoral specialization: The sector-specific demand and supply shocks are important components of macroeconomic fluctuations (economic cycles), then the regions with similar sectoral structures will have relatively symmetric economic cycles. Nevertheless, the models of trade and international specialization would predict the reduced exchange costs resulting from the monetary integration what will lead to an increase in the specialization of sectorial level due to the comparative advantage or arguments of agglomeration type.[2]

However, *Ricci (1999)* presents a new model of economic geography in which the opposite effect happens as follows: the monetary integration leads to the geographic dispersion of sectors and a more symmetrical relationship between the macro inter-regional shocks. Furthermore, *Atish R. Ghosh∗ & Jonathan D. Ostry∗∗ (2009)* stated that the various exchange rate regimes have important advantages and disadvantages. The more rigid regimes allow anchoring inflationary expectations, support the production growth and promote economic integration, but limit the use of macroeconomic policies, increase the vulnerability to the crises and hamper the external adjustment. The recent experience of emerging countries in Europe illustrates what proceeds in many countries with less flexible systems, growth was strong in the years leading up to the current crisis, but serious external imbalances have been accumulated, which increased their vulnerability

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[1] Masson, P. R. & Taylor, M. P. (1993). Fiscal Policy within Common Currency Areas. *Journal of Common Market Studies, 31 (01).*

[2] Frankel, J. A. & Rose, A. K. (1998). The Endogeneity of the Optimum Currency Area Criteria. *The Economic Journal, 108 (449).*

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∗∗ Deputy Director of the IMF Studies Department.

to a brutal and disruptive adjustment and limited the possibility of resorting to the counter-cyclical macroeconomic policies.[1]

Sebastian Edwards (1999) has addressed the issue of the selection of exchange rate regime, wondering why some countries choose a flexible exchange rate regime while others choose a fixed regime. He argued that the answer to this question is largely related to the political structure of the country concerned. He developed a model of the formal political economy to analyse this issue; this assumes that the fixed exchange rate regime is more credible than a flexible one. However, if the fixed regime is abandoned, it is if the authorities decide to devalue (or are constrained), the authorities suffer a significant political cost. The empirical results of this study show that for a sample of developing countries and of middle-income countries with unstable political regimes tend to choose more flexible exchange rate regimes.[2]

The adoption of the appropriate exchange rate regime has become a current topic and this was affirmed by *Summers (2000)* saying that the choice of an appropriate exchange-rate regime which, for economies with access to international capital markets, denotes more and more a distance from the median path of the fixed but adjustable parities towards extreme regimes of flexible rate or of sustained fixed rate, when appropriate, by the desire to renounce the independence of monetary policy.[3]

As well as *Fischer (2001)* said that, for countries open to international financial flows: i) the fixed parity is not sustainable unless it is very rigid, but ii) that a wide range of flexible agreements is possible.[4]   However, *the president of the third meeting of the Asia-Europe Finance Ministers, 2001*, highlighted that the countries seeking both to maintain the flexibility and avoid the excessive volatility in the exchange rate should consider intermediate regimes such as fluctuation bands' agreements. [5] In terms of the second endogeneity source (nominal shocks) both, *Buiter (2000)* and *Layard & al. (2000)* have argued that due to the high integration of exchange rates, the international capital markets tend to be a source of shocks rather than acting as a shock absorber. The regions must, therefore, pool their monetary policy in cases where they have high mobility of

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[1] Atish, R. G. & Jonathan, D. O. (2009). *Le Choix du Régime de Change.* Finance & Development, *IMF Working Paper, 46,* p40.

[2] See: Edwards, S. (1999). *The Choice of Exchange Rate Regime in Developing and Middle-Income Countries*, Changes in Exchange Rates in Rapidly Developing Countries Theory, Practice and Policy Issues. NBER-East Asia Seminar on Economics, 07, University of Chicago Press, Chicago, p22.

[3] Braga de Macedo, J. & al. (2001). Taux de Change: Ni Fixe, Ni Flottant. Paris*: Studies of the Development Centre of the Organisation for Economic Cooperation and Development (OECD).* p15.

[4] Ibid. p15.

[5] Ibid. p15.

capitals. In this context, the OCA becomes endogenous because the pooling of monetary sovereignty removes one of the main causes of the asymmetrical macroeconomic shocks. A second impact issue relative to shocks concerned whether they are permanent or temporary. The temporary or transitory shocks could, in principle, be absorbed by funding, while the permanent shocks would require an adjustment.[1]

The economist *R. Hiller* also presented some factors that could especially help the developing countries to choose their exchange rate policies, namely: [2]

3.1. The Openness Degree to the Outside World: This degree is measured by the ratio of goods included in the foreign trade (exports and imports) to GDP, and when this proportion increases, the economy's openness degree to the outside world increases consequently and vice versa. It is worth noting that the open economy is the one that is characterized by the increase in the relative importance of the foreign trade sector to build the national product. Choosing the free-floating policy of the economy   does not represent the perfect choice because it is distinguished by the degree elevation of the exchange rate variations' effect on the local price level, that's why economies should continue the political stabilization because of the rising costs of exchange rate modification, but for a less open economy, it is appropriate to continue the floating policy because it allows stabilizing the production; [3]

3.2. The Diversification Degree of Production Structure and Exports: More is the diversification degree of the domestic production structure regarding either export-oriented products or those oriented to the local market, fewer are balance-of-payments difficulties, that is why the need of making an adjustment to the exchange rate depreciates and it is better to continue a fixed exchange rate regime on the one hand and on the other hand the assessment of the degree of concentration in the production   structure in a number of products, creates continuous fluctuations in the exports' recipe of economy, as it is the case in the majority of developing countries, then here it will be appropriate to continue a floating policy based on giving some flexibility to the exchange rate in order to facilitate the adjustment of the disruption that may result from a sudden lack of exports' recipe;

3.3. The Integration Degree of the Local Capital Market with the International Capital Markets: By the ratio of foreign financial assets that belong to banks on the local

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[1] MacDonald, R. (2007). *Exchange Rate Economics: Theories and Evidence* (1st ed.). New York: Taylor & Francis Group, pp. 34-36.

[2] محمد سيّد عابد. (1990) *التّجارة الدّولية*. مصر: مكتبة الإشعاع للطّباعة والنّشر والتّوزيع، ص ص 380-387.

[3] بلقاسم العبّاس. مرجع سابق، ص18.

money supply, noting that when the transactions' freedom degree in the local financial market increases, it is preferable to choose the floating policy where the Exchange rate fluctuations play an important role in attracting capitals that are useful in adjusting the disturbance of the balance of payments caused by the current transactions, but for an economy that is distinguished by a low integration degree of the local capital market with international financial markets, it is better to choose the stabilization policy;

3.4. The Relative Rate of Inflation: It is often preferable to pursue the policy of exchange rate stabilization between countries, of which the inflation rates get closer, but it is more suitable to choose the exchange rates floating policy between countries of which the inflation rates differ;

3.5. The Relative Importance of Internal and External Sources of Balance of Payments Disturbance: If these sources are caused by the external causes such as the sudden decline in foreign demand for exports, it is better to choose the floating exchange rate policy, but if the majority of the shocks that the economy braves, are of internal sources so it is better to choose the stabilization policy;

3.6. The Value of External Trade Elasticity: It might not be suitable to choose the floating exchange rate policy if the elasticity of foreign demand for exports, the local demand for imports and local supply elasticity of exports are low, as it is the case in the majority of developing countries where the exchange rate variation becomes ineffective to readjust the balance of payments, for this reason, it is preferable to pursue the exchange rate stabilization policy and to rely on other alternative policies such as monetary and financial ones, in order to correct the disturbances;

3.7. The Impact of the Exchange Rate Change on the Local Assimilation and Money Supply: The choice of the suitable exchange rate regime depends on the response of the local assimilation and real value of the money supply to the exchange rate variations, more is the response degree of these variables in the medium and short-term, it is preferable to pursue a floating exchange rates policy, but if the exchange rate variations are of a little influence on the local assimilation or the money supply, thus it is better to stabilize the exchange rate and pursue the alternative rectifying policies;

3.8. The Provisions and International Monetary Balance: The choice of the appropriate exchange rate regime is determined also by the availability's extent of the international provisions where more is the volume of these, the less is the need for taking corrective

procedures for the balance of payments disturbance and therefore, the possibility to keep the exchange rate stable through financing the deficit based on these provisions. Therefore, in this case, it is better to pursue a policy of exchange rate stabilization, but in the case where the volume of international balance declines and the borrowings from abroad become difficult, it will be more proper to choose the floating exchange rate policy.

Factors that influence the choice of the exchange rate regime are summarized in the following table, by *Ripoll, l. (2001)*, according to which these factors could help States to know which regime for which situation and choose their own exchange-rate regime: [1]

Table n°02-01: The Factors Influencing the Exchange-rate Regime Choice

Size and degree of economy's openness	The more an economy is open, the higher is the volatility costs of the exchange rate and therefore, the less flexible rate is attractive →an open economy will bear a strong price instability of flexible exchange rates due to the international transaction costs.
Difference between domestic inflation and global inflation	If the inflation rate of a country is higher than that of its Commercial partners, → the country will choose a flexible exchange rate to respond to the external shocks and to prevent a loss of competitiveness
External/ Internal shocks	If the economy is highly integrated and characterized by high mobility of capital, → the fixed exchange rate's regime is optimal and it has the advantage of reducing the transaction costs as well as the currency risk
Capitals' mobility	The more capital is mobile, the more it is difficult to defend a fixed exchange rate, so the ideal system is the fixed exchange rate because the interest rate has a direct effect on the balance of payments.
Flexibility degree of wages -prices	The more real wages are rigid, the greater is the need for flexibility of the exchange rate in response to external shocks
Credibility degree of the monetary authorities	The more Central Bank's anti-inflationist reputation is weak, the more desirable is the exchange rate attachment. The gain in credibility is then expensive in terms of flexibility.
Pricing system	When prices are set at the consumer price, the consumption's stability is not affected under a flexible exchange-rate system, while there is a transmission of external shocks prices are set at the producer price, under a fixed or flexible exchange-rate regime.
Tradables /Non-tradables goods	The presence of non-tradable goods increases the desire for greater flexibility of exchange rates; Indeed, even in the absence of supply shocks, changes in demand will be absorbed in part by changes in the prices of non-tradable goods.

Source: Ibid. pp. 06-07.

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[1] Ripoll, L. (2001). Choix du Régime du Change, Quelles nouvelles?. Lameta, university of Montpellier-I, France. pp. 06-07.

4. The Main Exchange-rate Regimes: The main exchange rate regimes are the fixed and floating ones in the middle of which a number of intermediate regimes are integrated.

4.1. The Fixed Exchange Rate Regime, its Advantages and Disadvantages:

4.1.1. The Fixed Exchange Rate Regime: It is a regime in which the authorities fix (unilaterally or not) the reference nominal exchange rate and undertake to buy or sell any amount of demanded or supplied domestic currency by the public at announced prices. By adopting such a regime, the authorities also undertake to defend the parity of Exchange by interventions on the foreign exchange market or by the monetary policy.[1] So, the Central Bank plays a fundamental role. It is by its policy and its various interventions, must keep up the external value of the national currency equal to the fixed parity. If the foreign exchange market is liberalized, fulfilling this commitment requires it to intervene in the foreign exchange market as soon as the exchange rate moves away from the established parity.

The Central Bank purchases (sales) its currency if it tends to depreciate (appreciate) on the Forex. When the currency is inconvertible and the Forex market is controlled, the parity is arbitrarily defined by the Central Bank and can be, if appropriate, subject to artificially support. [2]

4.1.2. The Fixed Exchange Rate Regime/ Advantages and Disadvantages: that are:

4.1.2.1.The Advantages: the fixed exchange rate regime has several advantages, namely:

a. It confers some confidence in the country's currency Insofar as this one is attached to a fixed currency or to a basket of currencies. The fixed exchange rate regime often goes hand in hand with better results in terms of inflation (fixed prices encourage the anti-inflationary policy), particularly, in the developing or emerging countries. The commitment's credibility made by the Central Bank to defend the parity of its currency is thus essential; [3]

b. It encourages international cooperation since the changes require the agreement of the participating countries; it also provides a well-defined nominal anchorage that reduces

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[1] Yougbaré, L. op.cit. p28.

[2] See: The Forex web site: http://forex.trader-finance.fr, consulted the Dec. 13th, 2013 at 15:15H.

[3] Mondher, Ch. op.cit. p87.

inflation expectations and therefore, interest rates. As well as it serves to stabilize international prices and decrease uncertainty and risk and to promote international trade;

c. The fixed exchange rate regime also promotes the production growth and economic integration of the country. However, it hinders the external adjustment (a recent example of emerging Europe), limits the use of macroeconomic policies and increases vulnerability to crises. The fixed exchange rate is thus sometimes maintained at incompatible levels with the economic situation of a country.

4.1.2.2.The Disadvantages: Among the disadvantages, we will finally note the fact that this regime facilitates the speculation and limits the monetary policies of the country and the international exchange reserves constitute unusable liquidity for international trade and have very often to be substantial to defend currency parity, as well as the rates, may be fixed at levels that are incompatible with the fundamentals (misalignment).

4.2. The Floating Exchange Rate Regime, its Advantages and Disadvantages:

4.2.1. The Floating Exchange-rate Regime, of which the exchange rates fluctuate freely according to the free play of supply and demand for currencies where they can also fluctuate within a wide variations' limits. No commitment is therefore made, particularly by the Central Bank of the country, against the official exchange rate of the currency. The currency will, therefore, fluctuate freely (pure floating), based on supply and demand on the Exchange market, but when it does not exclude the Central Bank intervention, it is about an impure floating. Monetary policy is independent. This means that the Central Bank gives up the exchange rate control, which is determined by the Forex. The floating applies to a liberalized exchange market while it is possible to meet an impure floating supported by an exchange control. Unlike what happens in a system with fixed parities, the Central Bank does not intervene (or very rarely) to support the currency or to slow the increase in its value.[1] The floating exchange rate regime is enforced in many countries such as the United States, Japan, Switzerland, and the United Kingdom or in emerging countries as Brazil.

4.2.2. The Floating Exchange-rate regime: Advantages and Disadvantages

4.2.2.1. The Advantages: The main advantages that the flexible exchange rate regime covers, are the following: firstly, the floating exchange rate system allows a faster

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[1] See: The Forex web site: http://forex.trader-finance.fr, op.cit.

adjustment to external shocks since the exchange rate adjustment of the currency is constant; on the other hand, the monetary policy conducted by the Central and budgetary Bank set by the authorities of the country, can be more flexible and adjusted through the currency exchange rate variations of the country. The Central Bank has normally less need for holding significant reserves of foreign currencies to defend the currency exchange rate;

4.2.2.2. The Disadvantages: The main disadvantages of the floating exchange rate system are that Exchange rates record greater volatility and this can have a negative influence, especially for firms and international trade. A flexible exchange rate regime can be inflationary insofar as it involves fewer constraints in the monetary policies of countries. Fluctuations from the short-run capital movements could be important. The currency of the country can also inspire less confidence than a currency at a fixed exchange rate. The countries participating in the Eurozone, within the European Union, have chosen a limited flexible regime compared to other currencies in the framework of monetary cooperation mechanisms. Countries like Algeria, Turkey, Egypt, Brazil, Tunisia, Norway, Romania, Chile, and the People's Republic of China have chosen a managed floating regime. The United States, Canada, India, Indonesia, Peru, Japan, Mexico and Switzerland have meanwhile adopted an independent floating regime.

4.3. The Intermediate Regimes: Between the two extreme regimes, there are intermediate regimes that determine in terms of fluctuations that the Central Bank of the country concerned authorize around its reference parity and according to the frequency of the realignments of its parity, it belongs to this category:

4.3.1. The Exchange-rate Regime with a Sliding Parity: it is a regime in which the exchange rate is normally fixed, but periodically with adjustments that can respond to the changes in some predetermined variables; In such a way, the reference parity changes regularly to meet a number of objectives;

4.3.2. The Exchange-rate Regime with an Active Sliding: allows an anchoring on price expectations and announcing in advance the rate of devaluation for several months;

4.3.3. The Exchange-rate Regime with a Managed Floating: consists of having a floating exchange rate where the central banks inform markets about parity considered desirable and for which they carry out punctual or coordinated interventions.

5. The Relationship of Exchange-rate Regimes with Economic Policies:

The economic, financial, monetary policies and that of Exchange aim to achieve the economic equilibrium, but they differ in their impacts, and this could be illuminated through the following elements:[1]

5.1. The Exchange Rate and Monetary Policy: The monetary policy influences the exchange rates through growth rates, production rates and real interest rates that are, in turn, influenced by prices variations in the markets of goods and services, which leads to a series of effects between monetary policy and the price levels of goods and services, the real production rates, real interest rates and foreign exchange rates. The expansionary monetary policy often leads to a rise in the general level of prices which is reflected in the actual production by lowering their rates of growth and on the real interest rates by deteriorating; In both cases, the imports increase and the exports decrease, in addition to that the net capital flow is negatively influenced where the inflation rates escalation leads the capitals to escape in order to seek better the profit opportunities, This weakens the exchange rate value of the national currency, so the combined short-term effect of the expansionary monetary policy is the national currency devaluation and in contrast, the deflationary monetary policy influence the general level of the lowering prices, leading to an increase in the real production and real interest rate, therefore, the exports reinforce while the imports depreciate in addition to the attraction of the foreign capital toward inside which leads to an increased demand for the national currency and a currency of high value.

The monetary policy takes different formulas to intervene on the exchange market such as purchasing and selling the bonds in the foreign exchange market in order to maintain sufficient amounts of international reserves, and affecting the real interest rates to stabilize this market without using the international reserves in addition of assuming restrictions on the international capital movements to avoid or surpass the short-term pressure on Exchange rates, especially in protecting the unstable inflows and outflows, likewise to modify the long-term pressure upon the weakness of the national currency;

5.2. The Exchange Rate and Financial Policy: the fiscal policy influences directly the net government expenditures (the difference between government spending and income taxes). their change appreciating with the other factors stability leads to the increase and decrease in the global demand which is reflected on the prices of goods and services and assets to double

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[1] هوشيار معروف. (2005) *تحليل الاقتصاد الكلّي* (الطّبعة الأولى). الأردن: دار صفاء للنّشر والتّوزيع، ص ص 310-317.

prices where the increase in demand leads to an increase in the imports and a decline in exports, of which a part is oriented to the local market that negatively affects the local currency value by decreasing, as well as this variation leads to the emergence of a deficit or a surplus in the general government budget reflecting on the interest rates, the investment, the prices of goods and services and so the appearance of deflation and inflation pressures in the local markets and the evolution of the real interest rate, and reflecting on the movement of goods and services, the foreign capital and all this affects the supply of foreign currency against the domestic currency by changing the exchange rate.

The analysis differs in the long and medium-terms, where the financial expansion can have stronger effects in an open economy with a fixed exchange rate but in the long-term, it increases the aggregate demand and thus raises prices and wages what reduces, at the same time, the real money supply, the competitive effectiveness of prices and appreciates the interest rates which, in turn, leads to a shortage of demand on the consumption and private investment and therefore, the net foreign dispense depreciates, as well as the capital movement in an open economy could lead to eliminating the monetary policy effect in the short-term that can be executed in a closed economy, while the financial policy is stronger than in a closed economy, but in such an economy this policy leads to two different results: the financial expansion and the rise in interest rates, which leads to a decrease in the growth rate of the real production.

5.3. The Exchange Rate and Trade Policy: A distinction between two types of trade policy can be made, these policies are the free exchange policy and trade protection policy, the first is used to eliminate the administrative and quantitative restrictions and custom tariffs on the external trade but the second one is used to impose these restrictions, it leads especially in developing countries to several reverse results in terms of imposing on consumers of the local products of lower quality and higher prices than those of imported goods, which leads to a consumer trend towards these products either the importation is legally or illegally made, as it involves the emergence of the parallel markets and so the parallel exchange rate, and under the protection in a limited area, their impact cannot be strong, it depends on the importance of goods subject to protection. The exchange rate is used in the protection by stabilizing it at a value less than its fair value, which leads to higher import prices for the domestic consumers and low export prices for the foreign consumers, which reduces the imports and raises the exports, as well as the State control on the exchange rate by distributing it on spending that it deems necessary, which leads to the emergence of the exchange black markets, involving the deterioration of the national currency value.

Section 02: Theoretical and Empirical Exchange Rate Determination's Methods:

Several theories have treated the major determinants of the exchange rate by giving adequate reasons, namely:

I. The Traditional Models: that are:

1. The Purchasing Power Parity, PPP and *Balassa Samuelson* Effect: This theory emerged after the second world war, by the name of the Swedish economist *Gustav Cassel (1916),* as it was treated by many researchers, including the English ones, among them *David Ricardo (1817),* for its financial and explanatory value in the determination of exchange rate.[1] The PPP is the simplest equilibrium exchange rate estimation method, the oldest and most popular in order to explain the movements of exchange rates towards equilibrium; this simple approach is based on the relative prices. It ignores, however, other structural factors and seems too schematic, even when it is completed by a *Balassa-Samuelson* effect.[2] It defends the idea that "the value of the currency is everywhere the same," in other words, at equilibrium the exchange rate should reflect an equal purchasing power of the two considered currencies.[3]

The exchange rate of purchasing power parity is the exchange rate between two currencies that equate the two relevant national price levels if they are expressed in a common currency at this rate, as well as the purchasing power of a currency unit would be the same in both economies. This concept of PPP is often called the *"absolute PPP"*. The *"relative PPP"* is said to hold when the currency's depreciation rate against the other corresponds to the difference in the global inflation prices between the two countries concerned. If the nominal exchange rate is defined simply as the price of one currency against another, the real exchange rate is the nominal exchange rate corrected for the differences in the relative national price levels. When the PPP holds, the real exchange rate is a constant, so that the variations in the real exchange rate represent PPP divergences. Therefore, a discussion of the real exchange rate is equivalent to a discussion of PPP.[4] There are four hypotheses that allow delivering this parity:

H1- *The Perfect Financial Markets:* There are neither controls nor transaction costs nor taxes;

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[1] Simon, Y. (1981). *Les Marchés des Capitaux et Taux d'Intérêt* .Paris: Dallos edition, p55.

[2] Saâdaoui, J. (2012). *Déséquilibres Globaux, Taux de Change d'Equilibre et Modélisation Stock-Flux Cohérente.* Thesis for obtaining the grade of Doctor in economics. Faculty of Economics and Management, University of Paris XIII. Paris, p15.

[3] Mondher, Ch. op.cit. p45.

[4] Lucio, S. & Taylor, M. P. (2003). *The Economics of Exchange Rates* (1st ed.). New York: Cambridge University Press, p51.

H2- *The Markets Of Goods Are Perfect:* international expeditions of goods can take place freely, instantaneous and without costs or customs tariffs;

H3- *There is a single common consumption good for all.*

The hypotheses H1, H2 and H3 are sufficient to establish a simple version of the purchasing parity theorem introduced by *Cassel* in *1916.* So the exchange rate between the two countries can be calculated by the following relationship: [1]

$$1 \pm C = (1 - df)/(1 - de)$$ ……………………………………………………… (2.6) Where:

C   The appreciation or the depreciation of exchange rate;

df the external inflation rate; and de The local rate of inflation.

In 1922, *Gustave Cassel* suggested defining the equilibrium nominal exchange rate level as the one that ensures the purchasing power parity (PPP) between two currencies; this simple principle is traditionally declined in two versions, the absolute PPP and relative PPP:[2]

1.1. The Absolute Purchasing Power Parity (APPP): In its absolute version, the PPP hypothesis prevails in the absence of any form of barriers to international trade (customs taxes, non-tariff barriers...) by neglecting transportation costs and information costs.[3] The Purchasing Power Parity (PPP) theory predicts the price equalization of a long-term commodity through arbitration in the goods' market. It, therefore, implies that the real exchange rate is equal to one (RER=1). Empirically, the absolute PPP hypothesis is generally rejected in the post-Bretton Woods.

The relative form of the PPP recognizes that prices may differ between countries due to, for example, the existence of transaction costs. Accordingly, changes in the nominal exchange rate to offset the inflation differentials between countries so that the real exchange rate deviations from its PPP equilibrium are transitory. The equilibrium real exchange rate is then obtained as the long-term average of the real exchange rate.

In practice, the PPP's ability to accurately describe the real long-term exchange rate remains limited. Therefore, it does not provide a reliable indication of the misalignment degree of currency. Furthermore, the persistence of real exchange rate deviations from PPP indicates that other factors also determine the evolution of the real exchange rate. Indeed, the PPP theory

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[1] Stemitsiotis, L. (1992). *Taux de Change de Référence et Système Monétaire International.* Paris: Economica edition, p105.

[2] Mondher, Ch. op.cit. p45.

[3] Ibid. p45.

ignores the effects of the economy's fundamentals and capital flows on the real exchange rate evolution. This led to the proposition of other approaches that we are now exposing. [1]

According to this theory, the equilibrium exchange rate between two different currencies is equal to the relation between price levels, i.e. the purchasing power of a currency is similar to its purchasing power in another country, and that can be expressed by the following relation: [2] *The exchange rate = Local prices level / Foreign prices level.*

Gustav Cassel describes this relationship by saying: *"... When you agree to pay a certain amount of foreign currency, you see that currency through its purchasing power compared to goods and services in the country concerned. Furthermore, when you offer a certain amount of your currency, then you offer the purchasing power of your goods and services, and thus your estimate of a foreign currency expressed in units of your currency depends on the relative purchasing power of these two currencies, each to his country".* [3] According to this version, we can calculate the exchange rate as follows: [4]

$$s_t = p_t/p_t^* \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (2.7) \text{ Where:}$$

- s_t The exchange rate that determines the foreign currency against the local one;
- p_t The local price level; and
- p_t^* The foreign price level.

Given that: $p_t = \sum \alpha_i \ p_{it}$, $p_t^* = \sum \alpha_i \ p_t^*$ and α_i is the weighted average of tradable goods between the two countries i.

In the existence of some transportation costs and many barriers related to foreign trade such as customs tariffs..., as considering that these factors are constant over time, the following equation can be formed as follows:

$$s_t = \pi p_t/p_t^* \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (2.8)$$

The hypotheses of this version are not very realistic. The alternative is to retain the relative version of this theory, which is based on less strict hypotheses and explains the evolution of the exchange rate between two periods. It also allows analysing the variability of the exchange rate compared to domestic and foreign inflation rates. [5] Thus, it is obvious that the PPP is not verified for the emerging countries because the prices are much lower than in the advanced countries.

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[1] Yougbaré, L. op.cit. pp. 207-208

[2] Stemitsiotis, L.op.cit. p111.

[3] Peyrard, J. (1986). **Risque de Change**. Paris: edition of Vuilbert, p86.

[4] Ibid. p91.

[5] Descamps, C. & Soichot, J. (1995). **Gestion Financièrede Internationale**. Paris : Litec edition, p72.

The level differences in the PPP exchange rate are therefore large and persistent. But the relative version cannot apply either, especially because of the "*Balassa-Samuelson* effect".[1]

1.1.1. *The Balassa-Samuelson* **Effect (1964):** The persistent deviation of the real exchange rate from the calculated PPP rates gave rise to two separate tests on this subject in 1964, the first being that of *Paul Samuelson*, the other being of *Balassa (1964)*. The result is now known as the "Balassa-Samuelson".   This effect is one of the main limitations of the theory of the exchange rates' purchasing power parity (PPP), it relates to the existence, in all countries of a structurally sheltered sector, of international competition. Indeed, multiple factors (language barrier and geographical distance for domestic services, transportation costs for the building...) make many goods and services *de Facto* non-tradable internationally. The PPP, based on arbitration is therefore not intended to be verified on this type of property.[2]

This model sets up a critical distinction between the traded and non-traded goods in an economy and identifies the differences in productivity growth in both tradable and non-tradable sectors as a key factor, the hypothesis of productivist orientation, by definition, the *Balassa-Samuelson* analysis confirmed that the exchange rate would tend towards their PPP rates, but only because this applied to the tradable goods. The domestic price structure of a country, however, would also be determined by the productivity development of the non-tradable sectors, which could diverge significantly from those of the tradable sector. The productivity differentials between the tradable and non-tradable sectors would be reflected in the differentials between the real and PPP exchange rates. If the international productivity differentials of tradable goods, for example, were higher than those of non-tradable goods, countries with higher productivity would apparently have an overvalued currency. [3]

This effect predicts that, relatively abroad, when the productivity grows faster in the tradable goods sector compared to non-tradable goods one, the observed real exchange rate and equilibrium rate will appreciate. Only the supply factors have an effect on the real exchange rate's equilibrium in this model because we make the hypotheses of perfect mobility of labour

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[1] Coudert, V. (1999). Comment Définir un Taux de Change d'Équilibre pour les Pays Émergents?. *CEPII Review of 'Economie Internationnale', 77*, p03.

[2] Romain, D. (2001). Taux de Change Réel et Effet Balassa Samuelson. *CEPII Review in International Economy, 85*, p102.

[3] Patterson, B. & al. (2001). Taux de Change et Politique Monétaire. *Economic Affairs series ECON Working Paper, 120*, p33.

between domestic production sectors, with constant returns to scale and perfect international mobility of capital.[1]

1.1.2.1. The Balassa Effect (in evolution): [2] The Balassa effect explains why the PPP hypothesis is not verified between emerging and advanced countries. This effect is related to the differences in productivity between sheltered and exposed sectors. Indeed, during the development process, the productivity of the exposed sector tends to grow faster than that of the sheltered sector; "the evolving Balassa effect explains the trend appreciation of the real exchange rate as measured by consumer prices. This effect occurs when the economy is broken down into two sectors: tradable goods (basically industry and agriculture), and non-tradables (basically services). These two sectors have generally different evolutions of productivity. The productivity of tradable goods generally increases faster than that of services. This phenomenon is all the more marked as the country is underdeveloped. Indeed, significant productivity gains are then feasible in the industry simply by ''catching up'' on the productivity of developed countries that can be done by integrating the existing technologies. The price of domestic demand p is an average of prices in both sectors:

$$p = bp_T + (1 - b)p_N \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (2.9),$$
where:

p_T, p_N Refer to the price indexes of the tradables T and non-tradables N, and b is the share of tradables in the final demand.

The real exchange rate can also be defined using the price of tradable goods:

$$q_T = p_T + e - p_{usT} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (2.10)$$

By subtracting the two equations (2.9) and (2.10), we can express the real exchange rate as a function of qT and the relative prices between the exposed sector T and total demand:

$$q = q_T - [(p_T - p) - (p_{usT} - p_{us}) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (2.11)$$

According to this formula, when the relative price between the sector T and all sectors decreases faster (or grows less quickly) in the studied country than in the United States, the real exchange rate against the dollar appreciates. This appreciation can be done without a loss of competitiveness on the tradable goods, i.e. with constant . By expressing P according to its components, we can write:

$$Q = q_T - (1 - b)[(p_T - p_N) - (p_{usT} - p_{usN})] + (b - b_{us})(p_{usT} - p_{usN}) \dots\dots\dots\dots \quad (2.12)$$

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[1] Yougbaré, L. op.cit. p208.

[2] Coudert, V. op.cit. pp. 03-04.

The equation (1.12) shows that the relative decline in the prices of tradable goods causes an appreciation, all the more so since the share of the sector sheltered in demand (1-b) is important. The last term on the left is negligible if the share of the sheltered sector is close to that of the United States. During its development, a country tends to see its industrial prices fall compared to service prices because of the higher productivity gains in the industry. The previous formula shows that its real exchange rate tends to appreciate accordingly.

1.1.2.2. The *Balassa* Effect (in level): The *Balassa* effect also explains the differences in price levels between countries and hence the differences in PPP levels. The reason is simple. The differences in productivity between the two sectors make the price levels lower in the least developed countries, implying an undervaluation of their currency compared to the PPP in level. To demonstrate this, we should examine the prices' formation in both sectors. The international competition tends to harmonize price levels of tradable goods.[1]

1.2. The Relative Purchasing Power Parity, RPPP: Unlike the absolute version, the relative version is constructed taking into account the transport costs, the information transition's freedom and the elimination of trade barriers that limit the parity of prices expressed in currencies. This version examines the change in the equilibrium exchange rate from one moment to another; it considers that each variation in the relationship between the purchasing power of the two currencies, each to their country, from a precise equilibrium situation, must be reflected in an appropriate variation in the equilibrium exchange rate of these two currencies, i.e. that the nominal exchange rate eliminates inflation differentials in both countries, where this version is formed as follows: *The new equilibrium exchange rate = the equilibrium exchange rate in the base year×((The actual price index in the country 01) / (the actual price index in the country 02)).*

We can calculate it by the following relationship: *The new equilibrium exchange rate = the old exchange rate ×the proportion of change in the exchange rate.* Where the proportion of change in the exchange rate = the local inflation proportion – The foreign inflation proportion. Thus, the exchange rate can be mathematically expressed after applying the logarithm to the equation (2.7), as follows: [2]

$$\log S_t = \pi + \log p_t - \log p_t^* \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (2.13)$$

If we express the equation (2.7) by the variation, we obtain:

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[1] Ibid. pp. 05-06.

[2] Peyrard, J. op.cit. p96.

$$\Delta \log S_t = \Delta \log p_t - \Delta \log p_t^* \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (2.14)$$

This equation shows that the depreciation of the nominal exchange rate is equal to the difference in inflation levels between the two countries.

The recent economic literature operated some rehabilitation of this relative long-term PPP. Indeed, a number of studies have established the stationarity of the real exchange rates of a large number of countries against the dollar or against the mark. Since this variable is stationary, it can be subject to a number of shocks, but none should affect its long-term value that is stable. In the long-run, the nominal exchange rate, therefore, evolves the differences in prices between countries.

In short, the RPPP idea is that it is not useful to determine the present value of the spot exchange rate, but rather that the relative price variation between two countries over a period will determine the variation of the exchange rate over this period. More specifically, the relative PPP establishes that, if the exchange rate between the currencies of two countries is initially at equilibrium, any change in the inflation differential between these two countries will be offset in the long-run by an equal variation but against the spot exchange rate.

Figure n° 02-02: The Relative Purchasing Power Parity
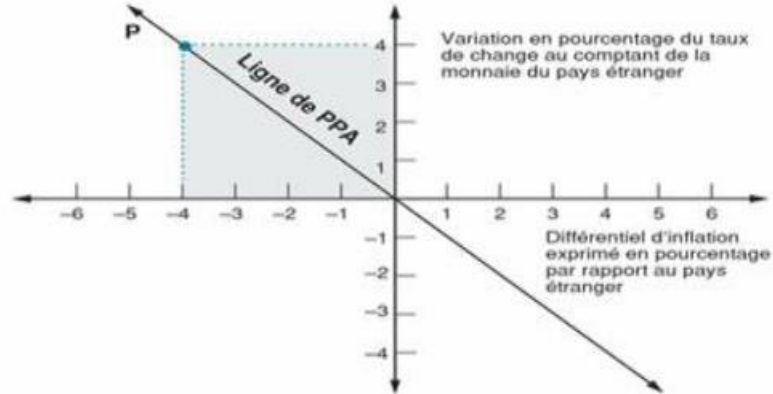
Source: Eiteman, D. & al. (2004). *Gestion et Finance Internationale* (10th ed.). France: Pearson Education, p11.

More specifically, the relative PPP establishes that, if the exchange rate between the currencies of two countries is initially at the equilibrium, any change in the inflation differential between these two countries will be offset in the long-term by an equal but opposite change in the spot exchange rate.[1]

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[1] Eiteman, D. K. & al. op.cit. p12.

2. The Interest Rate Parity: Despite the failure of the purchasing power parity to explain and form the exchange rate, especially in the short term, the parity of interest rates under a floating exchange rate system has an effect on both spot and forward prices, which makes them an important factor in explaining temporary changes in the exchange rate of its parity value.[1]

The theory of interest rate parity is developed by *John Meynard Keynes* and explained by the possibilities of arbitrage between financial markets, the difference in the interest rates between two countries must compensate for the evolution of both spot and forward exchange rate, expressed as a percentage of the spot rate, tends to match interest rates' differential between investments in similar terms in the currencies in question, either:

$y(1 + i) = y(1 + i^*) \times F/s$, or even $i - i^* = (F - s)/s$……..………………… (2.15), where:

y The capital in local currency;
i, i^* Respective domestic and foreign interest rates;
F The forward exchange rate; and
s The spot exchange rate.

The rate differentials between the two countries should reflect the rate of devaluation or early revaluation of one currency compared to the other.[2]

This theory is based on the interest rates to explain the variation that occurs at the level of the currency external value and also the dissimilarity of interest rates of two countries that reflects the rate of deterioration or appreciation toward the other currency where the increase in the discount rate in a country led to rise in the interest rate that leads in turn, to activate the capitals' movement towards that country in order to invest on the basis that the interest rate is higher than that of developed countries, which leads to an increase in foreign demand for the local currency and thus the appreciation of the exchange rate, the opposite occurs when the discount rate depreciates, it leads to reduce the local interest rate and therefore, to increase the local currency supply and capitals come out seeking a higher interest rate which involves the decline in the external value of local currency and this will be reflected in the balance of payments; [3] But despite the benefits of this theorem, it faced a lot of criticism, such as:

2.1. The interest rate does not represent an important factor to guide arbitrators' behaviour;

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[1] Simon, Y. op.cit. p69.

[2] Mondher, CH. op.cit. p48.

[3] محمّد الفنّيش. (2000). القطاع المالي في البلدان العربيّة وتحدّيات المرحلة المقبلة. وقائع النّدوة المنعقدة في 02-03 أبريل 2000 أبو ظبي-الإمارات العربية المتّحدة، عقده صندوق النّقد العربي والصندوق العربي للإنماء الاقتصادي والاجتماعي بالتّعاون مع صندوق النّقد العربي والبنك الدّولي، ص60.

2.2. The existence possibility of barriers that hinder the capitals' movement, such as the foreign exchange control;

2.3. The speculation can involve effects that move the exchange rate; **2.4.** Arbitrators cannot arbitrate as said this theory.

3. The Model of *R. Mundell & J. Fleming 1962* (Balance of Payments): The model of *Mundell-Fleming* had a huge impact on the research of the exchange rate determination theory; the original model assumes static expectations, although the generalization to regressive expectations, to a perfect foresight or rational expectations, is relatively direct. [1]

The predominant theoretical analysis until the early 1970s based on the situation of trade or current account balances to explain the exchange rate movements. *Mundell 1960* and *Fleming 1962*, two Keynesian-inspired writers, have developed models in which the exchange rates dynamic is a function mainly of the balance of foreign trade itself joined a level of domestic demand and that of interest rates. The empirical observation shows, indeed, that for an average period, the weak currency countries are those whose current account tends to be in a deficit. Symmetrically strong currency countries are those whose external balance is positive. This neo-Keynesian theory argues that the exchange rates are determined by equilibrium in the goods market (the price is determined by the demand and supply of currency), according to this theory, the currencies are requested primarily to buy some goods and foreign services. The currency supply corresponds then to export revenues, this theory is therefore based on current payments with outside. This vision of the exchange rate has prevailed in the post-war Bretton Woods system; it implicitly established a close link between exchange rate adjustments and current transactions' imbalances recorded in the balance of payments. However, moving to float exchange has blurred the link between current transactions and exchange rate. This approach sparked several theoretical reflections and empirical works, of which the majority is concentrated on the relationship between the prices and the volume in the equations of imports and exports. These reflections are summed up in the theorem of critical elasticities- or conditions of *Marshall - Lerner*-that sets the conditions from which the parity variations allow effectively restoring the equilibrium of the external balance.[2]

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[1] See: Leo Samo & Taylor, M. (2003). *The Economics of Exchange Rates*. (1st ed.). New York: Cambridge university press.

[2] Mondher, Ch. op.cit. pp. 44-45.

4. The Monetary Approach: [1] The determination of the exchange rate reflects first the currency market equilibrium. The exchange evolution is related is connected to the balance of official regulations and not to the current transactions. This approach was developed in the 1970s by Frankel 1976, the monetarist theory is in the context of floating exchange whose it tries to demonstrate the superiority over the abandoned fixed exchange-rate regime in 1973, and it started from the demand for money. This function depends on income, prices and interest rate:

$M = P \times L(Y, i)$ ……………………………………………….…………… (2.16)

$M^e = P^e \times L(Y^e, i^e)$……………….……………………………………… (2.17), where:

M, Me The stock of domestic and foreign currency;

P, P^e The general level of domestic prices;

Y, Y^e The level of real domestic and foreign income; and

i, i^e The domestic and foreign interest rates.

These equations describe the national and foreign money market equilibrium from the stocks of the supplied currencies (M, M^e), taken as exogenous (controlled by the monetary authorities), the level of prices (P, P^e), and demand functions for real money balances L supposedly identical across countries.[2]

The exchange rate is introduced into the basic model by applying the PPP, that gives:

$P = EP^e$…………………………………………………………….……… (2.18), where:

E   The price of one unit of foreign currency in the national currency (quotation under uncertainty; an increase of   corresponds to a depreciation of the national currency);

By combining equations (1.16) and (1.18) and by eliminating prices, we get:

$E = (M/M^e) \times (L(Y^e . i^e)/L(Y, i))$...……………………………………….…… (2.19)

The relationship (1.19) links the exchange rate of supply and demand for currency, the determination of the exchange rate being explained by the relative variations between countries of monetary mass, real incomes and interest rates. The exchange rate, that is the relative price of currencies, is determined by the money supply controlled by authorities on the one hand and the behaviour of monetary balances' holders on the other hand.

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[1] Plihon, D. op.cit. p53

[2] Mondher, Ch. op.cit. p50.

5. The Exchange Rate Over-reaction Model: Presented by *Dornbush (1976).* It represents the first coherent approach of the exchange rate instability and is a synthesis of real and financial exchange rate determination analyses. The idea is that the instability of the exchange rate is explained by the differences between the adjustment speeds in the markets of goods and services and financial ones. *Dornbush* assumes in fact, that the prices of financial markets adjust instantly to the changes in supply and demand, while prices of goods and services are rigid in the short term, in the long term the exchange rate equilibrium path is defined by the PPP; the evolution of the exchange rate is explained by the inflation differential between nations. Short term, it is the capital movements that dominate the foreign exchange market and the market equilibrium assumes the interest rate parity's condition fulfilled, as follows: the interest rate differential between two currencies is equal to the anticipated rate of the exchange rate depreciation. The exchange expectations are based on PPP and so bring the exchange rate to its long-term level. The PPP thus has a system anchor function.

Dornbush analyses the dynamics of Exchange as follows: in the short term, a monetary shock as for example the increase in money supply, leading to lower national interest rates, this decline, adding to the anticipation of a currency depreciation in relation to a lax monetary policy, creates an instantaneous depreciation of the exchange rate beyond its new long-term PPP value. There is thus an over-reaction (overshooting) of the exchange rate in the sense that the immediate movement of the exchange rate is strong and must be compensated later, indeed, in a second phase, following the initial depreciation of the currency, trade in goods and services react by an improvement in the current account balance, which leads to an appreciation of the currency until the standard of the PPP is respected again.

The theory of over-reaction was an important step in the understanding of the floating exchange rate, by putting in place an analytic framework to understand the phenomenon of exchange rate volatility. It has provided an important theoretical argument against the harmful effects of floating exchange rates; however, the "overshooting" models have important limitations related to the working hypotheses. In fact, it is the inability of agents to predict the long-term exchange rate that pushed them to (over) adjust their portfolios; and the convergence of the Exchange towards its long-term equilibrium is linked to the fact that expectations are supposed to be stabilizing because they bring the parities back on the equilibrium path, which is far from being verified in reality.[1]

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[1] Mondher, Ch. op.cit. p57.

6. The Portfolio Approach: The portfolio approach takes into account the diversification of investors' portfolio assets, which is a technique that tries to reduce risk by investing in the middle of different financial instruments and face the national restrictions, for example, below we consider a combination of domestic and foreign currency and of domestic and foreign bonds, the implications of these are illustrated in the following Figure: [1]

Figure n° 02-03: The Portfolio Approach
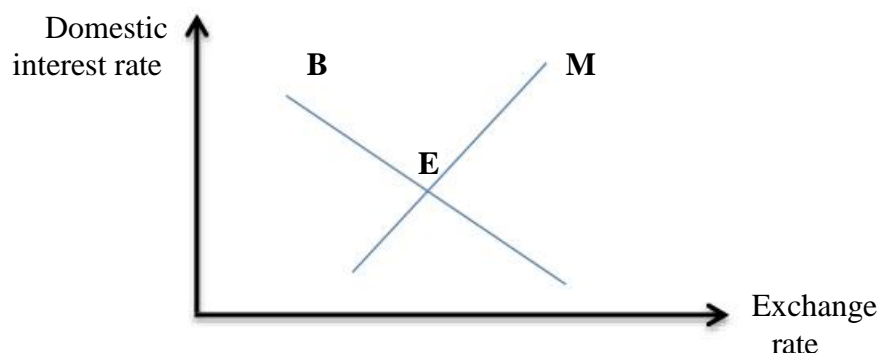
Source: Ibid. p06.

The two lines M and B show combinations of domestic interest rates and exchange rates. The ascending line M is in agreement with the balance in the currency market and the descending line B is in agreement with the balance in the bond market. Point E, which is the intersection of M with B, represents the combination of interest rate with the equilibrium exchange rate that gives balance in both bond and money markets.

What theory argues, is that the appreciation of the money supply will lead to a depreciation of the exchange rate. The magnitude of the depreciation depends on the propensity of curves M and b for example, if we consider an appreciation of the local money supply, we will anticipate that the lowest rate of interest and/or a higher exchange rate can only absorb the supply's excess, which in turn, will result in the reduction of the bonds, for this purpose the line M moves to the right and line B moves to the left.

7. The Speculative Bubble Theory *Blanchard, O. & Watson, M. (1984)*: The initial idea is that the sustainable differences between the exchange rate (or financial asset prices) observed on the market and its equilibrium value corresponding to economic fundamentals

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[1] Anastopoulos, M. (2013). Theories of Exchange Rate Determination. International Finance, pp. 06-07. Retrieved from the web site: *https://econtopia.gr/wp-content/uploads/2016/11/International-finance.pdf.*

(balance of payments, inflation, interest rate... etc.), can be existed; this differential is called a speculative bubble♣ because it tends to inflate and then roughly reabsorbed.[1]

This theory stipulates that changes depend mainly on the movements of asset markets, it gives an important role to expectations so that it can change the fundamental exchange rate's meaning; these speculative bubbles are made when most of the dealers in the market think that the price of a foreign currency will depreciate from its initial value defined by a specific theory, they are prone to explode at any time. The bubble can be formulated mathematically as follows:

$S = S^{EQ} + B$ …………………………………………………………….............. (2.20) where:

S The exchange rate in the market;
S^{EQ} The equilibrium exchange rate; and
B The speculative bubble.

Blanchard & Watson (1984) showed that bubbles could be compatible with the assumption of efficient markets, and in particular of rational expectations. This theory of rational bubbles revealed three results that seem to correspond to the recent functioning of the foreign exchange markets: In the short term, the market may know a multiplicity of equilibrium situation; The difference between the market exchange rate and its fundamental value may be growing and the exchange rate depends on its own anticipated value: The expectations are then self-fulfilling.

The mechanism of the exchange bubble is that most agents predict the appreciation of a currency without incorporating the fundamentals; the result is an excess of demand for this currency, whose exchange rate appreciates and deviates from its fundamental economic value, the expectations are self-fulfilling and the market is efficient in the sense where it correctly forecasts the exchange rate. However, as the versatile rumours outweigh the rational calculations, there is a reversal of expectations and the bubble ends up bursting. This notion of a rational bubble is, in fact, strongly antinomic because the notions of the bubble and rationality are incompatible.[2]

♣ A *speculative bubble*, also known as a "stock market bubble" or "financial bubble," is a very excessive rising prices on the markets of a financial asset (stocks, bonds, exchange rates), of real estate, of raw materials, etc. The usual logics of economic valuation of assets no longer apply, and it is through this break of logic that a bubble differs from a simple bull market.

[1] Mondher, Ch. op.cit. p58.

[2] Ibid. p58.

II. Recent Models:

In general, the concept of equilibrium exchange rate corresponds to the relative prices that reach both internal and external equilibrium at the same time; the first means that the non-tradable goods' sector is in balance while the second means that the current account is financed by a sustainable flow of funds. [1]

As a consequence of this analytical character, a variety of equilibrium exchange rates can be defined and their behaviour will vary according to different definitions of the exchange rate, as well as many theoretical models have been designed to provide a precise scientific basis for estimating this invisible concept, and even if there are a few flaws, these models of the equilibrium real exchange rate (FEER, DEER, BEER, and NATREX) assume that the real exchange rate ensures the external equilibrium, while the internal balance is ensured through fiscal policy or the balance of the external asset stock. However, they do not explicit the dynamics of the exchange rate adjustment. Their usefulness for the exchange rate forecast, as for the coordination of economic policies, is not assured. [2] It is noteworthy that these models express the same thing which is, " The real equilibrium exchange rate is determined at the level that achieves the internal and external equilibrium at the same time and realizes an optimal allocation of economic materials between the tradable goods and non-tradable sectors".[3] The following table summarizes these different approaches to the equilibrium exchange rate.

Table n°02-02: Some Theories of the Equilibrium Exchange Rate

Approach	Title	Remarks	Authors
Macroeconomic Approaches	The Fundamental Equilibrium Exchange Rate (FEER)	Medium-term, descriptive and normative approach. In each period, we identify the misalignment.	Williamson (1994); Edward (1989); Wren-Lewis (1992).
	The Desired Equilibrium Exchange Rate (DEER)	Based on the desired levels of employment and current account	Artis & Taylor (1993)
Econometric or Empirical Approach	The Behavioural Equilibrium Exchange Rate (BEER)	A static model with error corrections. A co-integration relationship between the exchange rate and some basic variables. The misalignment is a restoring force.	Clark & McDonald (1998)

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[1] لقاسم العبّاس. مرجع سابق، ص08.

[2] Bouveret, A. & Sterdyniak, H. (2005). Les Modèles de Taux de Change, Équilibre de long terme, Dynamique et Hystérèse. *OFCE Review, 93,* p245.

[3] سي بول هاليوود ورونالد ماكدونالد. (2007) *النّقود والتّمويل الدّولي*، ترجمة: محمود حسن حسني (الطّبعة الأولى .(المملكة العربية السّعودية: دار المريخ للنشر، ص09.

	The Permanent Equilibrium Exchange Rate (PEER)	The authors use econometric techniques to distinguishthe permanent equilibrium exchange rate (PEER) and the current (BEER) but the economic sense is difficult to grasp.	Clark & McDonald (2000)
Dynamic Approach	The Natural Exchange Rate	A dynamic model in the short, medium and long term. The NATREX ensures a balance of payments in the absence of cyclical factors of speculative capital flows and foreign exchange reserve changes.	Stein (1994) Stein & Allen (1997)

Source: Gnansounou, S. U. & Verdier-Chouchane, A. (2012). Op.cit. p18.

1. The Macroeconomic Approaches:

1.1. The Fundamental Equilibrium Exchange Rate, FEER: The FEER, originally proposed by *Williamson 1983 &1994* and by *Edwards 1989*, could be defined by the exchange rate that allows the current account to reach a given target when the internal equilibrium is achieved. The use of a macro-econometric model allows ensuring the coherence of the different used variables. Indeed, the FEER postulates the desirable and sustainable level of the capital account balance which is the counterpart of the current balance associated with internal equilibrium. At this level of desirable internal equilibrium that corresponds to a level of real exchange rate called the fundamental equilibrium exchange rate FEER. This approach introduces a subjective judgment of the analyst in determining the sustainable level of net savings and financial flows, including the determinants of net savings in the medium term, as well as in the choice of the necessary trade elasticities for calculating the FEER. In addition, it is sensitive to hysteresis effects since a temporary improvement of the current balance increases the net foreign assets and thus the net financial flows in the medium term. Moreover, no role is played by either the economic fundamentals or the real exchange rate adjustment dynamics in this approach. The IMF has attempted to improve the calculation of the desirable and sustainable capital account balance with the help of dynamic equations of desirable savings and investment.[1]

However, many recent studies using this approach do not use complete econometric models, but only foreign trade equations. By reversing these foreign trade equations, we obtain a relationship between the real exchange rate, the current balance and output gap. In this approach, calculating an equilibrium exchange rate requires the availability of estimated elasticities of foreign trade. Since the foreign trade volume data are rarely available over long periods for emerging countries, most of the existing studies focus on G7 countries. Other approaches,

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[1] Yougbaré, L. op.cit. pp. 209-210.

calculate the equilibrium exchange rate by reducing equations. They are based on the long-term relationship between the real exchange rate and fundamental economic variables affecting internal and external balance. The cointegration helps to highlight these long-term relationships. All the effects that affect the current long-term balance can influence the real equilibrium exchange rate under a double condition of internal balance and sustainability of the net external position.[1] Therefore The FEER approach indicates that the exchange rate is at its equilibrium value when satisfies the condition of simultaneous internal and external (terms of current account balance) balance.

1.2. The Desired Equilibrium Exchange Rate (DEER): Given its normative assumptions of what would be the level of internal and external balance, it has been suggested that the equilibrium real effective exchange rate derived from the FEER approach be called "desirable" or desired equilibrium exchange rate (DEER).[2] According to *Williamson (1993),* DEER refers to a concept of the equilibrium exchange rate that is consistent with the underlying macroeconomic balance based upon a set of desired macroeconomic objectives (Achieving desired positions of internal and external balance).[3]

2.The Econometric (Empirical) Approaches:

2.1. The Behavioural Equilibrium Exchange Rate, BEER: *Clark & MacDonald (1997)* proposed a composite model called BEER. The purpose of the latter is less to explain theoretically the determination of the exchange rate than to give an empirical account of its evolution over time. This approach consists in retaining a set of fundamental variables that can influence the real long-term exchange rate (term of trade, labour productivity, oil price, net foreign assets, unemployment rate …etc.) and then look for cointegration relationships between the exchange rate and these variables,[4] in addition to the uncovered interest rate parity (UIP) as an economic fundamental that is assumed to determine the short-term (cyclical) behaviour of the exchange rate.[5]

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[1] Coudert, V. op.cit. p06.

[2] Reza Y. S. (2011). The Concepts of Equilibrium Exchange Rate: A Survey of Literature. The South East Asian Central Banks (SEACEN)-Research and Training Centre. *Staff Paper, 81*, p16.

[3] Williamson, J. (1994). *Estimating Equilibrium Exchange Rates*. Washington: Institute for International Economics, p20.

[4] Bouveret, A. & Sterdyniak, H. op.cit. p251.

[5] International Monetary Fund-Independent Evaluation Office, (2007). The Equilibrium Exchange Rate: Alternative Concepts and Their Applications in IMF Surveillance. *A Backround Document, 03*, Retrieved from the web site: https://asean.elibrary.imf.org/abstract/IMF017/03238-9781589066496/03238-9781589066496/bd05.xml?rskey=LtIfSr&result=1

BEER aims to use a modelling technique that captures the movements in the real exchange rate over time, not only movements in the medium or the long-term equilibrium level. This econometric approach is quite simple to use and gives useful results. But the theoretical basis can be considered underdeveloped and the recent improvements have been mainly econometric and statistical.[1] It considers the equilibrium exchange rate as the level of the real long-run exchange rate which is determined by economic fundamentals. The latter - that influence the evolution of expected future real exchange rates - regroup, among others, the terms of trade, the net external financial flows in addition to the *Balassa-Samuelson* effect. The equilibrium is not normatively imposed, but it is estimated econometrically. The equilibrium exchange rate is then calculated using the estimated coefficients of fundamentals. A major limitation of BEER is that it is not always implemented in a general equilibrium framework,[2] i.e. it does not distinguish between the short-run and long-run values of economic fundamentals.

2.2. The Permanent Equilibrium Exchange Rates (PEER): *Clark & MacDonald (1998)* proposed the Permanent Equilibrium Exchange Rate (PEER) approach which is considered an extension of the BEER but differs from it in the way that the exchange rate is a function only of those variables that have a persistent effect on it.[3]

PEER is based on the consideration of the long-run "sustainable" levels of economic fundamentals, wherein decomposing the real exchange rate into temporary and permanent components is a critical step in the PEER approach under which the difference between the current real exchange rate and the estimated equilibrium real exchange rate is referred to as the total misalignment.[4]

3. The Dynamic Approach (Natural Real Exchange Rate), NATREX: Another concept that is closely related to FEERs is that of NATREX which was developed by *Jerome Stein (1994)* with an interesting distinction between short, medium and long-term. In fact, this model aims at explaining the dynamics of the real exchange rate of the medium to long term. The word "Natural" is used to express the deflated exchange rate of inflation rates, speculative movements

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[1] Saâdaoui, J. op.cit.p15.

[2] Yougbaré, L. op.cit. p209.

[3] Giannellis, N. & Minoas, K. (2009). Behavioural Equilibrium Exchange Rate and Total Misalignment: Evidence from the Euro Exchange Rate. *University of Crete*, p03. Retrieved from the web site: https://economics.soc.uoc.gr/wpa/docs/Giannellis_Koukouritakis_Manuscript.pdf

[4] International Monetary Fund. Independent Evaluation Office. op.cit. p55.

and central bank interventions.[1] The NATREX is the exchange rate that would prevail if speculative and cyclical factors were removed while unemployment was at its natural rate.[2]

In another way, it is the real exchange rate that relates the current account to savings and investment, where these are evaluated at an implicit level by fundamentals, whose fundamentals related to productivity and saving are exogenous. On this basis, this definition is very similar to the notion of medium-term equilibrium registered in the FEER. It would allow achieving the current equilibrium balance independently of cyclical factors and speculative capital flows. The internal balance is supposed to be reached. But, beyond these theoretical foundations, the NATREX estimate is based on a reduced equation that is not clearly related to the original model. As in the case of BEER, the approach is based on econometric techniques with added variables in the short term without clear justification and with a long-term value that can be hardly considered an equilibrium value.[3]

Section 03: The Balance of Payments BoPs

Nowadays, international trade occupies a very important place in economic policy debates, and their importance in the world economic activity is an acquired and proven fact by the history of economic facts and the international relations, so activity and employment are not only the result of domestic demand, but they are also the result of movements of goods, services and capitals between the national economy and its trading partners (Exports and Imports) that could be measured in volume or in value, then recorded in the trade balance and the international transactions (services, insurance, tourism) accounted for in the current account balance, then in the balance of payments.

To better understand the role that the balance of payments in general and trade balance in particular play in an economy, through exchanges with the outside world, we should present some important related concepts.

I. The Concept and Importance of the Balance of Payments BoPs

1. The Concept of the Balance of Payments BoPs: As the Bank of France defines it, the balance of payments is a statistical document presented according to the rules of the accounting in double part which gathers and orders, within a defined framework, all the economic and financial operations, giving rise to transfer of ownership between residents of a country or economic zone

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[1] Usupbeyli, A. (2011). Survol De La Littérature sur Les Modèles de Taux de Change d'Equilibre: Aspects Théoriques et Discussions Comparatives', *Ankara Üniversitesi SBF Dergisi, 66(4),* pp.137-138.

[2] International Monetary Fund. Independent Evaluation Office. op.cit. p55.

[3] Saâdaoui, J. op.cit. p16.

and non-residents during a given period.[1]

According to *Jalladeau, J. & Dorbaire, P. (1998),* the balance of payments is a static state that records, in an accounting firm, all real, financial and monetary asset flows between residents of a country and non-residents, during a given period. The presentation of the balance of payments follows the principle of double entry accounting. This means that the same transaction is counted twice: as a real flow and as a monetary flow, the exact counterpart of this real flow. As a result, a necessary equilibrium of the balance of payments. It is, therefore, the deficit or the surplus of the balance of payments. This is often the sum of the current account balance and the balance of financial flows. [2]

The balance of payments of a country is the statistical record of all economic transactions between residents and the rest of the world.[3]

2. The Importance of the Balance of Payments: The evolution of the balance of payments is still relevant because it is a measure of the commercial performance of any country on the international level, which has repercussions on the foreign exchange markets, it is therefore of particular importance because it is a record of all commercial transactions between the country and the rest of the world in a given year. It also tells us if the country has sufficient foreign currencies to meet all of its commitments abroad.

According to *McCombie, J. S. L.* & *Thirlwall, A. P. ***: « ... If countries wish to grow faster they must first raise the balance of payments constraint on demand. To raise the rate of growth of productive capacity (e.g. by improving productivity) without being able to raise the rate of growth of demand because of the balance of payments will merely lead to unemployment. If the balance of payments equilibrium growth rate can be raised, however, by making exports more attractive and by reducing the income elasticity of demand for imports, demand can be expanded without producing balance of payments difficulties; and, within limits, demand can generate its own supply by encouraging investment, absorbing underemployment, raising productivity growth and so on. Thus, the explanation of growth rate differences must lie primarily in differences in the rate of

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[1] Bank of France. La Balance des Paiements, Établissement et Présentation, *Euro-system, D10-069z, 201.* p01.

[2] Jalladeau, J. & Dorbaire, P. (1998). ***Initiation Pratique à la Macroéconomie*** (2nd ed.). Paris: De-Boeck. p91.

[3] Lecaillon, J. & Lafay, J. D. (1993). ***Analyse Macroéconomique***. Paris: CUJAS edition. p85.

[*] *McCombie, J. S. L*: A companion in economics at Downing College, Cambridge, and a director of the Economic and Public Policy Center in the Department of Land Economics, Cambridge University.

[**] *Thirlwallis, A.P:* Professor of Applied Economics at the University of Kent, UK. He has been a consultant in various government departments and a consultant to several international development organizations.

growth of demand, and the major constraint on the rate of growth of demand in most countries is the balance of payments.[1] It accounts for all commercial, financial and monetary transactions between a given country and the rest of the world during a given period.[2]

3. The Economic Utility of the Balance of Payments:
Since the beginning of the 1990s, the rapid development of financial flows (and singularly of flows intended for the money laundering in the offshore centres) led to a loss of information quality. It becomes more difficult to ensure the coherence of BPs on the international level. Some economists, however, have tried to take advantage of these inconsistencies to encrypt unlisted flows, such as capital flight. The slow rapprochement between BPs and national accounts now allows a strong consistency of concepts and estimation methods. Nevertheless, in the majority of countries, PBs is developed by central banks, whereas it is the statistical institutes that establish national accounts.[3]

The balance of payments is a record of the transactions taking place in the foreign exchange market during a period (month, quarter, or year). It records transactions that result in a change of ownership. It is not a private accounting document, but it traces the transactions that are recorded by administrations and transactions that are estimated, for example, the exports or imports that appear in the balance of payments generally include a raised part when passing through customs, and additional estimates. Also, it should be noted that the balance of payments does not record all the exchange flows between countries since, for example, the transfers of labour force whose economic role is essential, are not recorded. Another example of non-tradable transactions is provided by radio and television broadcasts or services exchanged over the Internet for free, which cross borders and correspond to export of services, but which are not taken into account in the study of the balance of payments.[4]

Among the many dials or indicators that form the dashboard of the economic and monetary policymakers of a country, but also all of the observers, the balance of payments is very prominent, and its importance keeps growing all the time.[5] In fact, the progress of transport, goods, passengers and those, even faster, of means of disseminating information and communications, have significantly reduced the dimensions of our planet and led to a very large opening of our economies

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[1] McCombieis, J. S. L & Thirlwallis, A. P. (2004). *Essays on Balance of Payments Constrained Growth* (1st ed.) London: Routledge. p27.

[2] Caves, L. (2003). *Commerce et Paiements Internationaux* (1st ed.). Paris: De-Boeck diffusion. p330.

[3] Raffinot, M. & Venet, B. (2003). *La Balance des Paiements*. Paris: La découverte, Repères collection. p32.

[4] Yaici, F. (2008). *Précis de Finance Internationale avec Exercices Corrigés*. Algeria : ENAG edition. p53.

[5] Biales, M. & Luerion, P. (2005). *Économie Générale* (3rd ed.). Vanves : Foucher edition. p81.

to the outside world. It is, therefore, a statistical document that, for a given period, summarizes all economic and financial transactions between residents of one country and those of other nations. What makes the balance of payments interesting is not only that it reflects an increasingly important part of the economic and financial activity, but it also includes decomposition into as many lines and sub-scales, as there are natures of operation. It represents an opportunity to evaluate the effects of the devaluation of the currency and thus it shows their impact on the growth or decline of the country's exports because of this devaluation for the private part of the current account in the balance of payments.[1]

4. The Economic Indicators of the Balance of Payments: We can know the economic situation of a state through its balance of payments and through economic indicators that are extracted or deduced from the sub-balances, namely:

4.1. The Coverage Rate (CR): The coverage rate is the proportion of exports X to imports of goods M, namely: *CR = (X/ M) 100* over a certain period. Indeed, the CR indicates the ability of export income to cover payments from imports, If the rate is less than 100, it means that the value of exports does not cover the value of imports, that is why the country must look for other resources to finance its imports; And since foreign trade statistics are made in current value, there are two types of coverage rates, the first in value and the second in volume:

4.1.1. The Coverage Rate in Value: is the proportion of exports to imports, according to the previous formula;

4.1.2. The Coverage Rate in Volume: is the proportion of export volume to import volume, according to the following formula:

CR $_{in\ volume}$ = (export volume/ imports' volume)×100 over a certain period.

When the value of *CR $_{in\ value}$* is higher than the value of *CR $_{in\ volume}$*, for the same period, this means that export prices have improved compared to import prices, which means that the exchange rate has appreciated.

In fact, three concepts of coverage rates will be successively considered. (See the insert n° 02-02 for precise definitions). The most classic, the industrial coverage rate by value. [2]

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[1] عبد الكريم العيساوي. (2012. **(التّمويل الدّولي :مدخل حديث .الأردن: دار صفاء للطّباعة والنّشر والتّوزيع.

[2] Asensio, A. & Mazier, J. (1991). Compétitivité, Avantages Coûts et Hors-coûts et Spécialisation. *Review of 'économie industrielle', 55,* p99.

> **Insert n° 02-01: The Different Indicators of the Industrial Coverage Rate**
>
> • The industrial coverage rate in value is the ratio of exports to imports in manufactured products at current prices
>
> $\quad$ CR $_{value}$ = P$_X$ X/P$_M$ M.
>
> • The Relative Coverage Rate is the ratio of a country's coverage rate (CR $_{value}$) to that of the six major industrialized countries
>
> $\quad$ RCR $_{value}$ = CR $_{value}$ / CR* $_{value}$.
>
> • The same indicators can be calculated at constant prices as follows:
>
> $\quad$ CR = X / M;
> $\quad$ CR $_{value}$ = CR $\times$ (P$_X$/$_{PM}$);
> $\quad$ RCR = CR / CR*.
>
> • The Structural Volume Coverage Rate is the relative volume coverage ratio adjusted for the relative demand effect.
>
> $\quad$ SCR = RCR$\times$ (D/ D*). Where:
>
> $\quad$ D = the domestic demand of the country;
> $\quad$ D* = the domestic demand of the six great countries.
>
> **Source :** Ibid. p101.

4.2. The Dependency Rate (DR): This rate represents the proportion of goods imports M to GDP: *DR = (M / PIB) 100,* as long as this rate is lower, it means that the country does not have a strong dependency abroad;

4.3. The Exportability Rate (ER): This rate represents the proportion of goods exports X to GDP: *ER = (X / GDP) 100,* As long as this rate is higher, the country will have an immense capacity to rely on the export sector;

4.4. The Rate of Capacity to Pay Imports CPM: This rate is evaluated by the number of days, as long as it is lower, it means that the country is able to pay their imports' invoice as soon as possible and it is better not to exceed 90 days [1], it is calculated by the proportion of foreign exchange reserves FER to goods imports M: *CPM = (FER / M) 360jours;*

4.5. The relationship between the Current Account Deficit and GDP: The relationship, between the current account balance and GDP, is expressed by the following equation: Boc/ GDP, where: Boc represents the balance of the current account. Generally, if this rate is equal to 5% it

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[1] Benmerzouka, T. & Mongi, S. (1994). *Monnaie et Finance Internationales*. Paris: Harmattan edition, p22.

will be normal according to the experts' opinions but if it exceeds 5%, the economic situation will be a little disturbed where the funding reserves in this country require borrowing.[1]

4.6. The Import Penetration Rate (PR): Competition can be measured by the domestic market by knowing the ratio of domestic guarantee demand for imported goods or that of local goods, so the penetration rate of the domestic market is the share of products purchased from abroad (imports) on the domestic market consumption expressed in domestic demand (local production + (Imports-Exports)): *PR = Imports / (Production+ Imports-Exports).*

These economic indices extracted from the secondary balances of the balance of payments accounts enable us to know the economic situation of the country, but the balance of payments is not always in equilibrium, and if it is considered in equilibrium on the accounting side according to the double registration principle, it will not be in equilibrium on the economic side. The deficit in the trade balance is not necessarily bad, as well as the excess is not necessarily good. [2]

II. The Structure of the Balance of Payments:

The balance of payments breaks down into five main categories: the current account, the capital account and financial transactions, the reserve account and errors and omissions. Let's take a look at each of these accounts.

1. The Current Account (The Current Balance): This account groups the following transactions:

1.1. Goods and Services: The goods component refers to goods and the balance of their international transactions is called *the trade balance*, which is equal to the difference between exports and imports. The current account, therefore, traces the "real" transactions, in contrast to "financial" transactions. The real transactions are considered more stable than financial transactions.

The country's exports of goods and services depend positively on the income of the rest of the world. When foreign income increases, the demand for domestic products tends to increase, all other things being equal. This leads to an increase in domestic exports. Symmetrically, the increase in domestic income implies an increase in imports. A country's exports and imports also depend on the level of the real exchange rate, which approximates the competitiveness of domestic products. When the real exchange rate appreciates, domestic goods are more

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[1] Ibid. p21.

[2] موردخاي كريانين. مرجع سابق، ص248.

expensive for foreign buyers. Consequently a loss of competitiveness that rattles exports of domestic products (and favours imports), thus, exports decline with the increase of the real exchange rate, the analysis of the trade balance is often conducted in terms of competitiveness: if there is a deficit, it is because the non-residents do not want to buy domestic products, or because the residents prefer to buy foreign products. The real exchange rate is not the only indicator of the domestic products' competitiveness.

1.2. The Trade Balance: It is also determined by the terms of trade (the relationship between export prices and import prices). In commodity-exporting developing countries, the imbalance of the trade balance is often the result of a sudden change in the terms of trade. There are also changes of this type in the industrialized countries (oil shocks). The difference between the two types of countries is that the deficit resulting from a shock in the terms of trade in the industrialized countries tends to be absorbed in the medium term by substitution effects, whereas many rigidities make the developing economies not flexible, that is to say, little able to change their specialization, in the short and medium term. In addition to considerations of competitiveness, the current account balance depends positively on foreign income and negatively on domestic income. As for the impact of a change in the real exchange rate, it is indeterminate.[1]

The services cover several categories including, among others: transport (goods and passengers), travel, communication services between residents and non-residents (postal services, telecommunications), building and public works services including consulting engineering, insurance services, financial services, computer services, royalties and license fees, other business services (international trade, other trade-related services), personal services, cultural and leisure activities, and finally services provided or received by the government, not elsewhere classified. Although this nomenclature of services appears a priori little varied, a few countries report data at such a detailed level.

It is observed that the registration of services poses several problems, among which: definition (the same denominations do not always cover the same activities); the mixed transaction issues (a value that is not known directly but aggregated to other transactions) and the problems identifying gross flows (transactions between related companies are settled by a clearing mechanism).

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[1] Raffinot, M. & Venet, B. op.cit. pp.52-55.

The investment income category includes compensation of employees (income of frontier workers, seasonal and other non-resident workers such as embassy staff), investment income of which receipts and payments for direct investment or portfolio (dividends, profits of subsidiaries, associates and branches, investment interest income) made abroad or that non-residents derive from the country; with regard to transfers, there are two types: the current transfer and capital transfer- this later is recorded in the capital account and financial transactions. What is the current transfer?

Current transfers are subdivided into two groups, the first is transfers from public administrations (food donations, clothing, medicines, cash to other governments, contributions to international organizations, transactions between the government and non-residents such as taxes, union dues, social benefits, pension benefits) and other transfers (remittances from immigrant workers, food donations, medicines, contributions to charitable organizations, religious... etc.). The second major category of the balance of payments is the capital account and financial transactions. The first part of this group, the capital account, comprises two main sub-categories: transfers of capital, acquisition or disposal of non-financial, non-produced assets.

1.3. Investment Income; and

1.4. Current Transfers.

2. The Financial Transactions' Account: It is more complex and more difficult to identify. Generally, any transaction that gives a monetary right over a foreign country is credited or debited. Three main items appear in the financial account: direct investment (DI), portfolio investment and other investments. The reserve account or the official reserves under the control of the monetary authorities (Central bank) has, among other functions, to correct the imbalances of payments and serve as a means of intervention in foreign exchange markets in order to influence the evolution of exchange rates. This account consists of monetary gold, SDRs (Special Drawing Rights), IMF's reserve position, foreign currency holdings in various forms, including currencies, bank deposits, bonds and other borrowing securities, derived products and money market investments.

3. Error and Omission: Finally, the last element of the balance of payments is 'error and omission'. It reflects the difficulty of estimating the accounts, in particular, the capital account and the financial transactions, and the non-respect of the double-entry writing system. It is possible to question the rationality of this mode of writing. First, it is important to note that, according to its name, the balance of payments account is intended to record a balance of

payments of residents of an economy to foreigners and foreign receipts.[1]

Insert n° 02-02: The Structure of the Balance of Payments

	Credits	Debits

I Current Account
    1. Good.
Balance: Trade balance
    2. Services
    3. Revenues
    4. Current transfers
Balance: Current Account Balance

II Capital Account & Financial Transactions
    5. Capital account
    6. Direct Investments
    7. Portfolio Investments
    8. Other investments
Balance: Capital Account Balance & Financial Transactions

III Error & omissions
    9. Erreurs et omissions
Balance: Global Balance

IV Reserves Holdings
    10. Change in reserves

Source: Ibid. p12.

In general, a negative current account reflects a lack of the economy's international competitiveness in the production of goods and services or over-indebtedness. In addition, it should be emphasized that capital account transactions (acquisition or disposal of non-financial non-produced assets) and the financial transactions account (particularly FDI and portfolio) result in payments or dividend income and interest income, which are accounted for in the income item of the current account. The "current" account comes to mean 'definitive' even if the notion may be contrary or at least unrelated to its first and common understanding; "definitive", therefore in a year. This notion of definitive temporality contrasts it with the capital and financial account that is important and has recurrent effects: a surplus in the capital and financial account implies an obligation to reimburse later.

It is possible to assess if a country is a net creditor or a net debtor concerning the rest of the world. The link between the two statements of the account passes through the capital account and financial transactions, as well as by the reserve assets. More precisely, the international

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[1] Nyahoho, E. (2002). ***Finances Internationales Théorie Politique et Pratique***. (2nd ed.). Canada: Quebec University Press. pp. 07-11.

investment position reflects the state of asset stock and external financial liabilities.

III. The balance of Trade and its Relationship to the Exchange Rate:

Political and economic authorities have many tools on which they rely when they draw their economic, financial and monetary policies, thus, the trade balance is one of these tools and a very important criterion for measuring several economic indicators as well as it is a very important account in the balance of payments and it reflects the most important international economic relations.

The trade balance is the most important element in a country's balance of payments and can be called the international trade balance of that country.[1] Moreover, their importance comes from the role that exports play in motivating or discouraging economic development, it all depends on these exports structure that is used to create work opportunities, to reform the balance of payments deficit, to achieve growth rates and attract local and foreign investment, if diversified.

1. The Balance of Trade Concept: This balance traces, on the one hand, the exports that appear on the credit and ensure the return of foreign currency, on the other hand, the imports that appear on the debit side and lead to the exit of currencies. The trade balance measures the competitiveness of a country against these competitors. For example, a positive trade balance shows a high-performing industry or a particularly efficient trading network. The trade balance also provides *the foreign trade coverage rate*, that is, the ratio of exports to imports. This rate indicates the extent to which imports are covered by exports (100% balance). The trade balance of goods and services shows the difference between exports of goods and services and imports of goods and services. A positive balance indicates that exports exceed imports by value (*trade surplus*). On the contrary, a negative balance indicates that imports exceed exports by value (*trade deficit*). [2]

It is also called the balance of goods or the balance of visible trade because it depends on the trade of goods i.e. the export and import of goods in a definite period, it is the most important in the current account, as it is the most traditional form that remains the main form of the economic relationship between countries, and it is the difference between the value of exports and the value of imports where the exported goods are credited (+) in the current account because they require foreigners to pay for payments to residents in the country, but imported goods are recorded as

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[1] مشهور هذلول بربور. (2008). العوامل المؤثّرة في انتقال أثر أسعار صرف العملات الأجنبية على مؤشّر الأسعار في الأردن1985 .'2006- رسالة مقدّمة لنيل شهادة دكتوراه فلسفة، تخصّص مصارف، ص09.

[2] The World Bank web site: www.worldbank.org/

debtors (-) in the same account as they require the residents in the country to remunerate payments abroad. [1]

The trade balance, as it is known, is one of the three special balances that constitute the balance of payments of each country, it reflects the capacity of a country's economy to produce in international competitive conditions and constitutes the main criterion in the estimation of the situation of the national economy in the international economic community.[2]

The trade balance records payments resulting from the sale of products only to and from abroad in the form of exports and imports of visible goods, where export performance is recorded in the credit side of the trade balance, while imports are recorded payments in the debit side. we cannot say that the surplus in the trade balance is favourable for the country or that the deficit of the trade balance is unfavourable for it, we must know the relative importance of the trade balance in relation to the current account, thus the economic conditions that the registration in which the surplus or the deficit trains, but one can say that there are other elements of the exports and imports, such as tourism activity or the performance of certain types of services such as shipping, return on investment abroad. In such cases, the surplus of the invisible trade balance may help cover some or the entire deficit, but some countries that rely primarily on invisible trade will not make the right decision if they try to pursue a policy aimed at achieving a surplus in the trade balance. This policy will not be favourable because they can resort to restricting imports of foreign goods and encourage certain exports of goods that cannot compete in the global market to implement the target.[3]

The trade balance includes exports and imports of goods (in credit and debit respectively). These are movements of goods that are the subject of a transfer of ownership from a resident to a non-resident. [4]

The trade balance is equal to the difference between exports and imports. As exports decline with the increase in the real exchange rate, the analysis of the trade balance is often conducted in terms of competitiveness: if there is a deficit, it is because the non-residents do not wish to acquire domestic products, or that the residents prefer to buy foreign products.

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[1] سيّد طه بدوي. مرجع سابق، ص24.

[2] Sotiris I. A. (1989). *Les Problèmes Structurels De La Balance Commerciale de La Grèce*. Prof. Emeritus, a paper presented to the Congress of the International Association of French language Economists, June 1-4th 1989, Belgradep123.

[3] ميرندا زغلول رزق. (2010 .(*التّجارة الدّولية* .مصر: جامعة الزّقازيق،ص ص69-70.-

[4] Raffinot, M. & Venet, B. op.cit. p20.

The real exchange rate is not the only indicator of the competitiveness of domestic products.[1] The trade balance is also determined by the terms of trade (the ratio of export prices to import prices).

The balance of the trade balance is also determined by the terms of trade (the ratio of export prices to import prices). In developing countries exporting raw materials, the imbalance of the trade balance is often the result of a sudden change in the terms of trade. There are also changes of this type in the industrialized countries (oil shocks). The difference between the two types of countries is that the deficit resulting from a shock in the terms of trade in the industrialized countries tends to be absorbed in the medium term by substitution effects, whereas a lot of rigidity makes developing economies inflexible to change their specialization in the short and medium term.[2]

2. The Relation of the Trade Balance with Macroeconomics:[3] Through the following equation that achieved equality between resources and uses in the economy:

$Y - (C + I) = (X - M)$, that is $Y = (C + I) + (X - M)$……………………………(2.21) where:

 Y Production representing the gross domestic product at market prices over a certain period;
 C Private and public domestic consumption; I Public and private domestic investments;
 X Exports of goods; M Imports of goods;
 C + I Internal uses denoted by el;

Y-el=X-M ……………………………………………………….………………(2.22) Where:

 Y-el The deficit or the surplus of the domestic production; X-M   The trade balance (the foreign trade sector).

If the country has recorded a surplus of GDP, Y-el> 0, this means that internal uses are fully covered by a part of GDP and the rest (the surplus) will be oriented to export, which explains the positive balance of the trade balance, in this case, X-M> 0 but if there was a deficit in the coverage of internal uses Y-el <0, the country will resort to importing, which explains the negative balance of the trade balance in this case X-M = 0. In short, if the exports' values are higher than those of imports, the balance will record a surplus but a deficit in the opposite case. It is noteworthy that

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[1] Ibid. p53.

[2] Ibid. p54.

[3] Benmerzouka, T. & Mongi, S. op.cit. p33.

the exchange rate is one of its main determinants because the currency value can appreciate when a single unit of the national currency is equal to several units of the currency of other countries.[1]

As well as exports and imports have a direct effect on a country's exchange rate that must be at its ideal level when the current account balance stabilizes. When a country imports a product, the payment will be in the foreign currency of the product's exporting country, so the importing country buys the foreign currency of the exporting country and sells their national currency, therefore any change in economic transactions (import or export) leads to a change in the exchange rate. If the trade balance is in a deficit (M>X), the demand for the foreign currency exceeds their supply, in such a case, the local currency tends to depreciate against the other currencies used in trade, Conversely, if the trade balance is surplus (M<X) the supply of the foreign currency exceeds their demand for, in this case, the local currency tends to appreciate or re-evaluate, but in spite of that, the weakness of the national currency allowed the country to export more and consequently the foreign currency will appreciate again as well as the power of this one allowed them to less export and consequently the foreign currency will depreciate.[2]

3. The Relation of Trade Balance with Exchange Rate: In order to measure trade with the outside world, the tool that seems the most appropriate remains the trade balance. The economic literature tells us that the Real Effective Exchange Rate has an effect on the trade balance.[3] Thus, a good real exchange rate policy can, in the short or long-run, improve the trade balance of countries' competitiveness in the global market. This last point is ideal of any nation, in general, and African countries in particular.[4]

As far as theories are concerned, it must be said that there are several theoretical approaches to the trade balance and its relation to exchange rate fluctuations. Thus, they explained the determining factors of the exchange rate of a currency. Some have even claimed that a low value of the national currency is a good situation for foreign trade that translates into the balance of payments.[5]

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[1] تومي صالح. (2004) *مبادئ التَّحليل الاقتصادي*. الجزائر: دار أسامة للإنتاج والطّباعة والنّشر، ص205.

[2] عبد الجليل هجيرة. (2012-2011) .أثر تغيرات سعر الصّرف على الميزان التّجاري، دراسة حالة الجزائر. رسالة تدخل ضمن متطلّبات نيل شهادة الماجستير، كلّية العلوم الاقتصادية وعلوم التّسيير، جامعة تلمسان، الجزائر، ص98.

[3] Sorel Francine & al. (2012). The Impact of Real Exchange Rates on the Trade Balance: The Case of Gabon. Sub-regional Institute for Statistics and Applied Economics (ISSEA), *MPRA Working Paper, 38606*, p11.

[4] Ibid. p04.

[5] هوشيار معروف. مرجع سابق، ص328.

Three theoretical approaches will have caught our attention. These are the price approach through the exchange rate, that is, *Johan Robinson*'s elasticity theory; the absorption theory and the *Mundell-Fleming* model

3.1. The Theory of Elasticities and the *J-curve*:

3.1.1. The *J-curve*: The international payment system established at *Bretton Woods* in 1944 is based on fixed exchange rates. The national currencies in this system have an exchange rate defined by reference to gold and dollars; this rate cannot come out of a very small range of fluctuation around the official parity. Even in such a system, there is a case where the parity has to be modified: that is the one where an imbalance in the trade balance is manifest (or the balance of payments) which does not tend to resolve spontaneously. Either, a deficit; why then change the exchange rate? Because such an operation must affect the prices of imports and exports; thus, a devaluation of the national currency must increase the first and decrease the second, modifying the traded volumes and restoring the balance of flows. It is essential to clarify the reasoning that traditionally allows achieving this result. Implicitly, it is assumed that firms set their prices in their national currency.[1]

The assumption of perfect price flexibility is at the centre of this model, which is rarely the case. It is observed that for many goods, export contracts are signed for a specified period so that the quantity does not adjust to price fluctuations if the contract allows variations. We thus evoke the hypothesis of the J-curve.

Figure n° 02-04: Hypothesis of the *J-curve*
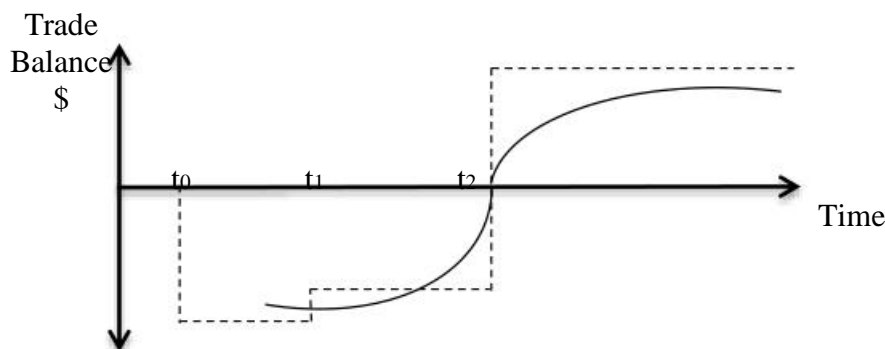
Source: Nyahoho, E. op.cit. p48.

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[1] Rainelli, M. (2003). *Le commerce international* **(9th ed.).** Paris: la Découverte. p86.

At a time t_0, where the devaluation is announced (Figure n° 02-04), exports do not increase in value for the reasons explained above, while imports become more expensive. The trade balance is deteriorating. From a certain time, i.e. t_1, the contracts are renegotiable and the trade balance improves to be positive at the time t_2, increasing afterwards to a limited point. When the good is sold abroad, its price, taking into account transportation costs and customs tariff, remains the same: it is simply converted into the foreign currency at the current exchange rate.

With specific assumptions about how domestic and foreign demand responds in terms of price changes (i.e. Price elasticities of demand), the result stated above is established: the devaluation allows the balance of trade to restore its balance through its action on the amounts imported and exported. During the fixed exchange period, Attention has turned to the conditions to ensure the success of devaluation, in particular, the appropriate rate and necessary accompanying measures. These are key points negotiated with the IMF and major trading partners, who want to avoid the excessive devaluation that would provide the country taking the initiative with a too pronounced advantage. The accompanying measures are guided by two imperatives: to avoid the chain of the inflationary process resulting from higher import prices and to limit domestic demand in order to generate the productive capacity to respond to the increase in external orders. However, the impact of the devaluations on the trade flows is not always in line with the expectations of governments. There are, indeed, additional imports, whose volume does not decrease following the devaluation. Moreover, the reaction of exports to the change in parities has been frequently slower than the increase in the value of imports. This can give rise to a phenomenon that is often commented on and popularized as the *J-curve*.[1]

Figure n° 02- 05: *The J-Curve*
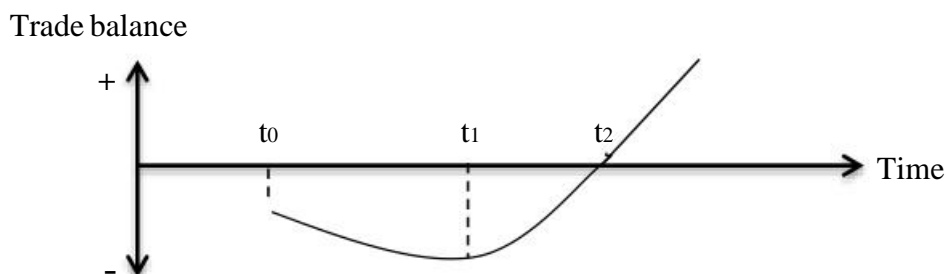
Source: Ibid. p87

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[1] Ibid. p87.

According to the previous Figure, a devaluation intervening at the moment t_0, the trade balance will deteriorate until the moment t_1, the effects of price changes. The time between t_0 and t_1 is a result of the time required for foreign consumers to react to the drop in prices of products exported by the devaluing country. The equilibrium of the trade balance will only be reached at the time t_2. Numerous applied works devoted to most countries have shown that *J-curves* cannot be really identified. It is decisive, for the sequences proceed as planned, that the devaluation occurs while the trade balance is close to equilibrium. In the opposite case, the positive slope part of the J curve may not exist; such phenomena are quite conceivable in a flexible exchange-rate system. The originality of the flexible exchange rate is, theoretically, that the public authorities do not intervene to maintain a parity of the national currency.[1]

The principles of such a system are very different from those previously described. Firstly, the absence of a common reference, since currencies are no longer defined against the dollar and gold, means that a currency may simultaneously depreciate against certain currencies and appreciate against others.   Concretely, this is the case of the French franc and several other European currencies, which in 1986 and 1987 appreciated against the dollar and depreciated against the Deutschmark. These movements make it much more complex to assess the precise effects of a change in parities that was not the case at the time of devaluation.

Secondly, it is no longer possible to eliminate the existence of vicious circles, that is, of processes in which depreciation leads to such aggravation of the trade deficit that it produces a further depreciation of the national currency and so on. There is then a succession of negatively sloping portions of the *J - curve*. Thus, at times t1 and t2, the trade balance does not improve but, on the contrary, sinks more and more in the negative values. These phenomena occur if the structure of the country's exports and imports is such that price movements have little impact on trade flows: this is the problem of the quality of international specialization. The more the domestic imports are complementary to the country's production, as when the production goods are bought abroad, the more likely the vicious circle is. It can be seen first that the impact of changes in the exchange rate is very slow to manifest; mostly, a fine analysis calls into question its relevance: the appreciation of

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[1] Ibid. p88.

the yen against the dollar did not prevent Japanese exports to the United States from increasing. [1]

Figure n° 02-06: The Vicious Circle of Depreciations
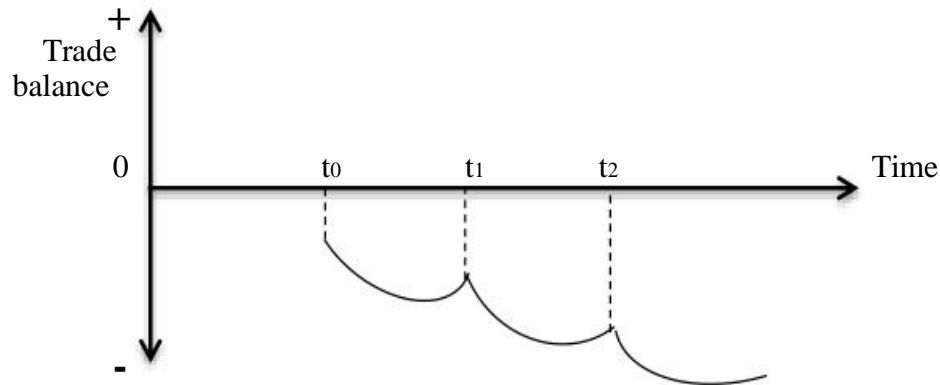
Source: Ibid. p89.

It is, therefore, necessary to relativize the scope of the usual reasoning relating to the impact of a change in the exchange rate on trade. One of the reasons, for these paradoxical results, is to be sought in pricing practices by exporting firms.

3.1.2. The Theory of Elasticities:[2] Before the theory of elasticities, it was only the evolution of non-financial variables (goods and services) that accounted for variations in the trade balance. Subsequently, it was necessary to introduce the price variable, one of whose manifestations operated through the exchange rate. Then, the theory of elasticities came that was developed by *Johan Robinson (1937)*. This approach attempts to find the conditions for which a change in the exchange rate can affect the balance of payments and consequently the trade balance. Before dealing with these conditions, let us first introduce the basic model.

3.1.2.1.Model Hypothesis: The elasticity model has four basic assumptions:

a. Only the elasticities of demand for products in relation to the price are taken into account;

b. The trade balance is supposed to be in balance before any exchange rate adjustment is made;

c. The monetary effects of the change in the exchange rate are not taken into consideration;

d. The elasticities of export supply, imports, foreign goods competing with domestic products and domestic goods competing with foreign products are hypothetically infinite.

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[1] Ibid. p89.

[2] Sorel Francine & al. op.cit. p06.

3.1.3. The Theorem of Critical Elasticities: Among the factors of competitiveness, price plays a leading role. Price flexibility helps correct imbalances in both the goods and money markets. At the international level, prices of goods and services incorporate exchange rates. Thus, as a result of a balance of payments deficit, the national currency depreciates, lowering export prices and increasing import prices. The country then sees its exports increase and its imports decrease, because becoming more expensive, resulting in a reduction of the initial deficit. This adjustment mechanism, in accordance with the law of supply and demand, leads countries to adopt a discretionary devaluation policy in the hope of hastening account imbalance corrections. However, the expected positive effect of this devaluation depends on a number of conditions that have been the subject of many studies. The work of the great economist *Alfred Marshall* later picked up by *Joan Robinson*, *Fritz Machlup* and *Abba Lerner*, illuminates this point. The analysis of these various authors consists in examining the elasticities of supply and demand for exports and imports, that is, the sensitivity of quantitative variation as a function of price changes.

Intuitively, devaluation, resulting from lower prices for export products, will have a real impact only to the extent that foreign demand and domestic supply justify it. In other words, it is necessary not only that the foreign consumers react favourably to falling prices, but also that domestic producers have the production capacity necessary to meet this additional demand increase. In the market for imported products, devaluation will have the desired effect if it discourages the local consumption of these products (elastic demand) and if it does not encourage foreign production (inelastic supply). (Figure 02-02).[1]

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[1] Nyahoho, E. op.cit. p46.

Figure n° 02- 07: Demand-Supply Curves of Exporting and Importing
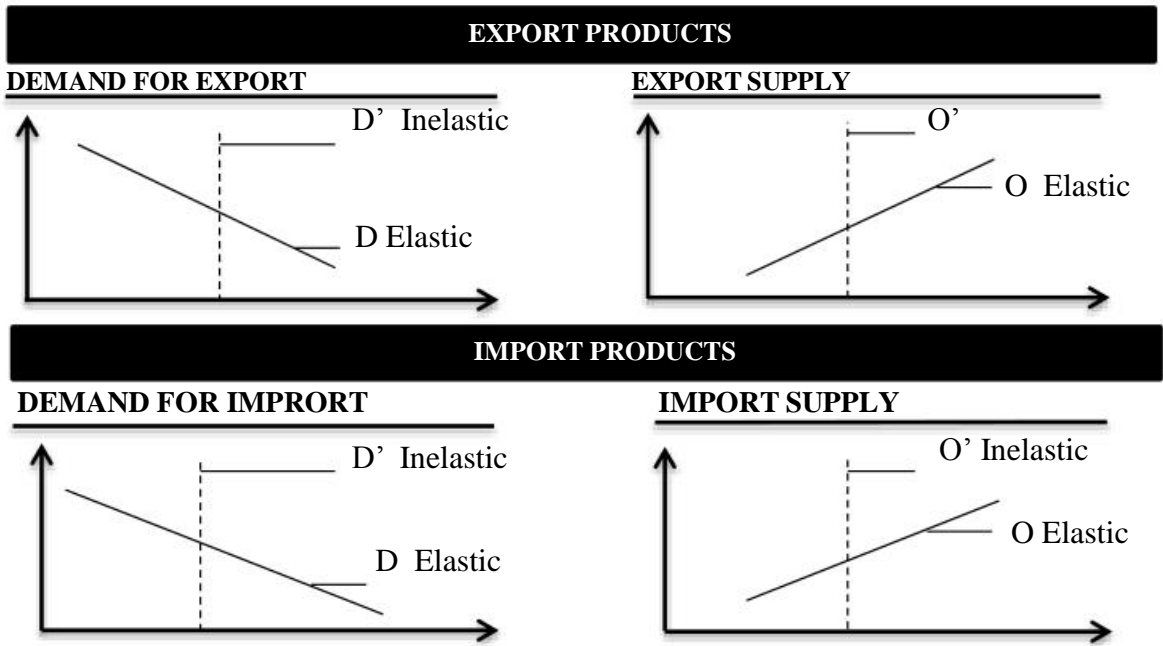
Source: Nyahoho, E. op.cit. p47.

Therefore, to ensure that exchange rate fluctuations have an impact on the trade balance if this later were initially in equilibrium, the sum of the critical export and import elasticities must be greater than 1: *it is the theorem of critical elasticities or condition of Marshall-Lerner,* which is stated mathematically as follows:[1]

$$[E_X(N_X - 1)]/[(E_X + N_X)] + \frac{N_M(1+E_M)}{E_M + N_M} > 0 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots(2.23) \text{ where}$$

e   The exchange rate $= (P_X/P_{X*}) = (P_M/P_{M*})$;   * Foreign;

P_X The export price of X;

P_M The Import Price of M;

X   The quantity of exported products;

M   The quantity of exported products;

E_X The export supply elasticity: $\Delta X\%/\Delta P_X\%$;

N_X The elasticity of demand for export: $-\Delta X\%/\Delta P_{*X}\%$;

E_M The import supply elasticity: $\Delta M\%/\Delta P_{*M}\%$; and

N_M The elasticity of demand for import: $-\Delta M\%/\Delta P_M\%$.

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[1] Ibid. p48.

As well as export and import supplies would be very elastic (case of the industrialized countries), the relation (2.23) becomes (the elasticities thus defined being positive):

$N_X + N_M > 1$…………………………………………………………………..…......... (2.24)

The identity (2.24) means that the devaluation only improves the trade balance if export and import demands are elastic enough. In the case of small countries, export demand and import supply are very elastic ($-E_M > \infty$, $-N_X > \infty$). In these cases, the limit of (2.23) is therefore reduced to this:

$E_X + N_M > 0$……………………………..……….…………………………..…………… (2.25)

In fact, it is accepted that the rest of the world has a production capacity that can meet the demands of a small country. The identity (2.25) shows that a small country necessarily improves its trade balance by devaluation since the two terms of the equation are positive.

If the trade balance is not in equilibrium before the exchange rate adjustment, then the trade balance improves following devaluation or a depreciation of the exchange rate if the sum of export and import price elasticities is greater than 1 with an export elasticity weighted by the ratio of the exports to the imports in national currency.

These conclusions could be generalized in all cases where there is a change in the exchange rate, which means that there is depreciation (devaluation) or appreciation (revaluation) of a currency. Thus, in the case of an appreciation or revaluation of a currency, the trade balance will be substantially modified only if *Marshall-Lerner*'s conditions are respected, both for an assumed initial equilibrium and for an initial disequilibrium. If these conditions are verified, an appreciation of the national currency is likely to affect the commercial balance as follows: An appreciation of the exchange rate of the national currency will imply an increase in the export price in foreign currency, which is likely to discourage exports and have a negative impact on the trade balance. On the other hand, the appreciation of the exchange rate of the national currency will make the foreign exchange currencies cheaper and in turn the prices of imported goods. This can encourage imports and thus deteriorate the trade balance. *''... La surévaluation de la monnaie est en effet une subvention à la consommation de produits importés et un impôt sur la production national...''* [1]

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[1] Sorel Francine & al. op.cit. p06.

In conclusion, the elasticity approach establishes that the devaluation improves the trade balance provided that the *Marshall-Lerner* condition is respected, that is, the sum of elasticities and prices of export and import requests, is greater than unity.[1]

3.2. The Theory of Absorption: This theory was developed in 1952 by *Alexander Sidney*, an employee of the International Monetary Fund. He considers that the elasticity approach is a simple way of looking at things, not that the elasticities are weak, but that the devaluation has repercussions on consumer spending. Specifically, the devaluation has a dual impact: first on national income and then, through the income effect on expenditures.[2]

3.2.1. Model of Absorption Theory: From the point of view of price, a depreciation of the national currency would lead to a greater demand for local products (imported goods costing more than before depreciation) at the expense of imported products. This cannot reduce the absorption costs, which are then subject to a modification of allocation linked to the domestic or foreign origin of the purchased products. On the other hand, absorption can be reduced by an internal situation that has affected prices such as inflation. Indeed, if there is inflation, the purchasing power of consumers will be eroded to lower their absorption capacity.[3]   In the absorption theory, the variables are Exportations (X), Importations (M), National revenue or total production of goods (N), Trade balance (B = X − M) and the domestic absorption (A). [4]

In an economy where the goods market is in equilibrium, the production of non-exported goods is equal to the use of non-imported goods. This is explained by:

B = (exportations + production of non-exported goods) - (importations + use of non-imported goods); or,
(Exportations + production of non-exported goods) = Y = total production of goods or national revenue;

(Importations + use of non-imported goods) = total quantity of used products in the economy = Consumption + Investment + government spending= A.

Thus, the trade balance can be rewritten under the form:

B = Y – A……………………………………….…………………………….…………….. (2.26)

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[1] Nyahoho, E. op.cit. p47.

[2] Ibid. p48

[3] Sorel Francine & al. op.cit. p08.

[4] Ibid. p07.

The observation is that according to this theory, the trade balance can improve if the national income (GDP) Y increases faster than the absorption A or if the absorption decreases faster than the income, i.e.:

$\Delta BC = \Delta Y - \Delta A$ …………………………………..……………………………….. (2.27)

The trade balance is a surplus (deficit) if the national income is higher (lower) than the absorption. And for a devaluation to improve the trade balance, it has to increase the national income (ΔY) or decreases the absorption (ΔA). The change in absorption expenditures has two components; one is attributable to income and the other is self - sustaining.

$\Delta A = c\Delta Y + Ad$……………………………………………….………..…… (2.28), where:

 c The marginal propensity to consume, supposed fixed;
 Ad The autonomous and independent expenditures of revenue.

Substituting (2.28) in (2.27), and after the transformation, we obtain:

$\Delta BC = (1 - c)\, \Delta Y - Ad$ ………………………..…………….…..……………...…...… (2.29)

From this identity (2.29), *Alexander* demonstrates that the favourable effect of a devaluation remains conditional, on the one hand, not only to the *Marshall-Lerner*'s statement for an increase in income Y driven by exports but also that the marginal propensity to consume (c) is low. On the other hand, devaluation should be able to lead to a fall in autonomous expenditure (Ad). This second effect is usually considered when the devaluation causes a rise in prices, which decreases the real money supply and leads to a decrease in consumption. When the economy is in full employment, income cannot be increased by the devaluation policy. The current account deficit must, therefore, in this full employment situation, be corrected by restrictive monetary and fiscal policies, in order to reduce consumer spending.

The absorption approach is at the root of the IMF's structural adjustment programs for developing countries, which are struggling with payment difficulties. It should be noted that the absorption approach also relies on the assumption of price flexibility and automatic adjustment of demand, an assumption that the facts seem to contradict. Moreover, the explanation of a deterioration of the balance of payments by consumption expenditure higher than a national product does not recognize external shocks as sources of imbalance. It is noteworthy that the elasticity and absorption approaches highlight the importance of export and import demand elasticities, but they are based on the often-held assumption of price flexibility and automatic market adjustment. The Keynesian-inspired model emphasizes the

incompatibility of the internal and external objectives of economic management. However, its assumption of exogeneity of exports is hardly attractive.

3.2.2. *Mundell-Fleming's* Model: This model was developed in 1962 by *Mundell Fleming* to analyse how the external and labour market equilibrium both can be achieved by using adequate economic and monetary policies. In this case, the external balance ceases to consider only the trade balance, but it combines the latter with the capital balance.[1] It adapts to a small open economy directed at rectification during a year and relies on the short-term analysis where the price and wage levels are fixed.[2]

The determinants of a country's export (X) are the activity level of the rest of the world which can be illustrated by the gross domestic product of the rest of the world, denoted by; the real effective exchange rate because the foreign buyers have to compare the prices of goods and services purchased abroad with the domestic prices of the same goods and services. Thus, exports also depend on the ratio of internal and external prices and therefore, on the real effective exchange rate noted by REER. In addition, more internal prices increase, more the demand for domestic products from abroad can decrease. In another aspect, if the NEER increases, the REER may also grow and slow down foreign demand, as more foreign currency units must be disbursed for one unit of national currency.[3] In conclusion, exports are a decreasing function of the REER. Thus, it can be written as follows:

$X = X (Y ', REER)$ ………………………………………………………………. (2.30) with:

$REER = e*P / P'*$;

P, P'   respectively represent the level of domestic and foreign prices; and

e   The exchange rate under the certainty that is the number of foreign currency units for a unit of national currency.

The determinants of importations (M) of a country are:

3.2.2.1. The Level of Domestic Activity represented by the domestic GDP and denoted Y. Indeed, the higher the level of domestic activity, the more the economy needs to import to cope with the increase in domestic demand. The level of domestic activity is therefore positively correlated with imports;

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[1] Ibid. pp. 08-09.

[2] هوشيار معروف. مرجع سابق، ص329.

[3] Ibid. pp. 08-09.

3.2.2.2. The REER: in fact, the higher the prices abroad, relative to domestic prices, the lower the REER and import demand too. Imports are therefore an increasing function of the REER. It can be written as follows: $M = M (Y, REER);$

3.2.2.3. The Trade Balance: given by $B = (eP)* X-PM$. With $dB/de>0$ in the case of depreciation (e decreases and is under certainty) or then $dB /de<0$ for an appreciation (e increases). These last two relationships imply that the *Marshall-Lerner* conditions are verified.

3.3. The Options of Equilibrium, Fixing or Floating: The choice between the fixed and flexible exchange-rate systems, as a mechanism to reach the equilibrium of the balance, represents a debate where adopting a floating system requires a set of requirements including a developed financial market and a flexible production base that is capable to respond rapidly to the changes in the exchange rate, that's why the majority of countries classified by the International Monetary Fund having a freely floated currency are among the economically developed countries.

In the international context, it is difficult to return to a fixed exchange rate system and should not be adopted by the states, regardless of the conditions of each country and the stage of growth recorded, In general we must admit that the two systems have failed to find solutions to the problems of international economic system from which emerged the intellectual environment that resulted from the current exchange-rate system arrangements, by attempting to find an appropriate degree of compatibility between the criteria of determination and selection of the appropriate system capable of achieving equilibrium and stability of the balance of payments, and between the circumstances of the country and the specificity of their economic experience.[1]

3.3.1. The Economic Implications of the Exchange Instability:[2] The exchange instability influences the economic performances by acting on the agents' behaviours, which leads to the disruption of the investment decisions and to weaken the trade and foreign direct investment.

3.3.1.1. An Effect on Trade: The instability of the exchange rate, increasing the risk of exchange, will have a negative effect on trade. More significant fluctuations of the exchange rate lead the producers to divert their activities' interests that are intended to satisfy foreign demand for the benefit of domestic activities. In this respect, *Grainw, P. (1993)* argues that the variability of the real exchange rate has a negative effect on the growth rate of trade. Furthermore, if the domestic producers are very sensitive to risk, the increased exchange's

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[1] الهيتي نوزاد ومحمّد عبد اللّطيف الخشالي. (2007). *مقدّمة في المالية الدّولية* الطّبعة الأولى. (الأردن: دار المناهج للنّشر والتّوزيع، ص61.

[2] Ben Abdallah, M. & Drine, I. (1999) .*Taux de Change Réel et Fluctuations Économiques: cas de la Tunisie*. 3rd Euro-Mediterranean Meeting, pp. 04-05.

risk reduced the marginal utility of exports. This decline of the exports' relative utility compared to the domestic activities (less risky) tends to reduce trade;

3.3.1.2. An Effect on Foreign Direct Investment: The exchange rate variability influences the investment choices of multinational firms. Indeed, when investors are risk averse, they choose to settle in countries where the currency risk is lower; and

3.3.1.3. The Allocation Effect: The exchange fluctuations affect the relative price of tradables and thus affecting the profitability of the sector exposed to foreign trade. The resulting reallocation of resources could be negative for growth. Indeed, (*Dollar, D., 1992*) says that an optimum level (compatible with external and internal equilibrium) of the exchange rate corresponds to an optimal allocation of resources. Any shock that pushes the exchange rate away from its optimal level is reflected in a sub-optimal growth. It remains to be noted that the effect's magnitude of Exchange fluctuations on the economy depends essentially on the degree of risk aversion. Thus, investors' behaviour in front of Exchange fluctuations determines the sensitivity of an economy to exchange rate shocks. The openness degree of the economy also plays a decisive role.

3.3.2. The Impact of the Automatic Adjustment of the Balance of Payments in the Internal and External Equilibrium:[1] If the balance of payments is assumed to be in a deficit because of the decline in exports due to the transformation of foreigners to other alternative sources or of fluctuations in the prices of raw materials, particularly for developing countries, the quick result will be the lowest levels of employment, production and income in the industries to be exported, and it will expand in many ways to the local economy and then to the workers and managers of the export industries and all who make the subject of the primary effect, it will decrease their consumer spending to goods and services that occur in other industries, also a decline in import of used materials occurs in the production process and the proportion of change in the national income that is transformed into an evolution of imports is called the marginal propensity to import, but consumption does not depreciate the same percentage as that of purchasing power because of the human nature that rejects the decline in the standard of living, which pushes them to withdraw from their previous savings, but the final consumption will decrease despite the use of saving and therefore, a decline in income and employment in industries, this effect will spread to the economy, and as a result imports will decrease as well as the consumption

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[1] موردخاي كريانين. مرجع سابق، ص ص 103-303

of local products will be reduced by providing a larger quantity of goods for export to the outside, therefore, this automatic effect of the balance of payments reduces the deficit of that one so that the final effects emerge in the long-run.

The reverse process takes place in the case of a surplus where the national income is appreciating due to increased exports and declining imports, and pursuant to the increase in the world demand for domestic exports, a primary effect occurs on export industries where the level of incomes and employment increases to cope with the world demand expansion, in these conditions the owners of these incomes put aside a part of them and spend the greatest part, which leads to the expansion of production and revenues in the industries that produce the goods they buy, therefore some of this increase is moving towards other industries and this process will expand in a decreasing way to other industries on the other hand, if the surplus leads to reducing imports, the initial area of effect will be the industries that produce substitutes for imported products and imports will increase as income increases, also the consumption of local goods will appreciate, which reduces the number of goods to be exported and reduces the pressure on producers for export. The final result of the increase in imports and decline in exports is reducing the balance of payments surplus.

3.3.3. The Adjustment of the Balance of Payments by a Fixed Exchange Rate: If the trade balance is positive, that is, exports are greater than imports, then there is an inflow of foreign currencies; the balance is expressing a surplus. The demand for national currency becomes important, and that will entail its appreciation. In order to maintain a fixed exchange rate, the Central Bank will sell its currency against foreign currencies or against gold, until the equilibrium is reached. If the balance of the trade balance is negative, that is, exports are lower than imports, then there is an outflow of foreign currencies and the balance is expressing a deficit. The supply of the national currency is important, this will provide for its depreciation. To support the price of the national currency, the Central Bank must buy its currency using the foreign exchange reserves or the stock to bring the balance back to equilibrium. [1]

3.3.4. The Adjustment of the Balance of Payments by a Floating Exchange Rate: Under a system of flexible exchange rates, the external value of money is determined through the forces of supply and demand in order to reach the equilibrium exchange rate of the exchange rate, that is, the theoretically necessary short-term and practically long-term price needed to correct the imbalance in the balance of payments and restores the equilibrium again, in such

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[1] Eiteman, D. & al. op.cit. p110.

cases the supply and demand factors decide the equilibrium prices without the intervention of the central banks to protect the external values of their currencies, which automatically means that the excess payments increase the external value of the currency, at a time when the deficits contribute to reducing this one.[1] Briefly, a country with a deficit sees the value of its currency goes down due to its excess supply on the foreign exchange market; this decline will encourage exports that will allow the balance to rebalance.[2]

Conclusion of the Chapter

Based on what has been addressed in this chapter, it can be said that the exchange rate is one of The most sensitive economic variables because of the internal and external influences to which it is exposed, especially in view of the expansion of foreign trade cycle and the evolution of international financial markets, moreover, it represents a link between international economies and a measure of their transactions' size; as it represents the basis of financial and economic balances which often reflects the quality of internal and external economic performance. The choice of the exchange- rate system of any country is the main determinant of the exchange type to be dealt with, and it is based on several considerations, the most important being the economic environment and its stability, therefore, an exchange control regime should be created to regulate foreign trade and create balance in order to avoid the deterioration of the external value of money under foreign trade laws

In fact, the value of the Algerian dinar is very poor, as a result of the parallel exchange market and the Algerian state has resorted to a gradual undervaluation in its nominal exchange rate as one of the instruments for balancing economic and financial reforms, eliminating this market and confronting the consequences of oil shock as it strives to upgrade exports out of hydrocarbons. Furthermore, Algeria's trade balance remains highly dependent on oil and gas revenues, which is the country's main source of income and accounting for more than 95% of the overall volume of exports. Accordingly, Algeria's economy seems doomed to remain a retrieval economy and despite the major economic projects and structural reforms that Algeria has launched since the independence and despite the significant achievements including infrastructure that have been made, the Algerian economy, through various stages of turbulence and difficulties especially since the eighties, remains unable to find its bearings and learn from previous failures.

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[1] الهيتي نوزاد ومحمّد عبد اللّطيف الخشالي. مرجع سابق، ص54.

[2] Eiteman, D. & al. op.cit. p110.

Chapter 03 :
Assessing the Dutch Disease Impact on the Equilibrium Exchange Rate's Performance in Algeria over the period 1990- 2016

Introduction to Chapter

The Dutch disease is mainly associated with massive capital flows to countries whether due to the discovery of significant resources or the rapid escalation of their prices as in the case of

the Algerian economy. However, it is difficult to assert the nature of the relationship between these flows and the real value of the local currency (DZ) and how they can affect its equilibrium level, owing to the existence of other factors that may interfere with the currency's value improvement. Through this chapter, we will try to rely on the real effective exchange rate because it is considered good for looking at the overall performance of a currency in order to highlight the impact of various symptoms of the Dutch disease on its equilibrium during the period 1990-2016 using an econometric model, so-called the autoregressive distributed lags ARDL after addressing the analysis of Algerian economy reality from different angles.

Section 01: Empirical Studies

The importance of determining the exchange rate has been one major theoretical issue that has dominated the field for many decades and the factors found to be influencing it, have been explored in several studies;   among the first serious discussions and analyses emerged with *Edwards, S. (1988)*[1]*,* and developed a dynamic model with three goods (importable, exportable and non-tradable) to describe the real equilibrium exchange rate and misalignment in a small developing economy with a dual currency system. Then, he tested his model in a sample of 12 countries having a fixed exchange system over the period 1960-1985. Using the technique of instrumental variables with fixed effects, *Edwards* found that an improvement in the terms of trade appreciates the observed and equilibrium real exchange rate. Tariffs and capital flows induce a real appreciation that is not statistically significant as government consumption has no significant effect. On the other hand, the technical progress significantly depreciates the equilibrium real exchange rate contrary to what the *Balassa-Samuelson* effect predicts. Regarding nominal variables, expansionary monetary and fiscal policies value the real exchange rate and ultimately contribute to its overvaluation.

In the same vein, *Ofair, R. & Collins, S. M. (1997)*[2] noted that productivity, long-term capital flows, terms of trade, trade balance and monetary policy are the main determinants of the long-run

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[1] Edwards, S. (1988). Real and Monetary Determinants of Real Exchange Rate Behavior: Theory and Evidence from Developing Countries. *NBER Working Paper, 2721,* 01-41.

[2] Ofair, R. & Collins, S. M. (1997). Real Exchange Rate Misalignments and Growth. *NBER Working Paper, 6174,* 01-21.

real exchange rate, and then they explained the short-term real exchange rate fluctuations during the period 1975-92 by product, absorption shocks and variations in the money supply. They found that the real exchange rate appreciates significantly with capital flows, terms of trade and depreciates with the trade balance in the developing countries, as well as the *Balassa-Samuelson* effect, is never meaningful and monetary policy is meaningful only in these but with a bad sign. Moreover, Absorption shocks significantly value the real exchange rate with a pronounced impact, conversely, commodity shocks depreciate the RER and appreciate them, as is the case with the monetary shocks in the industrialized countries whose trade and political balance monetary policy are not significant. Another study reported the use of panel cointegration techniques to estimate the relationship between the real exchange rate and its real and monetary determinants in developing countries divided into middle-income and low-income countries from 1979 to 2000.

The results showed that the trade openness depreciates the real exchange rate and its equilibrium while the technical progress appreciates them. An increase in government consumption is accompanied by a real but not always significant appreciation in low-income countries while the impact of these fundamentals is more significant in the middle-income countries as the net foreign capital flows and nominal variables as monetary policy, devaluation and foreign exchange reserves are not significant in low-income countries which on the contrary, tend to appreciate the real exchange rate in the middle-income countries. From these variables, only the monetary policy is significant in appreciating the real exchange rate in the middle-income countries, the other two variables have no significant impact.

Dufrenot J. G. & Yehoue, E. B. (2005)[1] aimed to estimate the relationship between the real exchange rate and its real and monetary determinants in developing countries divided into middle-income and low-income countries from 1979 to 2000 using panel cointegration techniques. The results show that the trade openness depreciates the real exchange rate and its equilibrium while the technical progress appreciates them. An increase in government consumption is accompanied by a real but not always significant appreciation in low-income countries, while the impact of these fundamentals is more significant in the middle-income countries as the net foreign capital flows and nominal variables as monetary policy, devaluation and foreign exchange reserves are not significant in low-income countries which, on the contrary, tend to appreciate the real exchange rate in the middle-income countries. From these variables, only the monetary policy is significant appreciating

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[1] Dufrenot J. G. & Yehoue, E. B. (2005). Real Exchange Rate Misalignment: A Panel Cointegration and Common Factor Analysis. *IMF Working Paper, 05/164,* 01-38.

the real exchange rate in middle-income countries, the other two variables having no significant impact.

Calderón A. C. (2002)[1] investigated similar issues on the real exchange rate in the period from 1966 to 1997, applying panel cointegration and Dynamic Ordinary Least Squares techniques in a sample of 67 countries and he found that an increase in the foreign net assets, the tradables sector productivity and an improvement in the terms of trade tend to appreciate the real exchange rate and its equilibrium value in a significant and generally robust way. On the other hand, the real exchange rate declines as a result of increased productivity in the non-tradables sector.

While *Saborowski, CH. (2009)*[2], using the same technique based on annual data of 85 countries during the period 1995-2006, argued that the development of a deep and active financial sector can weaken the problematic link between capital inflows and a real appreciation of the exchange rate, also the impact of capital flows on the real exchange rate can be significantly reduced by the use of a more flexible. Similarly, *Mouhamadou, S. & Tabarraei, H. (2009)*[3] aimed to explain theoretically and empirically the effect of capital inflows such as foreign aid, remittances and foreign direct investment on the real exchange rate movements in developing countries using recent techniques, developed in time series and panel data econometrics. Results showed that real fundamentals are the main driving forces of real exchange rate movements in LDCs, not capital inflows. The Balassa-Samuelson effect by itself accounts for 57% of the RER variations while capital inflows account only for 19% of RER variations, thus, the Dutch Disease theory is not rejected but its effect on RER movements in LDCs is weak.

For the same purpose, another study used panel cointegration techniques by means of the dynamic least squares technique in a set of 48 industrialized and emerging countries, from 1980 to 2004. The results have shown that the real exchange rate appreciates significantly at equilibrium when government consumption increases, when the terms of trade improve, or - but weakly - when the country accumulates net foreign assets. The appreciation of the equilibrium real exchange rate induced by an increase in the productivity differential between the tradables and non-tradables sectors is relatively small although statistically significant. A country that decides to liberalize its foreign

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[1] Calderón A. C. (2002). Real Exchange Rates in the Long and Short-runs: A Panel Cointegration Approach. *Central Bank of Chile Working Paper, 153*, 01-48.

[2] Saborowski, CH. (2009). Capital Inflows and the Real Exchange Rate: Can Financial Development Cure the Dutch Disease?. *IMF Working Paper, 09/20,* 01-42.

[3] Mouhamadou, S. & Tabarraei, H. (2009). Capital Inflows and Exchange Rate in LDCs: the Dutch disease problem revisited. *Paris School of Economics PSE Working Paper 2009/26.*

trade registers a depreciation of its equilibrium real exchange rate. In countries where price controls exist, their reduction significantly increases the equilibrium level of the real exchange rate. The author highlights a structural break in the period after 1973. ***Ricci L. A. & al. (2008)*[1].**

A research with regard to *Algeria*, attempted to study the behaviour of the equilibrium exchange rate that was characterized by fluctuations due to its association with foreign trade and its impact on external shocks from 1970 to 2007 in order to discovering and analysing periods of imbalance in the real exchange rate and studying the causal relationship between this deviation and economic growth by constructing a standard model that was already appreciated by *Edwards 1989* and *Cashin & al. 2002*. This model assume that the economy is small open and depends on the production of two types of goods, export-oriented goods and non-tradable goods. The results have shown that with the continued rise in inflation, the purchasing power of the Dinar is deteriorating further and the positive quantitative effect of the general price increase on the exchange rate of the Dinar against currencies that, during the years of the crisis, led to the continued deviation of the real exchange rate and the decline in the prices of exports (hydrocarbons) led to a decline in the level of national production and national income, including the disturbance of the level of government spending through which the troubles move to the political and social fields, Local stability with the volatility of foreign markets, which imposes local stability on the volatility of foreign markets as a threat to economic security and thus showed that the causal relationship between the deviation of the real exchange rate from the level of balance and economic growth indicates the negative impact of this variable on the economy as a whole. ***Benzaoui, A. & Naamoune, I. (2102).*[2]**

A similar line of research highlights the role of the external value of the currency in measuring the competitiveness of domestic production in the international markets by giving competitive advantage to exports (competitive price) and thus, highlighting the importance of the exchange rate as one of the indicators for measuring competitiveness by studying the relationship between this variable and growth rate as an indicator of overall stability according to the absorption model from 1970 to 2006 and demonstrates that the exchange rate affected the growth rate by 20.72% and the correlation between the growth rate of GDP and changes in oil prices is very strong by 76.45%, which means that the source of growth, as an indicator of a competitiveness, is a source of oil revenues and, therefore, the exchange rate cannot affect the growth rate and vice versa. The growth rate is also

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[1] Ricci L. A. & al. (2008). Real Exchange Rates and Fundamentals: A Cross-Country Perspective. *IMF Working Paper 08/13*, 01-25.

[2] عبد الرزّاق بن الزّاوي وإيمان نعمون. (2012). دراسة قياسيّة لانحراف سعر الصّرف عن مستواه التّوازني في الجزائر .مجلّة *الباحث،(10)* ، الجزائر، 85-98.

linked to oil prices, and if it rises, the demand for the national currency increases. ***Zouaoui, H. (2006)***[1].

A large and growing body of literature has investigated the relative importance of exchange rate that still a subject to considerable debate. Recently investigators have confirmed the role that capital flows, derived mainly from the new resource discoveries-especially oil thanks to its strategic role in all economies or from the appreciation of their prices, play in appreciating a country's exchange rate, causing the well-known *'Dutch Disease'* phenomenon and examined its effects that make economies, particularly those of Oil-Exporting countries, suffer big problems influencing their production and industrialization structures. In this regard, ***Chen, Y. & Rogoff, K. (2003)***[2] have tested such a relationship for three OECD countries: Canada, Australia, and New-Zealand that have a large share of commodity exports in their total exports and a relatively small size, which disables them to influence the world price of commodities. The authors found out a significant positive relationship between the real exchange rate and world commodity prices for Australia and New Zealand which confirms the Dutch disease. However, it is not significant for Canada after the trend of declining world commodity prices is being removed out of the relationship, and the data is compiled only out of three developed countries. For this reason, it may not be very useful for policy-makers in the developing world that have to deal with the resource curse the most.

While ***Emmanuel K.K. Lartey (2007)***[3], asked whether the effects of the Dutch disease in the form of contracting the manufacturing sector and the rise in prices of non-tradable goods caused by capital inflows should be addressed by monetary policy. By developing a two-sector dynamic stochastic general equilibrium model in Argentina and the Philippines in the 1990s, the results have shown that the increase in capital flows causes effects of Dutch disease when the monetary policy is designed to maintain the nominal exchange rate fixed, when the monetary policy follows Taylor interest rate rule generalized with either the nominal exchange rate or the real exchange rate, the effects of the Dutch syndrome do not occur so in short, the Dutch syndrome effects occur under a fixed nominal exchange rate regime.

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[1] زواوي الحبيب. (2006). سعر الصّرف ومؤشّرات قياس التّنافسية -حالة الجزائر. الملتقى الدولي الرّابع حول المنافسة والاستراتيجيّات التّنافسية للمؤسّسات الصّناعية خارج قطاع المحروقات في الدّول العربية ، 01-21. -

[2] Chen, Y. & Rogoff, K. (2003). Commodity Currencies. *International Economics Journal, 60,* pp. 133-160..

[3] Emmanuel, K.K. Lartey. (2007). Capital Inflows, Dutch Disease Effects and Monetary Policy in a Small Open Economy. *California State University, Fullerton*, 01-34.

Moreover, ***Jahan, P. & Mohammadi, H. (2009)***[1], aimed to provide a formal test for the Dutch disease hypothesis by examining the possibility of a long-term relationship between the real oil prices and real exchange rates in 14 oil exporting countries including *Algeria* and for different periods; the authors used the model of Autoregressive Distributed Lag (ARDL) of *Pesaran* and found out that there is a stable long-term relationship between the real oil prices and real exchange rates in all countries supporting the Dutch disease hypothesis. The likelihood of a Dutch disease problem has not decreased over time and in particular, the monetary authorities in oil-exporting developing countries should be vigilant to counter the negative impact of the oil windfall.

If we now turn to ***Jean-Philippe Stijns (2003)***[2], who used a trade gravity model and identified four different testable hypotheses from which only one hypothesis (a decrease in manufacturing exports) is being tested. Three approaches are being used. First, only the world price of energy is used as the independent variable. Second, net energy exports are being used for this purpose. And third, the net energy exports and the world price of energy are used together to capture the benefits of both approaches. *Stijns* found negative relationships between the country's net energy exports and manufacturing exports, and between the energy world prices and manufacturing exports. Following the obtained results, a 1% increase in the price of energy will, ceteris paribus, decrease the real manufacturing exports by 0.5%. In addition, a 1% increase in the net energy exports will, ceteris paribus, decrease the net energy exporter's real manufacturing exports by 1/8%; these results are very interesting. In all the three approaches, there seems to be significant evidence that supports the Dutch disease theory: the world price of energy and energy exports both have a negative effect on manufacturing exports.

In light of the wide controversy and different views about whether changes in the dollar exchange rate lead to the changes in the world crude oil prices or vice versa ***Al-Janabi, N.M. & S. Kareem, (2011)***[3] used cointegration and Granger causality to examine such a relationship and interpreted the reality of the performance of variables based on a daily data from 10/08/2009 to 30/06/2010; it has been assumed that there is a stable and one-way causal relationship between the Dollar exchange rate against the Euro and crude oil prices in the short and long-term. the research findings showed that

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[1] Jahan, P. & Mohammadi, H. (2009). Oil Prices and Real Exchange Rates in Oil-Exporting Countries: A Bounds Testing Approach. *Munich Personal RePEc Archive MPRA Working Paper, 19605,* 01-14.

[2] Stijns, J. PH. (2003). An Empirical Test of the Dutch Disease Hypothesis Using a Gravity Model of Trade. Department of Economics, university of California at Berkeley, 01-33.

[3] نبيل مهدي الجنابي وكريم سالم حسين. (2011). العلاقة بين أسعار النّفط الخام وسعر صرف الدّولار باستخدام التّكامل المشترك وسببية. (Granger) مجلّة كلّية الادارة والاقتصاد، (01)، 01-24.
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both oil prices and Dollar exchange rate are not stationary on the general level as they are integrated, and the relationship between them is long-term equilibrium, moving from the Dollar exchange rate to international oil prices in the long and short term so that the dollar's decline by 1% leads to a rise in the oil price by 1.5% in the long-term and 1.05% in the short term. Similarly, *Fakhri, H. (2011)*[1] found that there is a statistically significant and positive relationship between the real oil price and real exchange rate in Azerbaijan during 2000-2007 by applying the OLS method.

In the same vein *Kutan, A. M. & Wyzan, M. (2005)*[2] tried to answer the question of whether Kazakhstan is vulnerable to Dutch disease by explaining the real exchange rate movement and estimating its equation that incorporates oil prices using an extended version of the *Balassa-Samuelson* model, during 1996-2003. The results showed that the real appreciation of the exchange rate due to capital inflows resulting from oil discoveries indicating vulnerability to Dutch short-term syndrome effects, cannot be an immediate concern in Kazakhstan, but the country in the medium and long-term may indeed be vulnerable to this phenomenon and that oil and gas will play a growing role in the economic development of the country in the coming years.

A broader perspective has been adopted by *Treviño J. P. (2011)*[3] who aimed to search for Dutch disease indications in the oil-rich countries of the Central African Economic and Monetary Community (CEMAC) during 1990-2009, and argued that the observed appreciation of the real exchange rate and the rapidly changing labour force from the agricultural sector in oil-rich countries are fully consistent with the presence of DD. However, there is no strong evidence for a resource curse, as oil abundance does not seem to be correlated with long-term overall economic performance. Indeed, the actual overvaluation of the exchange rate is associated with greater rather than lower growth in some cases. While, *Shahid, H. J. (2009)*[4], have chosen to rely on the Generalized Method of Moments (GMM) to see if the increase in foreign capital inflows in particular remittances (REM), foreign direct investment (FDI) and official development assistance (ODA) results in the real appreciation of exchange rate (a case of Dutch disease) in six selected economies from Southeast Asia: the Philippines, Bangladesh, India, Malaysia, Pakistan and Indonesia between 1981 and 2007.

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[1] Fakhri, H. (2010). The Impact of Real Oil price on Real Effective Exchange Rate: The Case of Azerbaijan. *Munich Personal RePEc Archive, MPRA Working Paper, 33493,* 01-26.

[2] Kutan, A. M. & Wyzan, M. L. (2005). Explaining the Real Exchange Rate in Kazakhstan, 1996–2003: Is Kazakhstan vulnerable to the Dutch disease?. *Economic Systems, 29,* 242–255.

[3] Treviño J. P. (2011). Oil-Price Boom and Real Exchange Rate Appreciation: Is There Dutch Disease in the CEMAC?. *IMF Working Paper, 11/268,* 01-29.

[4] Shahid, H. J. (2009). Dutch disease Investigated: Empirical Evidence from Selected South-East Asian Economies. *SBP Working Paper Series, 31,* 01-24.

The results indicate that the increase in inflows (FDI, ODA & REM) leads to a real appreciation of the real exchange rate and the increase in FDI and REM flows. REM and FDI cause the spending effect, whereas REM and FDI show a resource movement effect, thus causing the Dutch Disease effects.

Another study, focused on the Canadian economy between 1981 and 2008 using the DSGE model. The paper shows that the trend against an appreciating exchange rate can prevent an inefficient loss of tradable outputs but at the cost of producing a misallocation of resources in other sectors of the economy as well as the welfare is a decreasing function of the exchange rate intervention. *Lama, R & Medina, J. P. (2012)*.[1]

Djoufelkit, H. (2008)[2], in his impressive analysis, the key research question of this study was whether or not *Algeria* will learn from previous oil shocks and use this new wealth to diversify its economy by promoting the development of the mentioned sector. According to this study, there are two main transmission channels between shock resources and economic growth; the first is direct, through the impact of natural wealth on the competitiveness of the tradables sector through the appreciation of the real exchange rate (Dutch Syndrome), but this channel is not engaged in the case of Algeria since the real exchange rate follows a downward trend, even though the terms of trade that have continued to increase; the second channel is indirect, going through the impact of these revenues on the incentives for economic actors to engage in entrepreneurial activities. The manufacturing sector is theoretically a source of long-term growth, but according to statistical data, it does not play its role as an engine of growth and this situation does not favour the development of competitiveness through an active innovation policy, which further amputates the prospects for long-term growth. As a result, it appears that the Algerian growth is highly dependent on the short-term performance of the oil sector. Finally, the author concluded that the Algerian government seems definitively want to learn from previous oil shocks, saving a large part of the income and use of the other party to promote diversification of the economy, but despite this, it seems that macro-economic incentives for the developing the productive sector, however, are insufficient and inhibited by the lack of microeconomic incentives.

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[1] Lama, R & Medina, J. P. (2012). Is Exchange Rate Stabilization an Appropriate Cure for the Dutch Disease?. *International Journal of Central Banking, 08(1),* 01-46.

[2] Djoufelkit, H. (2008). Rente, développement du Secteur Productif et Croissance en Algérie. *French Developement agency AFD, Working Paper n° 64,* 01-25.

Furthermore, ***Johanna, R. (2009)[1],*** aimed to reconcile the mixed empirical evidence regarding the currencies' co-movements of oil-exporting countries with the oil price. Based on an overview of the political economy models of budget spending during 1985-2005 on a sample of 33 oil exporting countries including *Algeria*, she pointed out that the covariation between the oil price and real exchange rates of the oil exporting countries in the sample, is conditional on political and legal institutions; the currencies in countries with strong bureaucracies and legal systems are less affected by changes in oil prices; and the oil exporting countries with sufficiently strong institutions can avoid the resource curse associated with a volatile real exchange rate. These results indicate that the strong institutional setup can prevent a country from catching Dutch disease from a volatile real exchange rate. The lack of strong positive price effects, even in highly oil-dependent economies such as Norway, Canada or Saudi Arabia, may be the result of favourable institutional characteristics in these countries.

According to ***Gylfason, T. (2001)[2]*** who examined, in different ways, the cross-country evidence of which a strong dependence on natural resources can adversely affect economic growth performance and impede it in 85 countries during the period 1965-1998, mentioned five main transmission channels of the abundance of natural resources that slow economic growth, as suggested in the literature: Dutch disease and foreign capital, rent-seeking and social capital, education and human capital, savings - investment and physical capital, money, inflation and financial capital, and argued that the real problem is not the existence of natural wealth, but rather the inability to avoid the risks associated with nature's gifts, namely: Reducing the openness of the economy to trade and foreign investment because it drives the real value of the national currency to the level as other export industries and industries compete with imports find it difficult to manage; overconfidence in countries with abundant natural resources that tend to underestimate or neglect the need for good policies and economic institutions as well as for good education and good investments; weakening various institutional arrangements of the company that need to be strong for the economy to grow vigorously; the heavy reliance on endowment of a nature tends to be directly associated with corruption, inequality and political oppression, that tend to hinder economic growth; the intensity of natural

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[1] Johanna, R. (2009). Oil Prices and Real Exchange Rate Movements in Oil-Exporting Countries: The Role of Institutions. *Institute for Research in Industrial Economics IFN, Working Paper, 810,* 01-31.

[2] Gylfason, T. (2001). *Natural Resources and Economic Growth: From Dependence to Diversification.* International Conference on the Factors of Sustainable Economic Growth in Ukraine organized by the Institute for Economic Research and Policy Advice and the German Advisory Group on Economic Reforms with the Ukrainian Government. June 25-26th 2001. Kyiv, Ukraine.

resources is inversely associated with financial depth; and developing a false sense of security and become careless about the accumulation of foreign capital, social, human, physical and financial.

Additionally, ***Kablan, S. A. & J. L. Loening (2012)***[1] examined whether Chad, one of the last African countries to have discovered oil, could be affected by the resource curse across Dutch disease using the VAR model in the period 1985 to 2008; the results show that the Chadian economy shows symptoms of Dutch disease and that the manufacturing sector is not negatively affected by energy booms, while the agricultural sector could, in the long-run, react negatively to oil production. To avoid the phenomenon of the curse of natural resources, the authors made the following recommendations: The export diversification of both goods and trading partners is important. Since oil is now its dominant export, Chad's economy is vulnerable to demand shocks and oil supply shocks; and the wise spending policies are also indispensable and revenues from oil exports, if well managed, it can contribute to economic growth.

Also, ***Rodriguez, C. M. (2006)***[2], tried to determine whether Saudi Arabia has suffered from Dutch disease or not and to examine how this country has addressed the symptoms related to this phenomenon over the period 1960-2004 based on *Corden* and *Neary* model. He found that Saudi Arabia has suffered symptoms related to Dutch disease; however, it has not suffered from this syndrome as the theory only partly explains the real events of the economy.

Marc-Antoine, A. (2003)[3] has chosen in his empirical applied study Oil-Exporting developing countries, including *Algeria*, to see whether they had experienced a Dutch disease episode during 1980-2000 and to check whether these countries had experienced a similar phenomenon following the inflow of foreign aid and to study the impact of foreign investment on the real exchange rate as sub-objectives, using the methods of Generalized Least Squares and Panel and as a result he did not find any episodes of Dutch disease for their sample during the covered period.

In addition, it is important to ask about the negative statistical link between the abundance of natural resources and economic growth overflows on other important economic and social indicators. A study with this regard adopted the LW-IWPB-SS approach to estimate two equations: an equation of "institutions quality" and the equation of development. The main results of this study assert that the countries with abundant resource points end up in bad institutions and bad governments, and that

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[1] Kablan, S. A. & Loening, J. (2012). An Empirical Assessment of the Dutch Disease Channel of the Resource Curse: The Case of Chad. *Economics Bulletin, 32 (3),* 2007-2014.

[2] Rodriguez, C. M. (2006). Dutch Disease in Saudi Arabia?. Ekonomi Hogskolan/ Lunds universitet, 01-30.

[3] Marc-Antoine, A. (2003). Op.cit.

countries with abundant diffuse resources show no tendency to follow this pattern and abundance of natural resources has no direct effect on development indicators (human development, undernourished, human poverty index, underweight children, life expectancy); Some types of "resource point" resources that can be easily controlled by small groups in society - are usually associated with less democratic regimes and poor institutions that provide poor governance quality as well as low-quality countries. Institutions (or the quality of governance) tend to decline on various development indicators. The income and governance levels and the abundance of diffuse resources generally do not have a significant impact on development. It is the indirect impact of resources on development that occurs only through institutional quality channels. ***Bulte, E. H. & al. (2004).***[1]

Harding, T. & Venables, A. J. (2010)[2] have studied the effects of foreign exchange windfalls on the balance of payments using a data set consisting of 133 countries from 1960 to 2000. Two different forms of the foreign exchange windfalls are studied; net resource exports, defined as the net exports of fuels, metals, and ores; and foreign aid, defined as inflows of aid. The results of their study led to the conclusion that roughly per dollar of resource exports, there is a 50 cent decline in non-resource exports, a 15 cent increase in imports, and 35 cents are saved. The effect of one dollar of foreign aid is an increase in imports by 40 cents, while exports decline only slightly. So an increase in resource exports tends to decrease non-resource exports. The latter could lead to a symptom of the Dutch disease, namely a decrease in outputs of the non-resource tradable sector.

In their important study, ***Arman, A. & Aghajari, S. A. (2009)***[3] examined how oil booms and collapses have affected the Iranian economy especially the growth of the non-oil sector and inflation over the period 1960-1990 using the Seemingly Unrelated Regression Method (SUR). They concluded that there is a slow direct negative effect of oil revenues on the non-oil sector, but it does not seem to be a significant spending effect. Oil revenues have a complex influence on inflation. There are direct negative effects on the short and long term, as well as a positive indirect effect through foreign prices and exchange rate and no evidence of significant monetary effects.

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[1] Bulte, E. H. & al. (2004). Resource Abundance, Poverty and Development. *ESA Working paper 04/03.* 01-29. Retrieved from the web site: www.fao.org/es/esa.

[2] Harding, T. & Venables, A. J. (2010). Foreign Exchange Windfalls, Imports and Exports. *Oxford University.* 01-25. Retrieved from the web site: http://www.etsg.org/ETSG2010/papers/harding.pdf

[3] Arman, A. & Aghajari, S. A. (2009). Oil Revenue, Inflation and Growth in Iran: A pre- Exchange Rate reform examination of Dutch disease. *Quarterly Journal of Quantitative Economics, 6 (2)*, 37-62.

While the study of ***Kareem, I. (2010)[1],*** derived structural implications of the Dutch disease in oil-exporting countries due to permanent oil price shocks from a typical model. It tests these implications in manufacturing sector data across a wide group of countries including oil-exporters covering 1977 to 2004. The results of oil-exporting countries are:

- The permanent increases in oil price negatively impact output in manufacturing as consistent with the Dutch disease;

- Evidence in the data shows that oil windfall shocks have a stronger impact on manufacturing sectors in countries with more open capital markets to foreign investment;

- The relative factor price of labour to capital and capital intensity in manufacturing sectors appreciate as windfall increases; and

- The manufacturing sectors with higher capital intensity are less affected by windfall shocks than their peers, possibly due to a larger share of the effect being absorbed by more labour intensive tradable sectors. An implication of the fourth result is that having diverse manufacturing sectors in capital intensity helps cushion the volatility of oil shocks.

The results of ***Jeffrey, D. S. & Andrew, M. W. (1997)[2]*** asserted that, over the period 1970-1990, there was an inverse association between natural resource intensity and growth using a large number of variables that seem to have an important role to play in cross-country growth (initial GDP, human openness policy, investment rate, human capital, accumulation rates, changes in the terms of trade, public spending ratios, terms of trade volatility and the effectiveness of government institutions.

Olomola, Ph. A. (2007)[3] aimd to explore the association between oil wealth and economic growth across the different transmission channels in a sample of 47 oil-exporting countries, including Africa and 13 non-oil-exporting countries between 1970-2000 using the Least Squares method and System Generalized Method of Moments (SYS-GMM) on time series data. The results showed that for African oil-exporting countries, as for other oil-exporting countries, the oil rent has failed to promote growth; they will ensure the application of the rule of law and reduce corruption and rent-seeking activities so that the oil rent can filter to economic growth. In addition, developing countries need to diversify the production base so that manufacturing activities can be expanded.

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[1] Kareem, I. (2010). The Structural Manifestation of the Dutch Disease: The Case of Oil Exporting Countries. *IMF Working Paper, 10/103,* 01-36.

[2] Jeffrey, D. S. & Andrew, M. W. (1997). Natural Resource Abundance and Economic Growth. *Center for International Development and Harvard Institute for International Development,* 01-36.

[3] Olomola, PH. A. (2007). Oil Wealth and Economic Growth in Oil Exporting African Countries. *African Economic Research Consortiums AERC Research Paper, 170*. 01-34.

Chouikhi, H. & al. (2009)[1], aimed to study the impact of the recent changes in oil price on the Libyan economy and to analyse the symptoms of Dutch Disease using the monthly applied data VAR model from 1997:1 to 2008:12. The results showed that the most important sources of change in economic growth are the real price of oil and inflation. The real price of oil can be considered the main source of the rise in inflation but its contribution in the real exchange rate variation is insignificant so the price of oil hits the economic activity and inflation, but not the Real exchange rate and Libya does not present the symptom of Dutch disease.

Magud, N. & Sosa, S. (2010)[2], the purpose of this note was to examine whether the literature provides strong support for concerns about the potential negative effects of Dutch Disease on the long-term growth. Indeed, the results have shown, on the one hand, that the Dutch syndrome exists and the real exchange rate appreciates, there is a reallocation factor and the production goes far from manufacturing. On the other hand, exchange rate volatility hampers economic growth. The misalignment of the real exchange rate with its fundamental value also lowers growth. Overstatements are always negative for economic growth, while the evidence on undervaluation is inconclusive.

Saab, G. & Maya, A. (2010)[3], Through this study, the authors aimed to examine Dutch disease in the most diverse economies of the Economic and Social Commission for Western Asia (ESCWA) and turn around its determinants on these very similar economies and their impact on the different sectors of the economy during the period 1990-2004 but the sample composed of Egypt, Lebanon, Jordan and Syria, is studied from 1994 to 2004. The authors concluded that remittances from workers, foreign migrants and oil revenues are the main factors behind Dutch Disease in the ESCWA region and that the remittances that plunge into investments, subsidize the production of lagging sectors, and impose higher tariffs are recommended to reducing the negative externalities of this phenomenon

For *Lo Bue, M. C. (2011)*[4], The purpose of his research was to discover whether any traditional and non- traditional form of Dutch disease has been established in 22 countries that are Eastern Europe and former countries in transition and the Soviet Union in the last two decades from 1990 to 2007, estimating the impact of most of the above factors on the real exchange rate in transition

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[1] Chouikhi, H. & al. (2005). Prix du Pétrole et Syndrome Hollandais: Cas de la Libye. Faculty of Economics and Management of Sfax, Tunisia, 01-15.

[2] Magud, N. & Sosa, S. (2010). When and Why Worry About Real Exchange Rate Appreciation? The Missing Link between Dutch Disease and Growth. *IMF Working Paper, 10/271,* 01-32.

[3] Saab, G. & Maya, A. (2010). The Dutch disease syndrome in Egypt, Jordan, Lebanon, and Syria: A Comparative Competitiveness Review. *International Business Journal* incorporating *Journal of Global Competitiveness, 20(4),* 343-359.

[4] Lo Bue Maria, C. (2011). Op.cit.

transition economies through two models, namely the Ordinary Least Squares (OLS) and Generalized Least Square (GLS). In a group of resource-rich countries (Azerbaijan, Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan); the export of raw materials is valuable. The results showed that these mineral economies seem to have done well as a group compared to non-mineral transition economies and it would be difficult to argue that they underperformed. On this basis, the resource curse is, where appropriate, the exception rather than the rule.

Benkhodja, M. T. (2011)[1], in his study**,** aimd to compare, first, the impact of a windfall and a booming sector on the four economic sectors of an oil exporting country and their social consequences; in a second step, the author analysed how monetary policy should be conducted to protect the economy from the main impact of these shocks, namely the Dutch disease, and found that the effect of Dutch disease arises after the spending and resource movement effects in the following cases:

- The flexibility of prices and wages, both in the windfall and boom cases;
- Flexible wages and rigid prices only in the case of a fixed exchange rate; and
- In other cases, the effect of Dutch disease can be avoided if the prices are rigid and wages are flexible when the exchange rate is flexible.

Chukwuka, O. I. & al. (2013)[2] evaluated how the discovery and exportation of crude oil have affected production and export of agricultural output in Nigeria during the period 1970-2011 based on cointegration and Vector Error Correction Model. The authors showed in the long-run the presence of Dutch disease in Nigeria, as they recommended that policymakers should make considerable investments in developing other economic sectors, re-channel the extra revenue from oil to accumulate income-producing foreign assets, and come up with a number of tax and import duty waivers, import substitution and diversification measures in order to boost productivity in the "lagging" traditional tradable sector and develop other agro-allied industries to improve the value chain.

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[1] Benkhodja, M. T. (2011). Monetary Policy and the Dutch Disease in a Small Open Oil Exporting Economy. Group of analysis and economic theory. Lyon-St−Étienne Gate Group *Working Paper, 1134*, 01-38.

[2] Chukwuka, O. I. & al. (2013). Oil Exploitation and Agricultural Commodity Export in Nigeria: An Empirical Evaluation of the Extent and Impact of the Dutch Disease. *IOSR Journal of Humanities and Social Science (IOSR-JHSS), 14(1).*

The study of ***Chekouri, S. M. & al. (2013)***[1] investigated the Dutch Disease evidence in Algeria and its effect on the economy during the period of 1963-2008. The study's results revealed that Algeria's economy has been clearly affected by this syndrome: the manufacturing growth slowed down and the agricultural sector showed very slight performance, while the service sector performed well and the employment shifted to the service sector. According to the authors, the Algerian government often failed to take measures in order to avoid problems related to resource abundance or resource price boom and the resource curse is best explained by the Dutch Disease hypothesis. In the same vein, ***Apergis, N. & al. (2014)***[2] aimed at examining the impact of an oil sector boom on agriculture value added in oil-producing countries from the Middle East and North African (MENA) using annual data from 1970 to 2011 and applying Panel cointegration tests, long-run panel causality tests and two-step System GMM. The authors found a negative relationship between oil rents and agriculture value added in the long-run, with a rather slow rate of short-run adjustment of agriculture value added back to equilibrium after a boom in oil rents. These results indicate that an oil sector boom is associated with a contraction in the agriculture sectors of the countries in the panel in the long-run. This is probably attributable to a resource movement effect from other economic sectors to the booming oil sector in these countries. This serves as evidence of a Dutch disease effect of an oil sector boom on agriculture in the MENA countries.

Very recently, ***Rizgar, A.A. & al. (2018)***[3] aimed to investigate the long-run relationship between oil price, real exchange rate and examine their effect on agriculture in 25 oil-exporting countries including Algeria, using Panel, ordinary least squares (OLS), dynamic OLS and pooled mean group methods. The result of the study showed a significant negative effect of oil price and exchange rate on agriculture value added indicating the existence of Dutch disease and de-agriculturalization in oil-exporting economies.

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[1] Chekouri, S. M. & al. (2013). *Natural Resource Abundance and Structural Change: The Dutch Disease in Algeria.* Economic Research Forum ERF 19th annual conference, Economic Development and the Rise of Islamist Parties, AFESD, Kuwait, 01-20.

[2] Apergis, N. & al. (2014). Dutch Disease Effect of Oil Rents on Agriculture Value Added in Middle East and North African (Mena) Countries. *Energy Economics, 45,* 485-490.

[3] Rizgar, A.A. & al. (2018). Dutch Disease effect of Oil Price on Agriculture Sector: Evidence from Panel Cointegration of Oil Exporting Countries. *International Journal of Energy Economics and Policy, 8(5).* 241-250.

Section 02: Algeria's Exchange Rate Policy

I. The Conduct of the Exchange Rate Policy:

The *Reer* (Real Effective Exchange Rate) is determined monthly by the Bank of Algeria (BA) and depends, simultaneously, on the country's price level compared to their 14 trading partners, the structure of foreign trade and the nominal exchange rate against the US dollar. The purpose of the foreign exchange policy in Algeria, according to the monetary authorities is to try to maintain the stability of the real effective exchange rate of the dinar at its equilibrium value against the currencies of the main trading partners, specified by the Fundamentals of the national economy and also to increase the competitiveness of local products in the face of the products of partners.[1] In fact, three phenomena are at the origin of the variation of the Dinar's exchange rate DZ: the referential *Reer* set by the authorities, the variations arising from the free fluctuation of currencies between them, and finally, the variations caused by the interplay of supply and demand in the interbank foreign exchange market. At last, the Bank of Algeria BA acts as a currency provider, which allows it to influence the price trend: it supplies the market with the necessary foreign currencies and reduces any possible excess liquidity. In intervening, the BA periodically realigns the nominal exchange rate in order to fulfil its *Reer* objective. [2]

II.The History of the Dinar Exchange Rate

Policies establishing the exchange rate regulation of national currency have experienced four main phases:

1. The Dinar Exchange Rate Determination, 1962-71: During this period, Algeria was newly independent and associated with the Franc zone where the currency is freely convertible. Unfortunately, in front of the risks generated by the massive capitals volatility and disequilibrium in the balance of payments, the monetary authority instituted in 1963 the exchange control over all transactions with the rest of the world through the promulgation of Law n°63-111 and isolated Algeria from the franc zone, thereby having its own exchange and monetary policy. This change was accompanied by diverse actions to control foreign trade, and followed in April 1964 by the

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[1] لزعر علي وآيت يحيى سمير. (2012. معدّل الصّرف الحقيقي وتنافسيّة الاقتصاد الجزائري .مجلّة الباحث، (11). الجزائر

[2] French Embassy in Algeria. (2006). La Politique de Change en Algérie. *Summary sheet, economic mission*.

creation of the national monetary unit "Algerian Dinar" [1] whose; its value was set at 0.18 grams of gold in accordance with the French Franc (DZ1= 1 Francs till 1969).

2. Pegging the Dinar to a Basket of Foreign Currencies, 1971-86: Before 1987, the exchange rate policy in Algeria occupied a secondary position in the monetary policy and it was only a means to serve the strategy of growth. As a result of the dysfunction in the international monetary system after the collapse of the Bretton Woods system and the circulation of floating currency system, Algeria has resorted to pegging the Dinar with a weighted basket of 14 currencies including the US $. Each currency is given a specific weight within the basket that is determined by the ratio of imports with major trading partners to total trade (the importance of foreign trade expressed in the same currency) in order to stabilize the nominal effective exchange rate, but the pegging of the Dinar with a weighted basket has left some variability in the bilateral rates against the currencies in the basket, this increased the currency risk for economic decision-makers.

Thereafter, Algeria applied a new management system for public enterprises, including in particular the socialist management of companies, the general status of the worker and the launch of economic development plans, the aim is to stimulate productive investment and facilitate foreign trade operations. Many legal texts came to regulate investment. This period is marked by the total monopoly of the state over the economy. All production and marketing operations are entrusted to the state offices, the legal texts have set the terms of access to the foreign exchange market. All imports registered under the monopoly are subject to the importation's global authorization, and any product not included in this box requires an importation license. Public and private companies cannot benefit from the retrocession of the foreign currencies generated by their activities with the rest of the world, except for mixed-economy companies whose retrocession amount is set at 20%. Thus, from 1974 the restrictions of access to the foreign exchange market accompanied by a policy of the quota of the imports gave birth to the market of parallel exchange (parallel market, informal market or black market exchange rate);

3. The Adjustment of Algerian Dinar, 1986-87: The exchange rate of the Algerian Dinar was adjusted as a precursor to a dynamic management policy for exchange the rate responsive to new economic data;

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[1] Benbouziane, M. & al. (2005). Marché de Change Informel et Mésalignement : Le Cas du Dinar Algérien. *Review of 'Les cahiers du Mecas, 01,* p119.

4. The Dynamic Management of the Dinar Exchange Rate, 1987-92: The sudden deterioration of oil prices in 1986 slowed the economic activity which has necessitated radical reforms in the various areas of the economy in terms of management and regulation focusing on the monetary and financial aspects. Thus, some economic and legal reforms, such as the law on companies' autonomy (1988), the law on money and credit (1990) and law on prices, gave a new breath to the Algerian economy. The objective of these new reforms was to break with the state monopoly on foreign trade, to rehabilitate private companies, to gradually offer a management autonomy for the public companies, enabling them to make a good transition to the market economy and finally to ensure the autonomy of central bank in relation to the public treasury.[1] In fact, during the 1990s, Algeria gradually tended to free its exchange rate system in two stages that are:

4.1. The Progressive Sliding Stage, 1987-91: The Algerian Dinar between 1989 and 1990, was devalued from DZ8.03 to DZ12.02 per $ in order to deal with the terms of trade evolution, the low exchange reserves and the heaviness of debt service;

4.2. The Explicit Devaluation Stage 1991-94: In the end of 1991, and after the stability of the dinar for six months, the monetary authorities represented by the monetary and Loan council, decided to devalue the dinar again by 22% (DZ18.05 per $) in order to approximate the official exchange rate to the parallel exchange rate, realign the relative domestic prices, and making Algeria's exports more competitive in the global market. More precisely, the reforms advocate that private enterprises can access the official exchange market through the Chamber of Commerce, launching a partial convertibility during 3 years from 1991 to 1993; it is understandable that in front of this catastrophic historical evolution, the Algerian authorities have taken as a guideline, the stabilization of the exchange rate. The next Figure shows us the evolution of the nominal exchange rate in Algeria from 1970 to 1994.

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[1] Ibid. p 120

Figure n°03-01: The Nominal Exchange Rate of Algerian Dinar during the 1970-94 period

Official Exchange Rate (LCU per US$, period average)
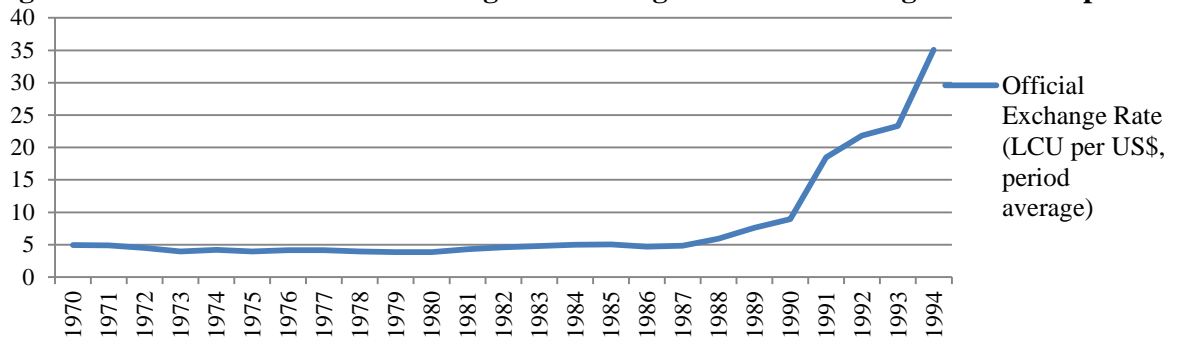
Source: Made by the author based on the World Bank database.

Through the precedent Figure, we note that the exchange rate remained stable between 1970 and 1971 recording DZ4.93 in 1970 and DZ4.91 in 1971, and then the currency began to appreciate gradually from DZ4.483 in1972 to DZ3.83 in 1980 going back to the same level as 1970 from 1981 to 1986. After 1986, the Dinar exchange rate proceeded to decline gradually from DZ4.70 to DZ5.91 in 1988 then to DZ8.95 in 1990 with 25.7% and 51.43% rate of increase respectively. In fact, this decrease in the Dinar value was deliberate by the authorities (devaluation) as a tool to address the repercussions of the collapse of oil prices after the adverse oil shock in 1986 that became $13.53 per barrel. From 1988 to 1994 the Algerian Dinar continued to decrease recording DZ5.91 in 1988, DZ8.95 in 1990, DZ21.83 in 1992 and finally DZ35.06 per $ in 1994 with approximately 51.43%, 143% and 60.6% rates of increase in the exchange rate; this depreciation was officially following the IMF request in exchange for the provided financial aid to Algeria in order to correct the rise in the real exchange rate (overvaluation) and reduce the difference between the official and parallel exchange rates.

5. The Managed Floating System, from 1994 to 2016: The Algerian dinar has known a real transformation and a gradual change in terms of the determination. This phase can be divided into two periods:

5.1. The Fixing: It is a meeting of representatives of the commercial banks under the supervision of the Central Bank, which displays when opening the session, a fixed amount determined in US $ on the basis of the exchange policy objective. The banks will then perform the process of showing the amount to be obtained at the price that suits them and the dinar exchange rate will be adjusted gradually through the supply of foreign currencies by the bank

of Algeria and the demand for them from the commercial banks until the dinar exchange rate is determined at the lowest price offered by the participating banks.[1]

The access to the official foreign exchange market became possible by the IMF in 10-04-1994, to all economic operators (public or private) following Algeria's signature of the first agreement concerning the rescheduling of part of its debt. The Algerian state focused on maintaining the equilibrium exchange rate fixed during the period 1964-78, which led to its gradual separation from the economic reality and caused the emergence of parallel market of the national currency where it is determined by supply and demand; but due to the deterioration of oil prices during 1986 in parallel with the procedures aimed at an economy based on market forces, this leads us to think of the revaluation of the dinar in a way that reduces the difference between the official and parallel exchange rates, and in agreement with IMF, the dinar was devalued in 1994 by a rate of 40.17% (DZ36 per $), leading the Algerian Dinar to enter the managed float system.[2] At the end of September 1994 the DZ exchange rate was subsequently devalued;

5.2. The Interbank Market: In 1996, under the structural adjustment program, the Central Bank of Algeria issued on the date of 23/12/1995 the regulation n°08-95 that included the establishment of an interbank market that allows commercial banks to act freely in foreign currencies obtained by their customers, that is, all banks and financial institutions can intervene daily to sell and buy these currencies convertible freely against the Algerian dinar. The interbank market activity was officially launched on 02/01/1996 where the exchange rate is determined by supply and demand; in the context of a flexible exchange rate management policy, the DZ exchange rate was devalued in 1996 reaching DZ54.76 per $. Algeria also adopted the 8th Article of the International Monetary Fund's systems, considering it as a real first step towards the application of a floating exchange rate system so-called the managed floating. The DZ exchange rate continued to increase by stable rates compared to the previous period (by 10%), then, from 1998 to 2001 it was depreciated by 12%. In 2003, the Algerian legislator promulgated the order 3-11 on credit and money that replaces the law 90-10 to redefine the bank framework.

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[1] Bank of Algeria. (1994). *Le Fixing- un Nouveau Système De Détermination Du Taux De Change*. Media Bank n°14. p10.

[2] زيرار سمية وآخرون. (2009). أثر سياسة الصّرف الأجنبي في الميزان التّجاري الجزائري 1970-2004. *مجلة دراسات العلوم الإدارية*، 36(02)، ص361.

Among the economic programs that Algeria applied during this period, first, *The economic revitalization program (2001-04)* that express the state will for perusing an expansionist policy aimed at stimulating the overall demand through praising the large investments after the difficult experience that the Algerian economy has undergone; second, *The supplementary Program for sustaining economic growth (2005-09)* has been launched in 2005 based on two axis, the first was about launching an investment program of $55 billion dedicated to strengthen the infrastructure and revitalize the economic sectors, while the second was about controlling of current spending to maintain the stability of the wage mass. This program is considered unprecedented in Algeria's history, because of the sums allocated to it, which led to the growth of the public investment volume in high proportions (2% on average).[1]

As a result of the financial improvement in 2006 due to the soaring oil prices, Algeria has made a quasi-total payment of their debts from DZ33 billion in 2006 to less than DZ4.5 billion in 2007, but with the decline of the US$ against the Euro, the value of the DZ has been improved reaching DZ64.58 per $ in 2008, which was influenced by the financial crisis that the world economy experienced in the same year, while improvement in the exchange rate of the Dollar against the Euro has led to a decline in the currencies' values of countries that follow managed floating systems against the $, as Algeria, where the value of the DZ against the $ is depreciated by 5.12%, 4.2% in 2009, 2010[2], reaching DZ72.64 and DZ74.31 per $ respectively.

As a part of the Algerian authorities' attempts to revive their economy, a new program has been launched between 2010 and 2014 for *fostering growth*, aimed mainly to developing the province and basic infrastructure, support the human development and make it in the service of economic development and enhance the national economic competitiveness. In 2015, the Algerian authorities allowed a new devaluation to the Dinar by 25% in order to reduce the demand for imports and the pressure on international reserves and raising the oil revenues in dollars. In fact, the aim of the Algerian exchange rate policy, according to the monetary authorities, has been always trying to maintain the stability of the real effective exchange rate of the dinar at its equilibrium value against the currencies of the main trading partners, specified by the fundamentals of the national economy and also to increase the competitiveness of local

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1 زهير بن دعاس وشافية كنّاف .(2015). سياسات الاستثمار العمومي بين جدليّة دعم النّمو الاقتصادي ومخاطر تفشّي الضّغوط التّضخمية -حالة الجزائر 2001-2014. مؤتمر دولي أيام 11 و12 مارس، كلية العلوم الاقتصادية والتّجارية وعلوم التّسيير، جامعة سطيف، الجزائر، ص17.

2 دريس رشيد،(2014). انعكاس الانفتاح التجاري في الجزائر على هيكل ميزان مدفوعاتها خلال الفترة 2000- 2012 .مجلة الأكاديمية للدراسات الاجتماعية والانسانية، 11، الجزائر، ص ص 25-26.

products in front of the partners' products.[1] For analyzing the evolution of the Algerian exchange rate after 1994, we display the next Figure:

Figure n° 03-02: The Exchange Rate Evolution of the Algerian Dinar from 1994 to 2016

Official Exchange Rate (LCU per US$, period average)

Real Effective Exchange Rtae REER index (2010 = 100)

Nominal Effective Exchange Rate, Trade Partners by Consumer Price Index
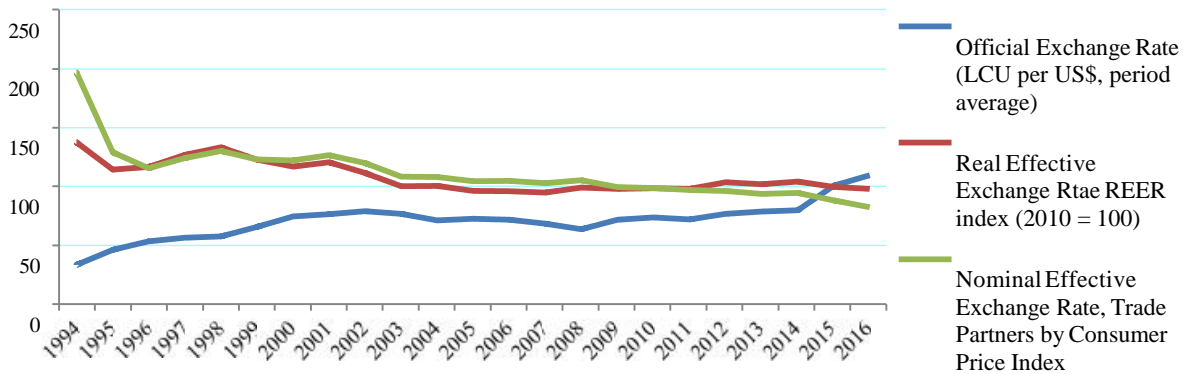
Source: Made by the author based on the World Bank and IMF databases

The previous Figure delineates the movements of the real effective exchange rate *Reer*, the nominal effective exchange rate *Neer* and official exchange rate *Ner* in Algeria from 1994 to 2016. It shows that both *Reer* and *Neer* are declining over the sample period and negatively related to the *Ner*.

In fact, the *Neer* values after (before) 2010, have been below (above) 100 meaning that the DZ (undervalued) was worth less (more) than an imported currency, while we can see that for the period 2005-07 and for the years 2009, 2011 and 2016, the *Reer* values have been below 100 indicating that domestic prices were low by international state goals, therefore, domestic producers were competitive and, conversely, for the rest of the period, the *Reer* values have been above 100 which means that the DZ was overvalued and its exchange rate was far from equilibrium as it was expected to depreciate the domestic prices too high. In fact, in the early 1990s, the depreciation of the *Reer* was mainly due to liberalizing the DZ and applying adjustment on the NER of DZ, thereafter, in 1991 and 1993 the DZ real value has been improved from 129.4 to 159.2 respectively, as a result of pursuing expansionist monetary and financial policies, the currency devaluation and pursuing an anti-inflationary policy; while in 1994 the *Reer* decreased to 137.48 because of the new adjustment for the DZ nominal exchange rate as a goal of the structural adjustment, but simultaneously with the new Mediterranean policy for enhancing the commercial relationships with the European Union and achieve a sustained

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economic and social development and the establishment of an inter-exchange market during 1995-98, the *Reer* began to increase (DZ appreciation) from 115.25 to 133.4 due to the improvement in the oil prices as in the exchange reserves and falling inflation rates, then over 1999-2000 the change in oil prices led to pursuing a severe fiscal policy and depreciating the real value of currency from 123.35 to 117.58 which thereafter, appreciated slightly in 2001 reaching 121.32 but it shows again a real depreciation reaching 96.39 in 2007, thereafter, the *Reer* was relatively stable with very close values reaching 99.35 in 2016.

Unlike the *Reer* and *Neer*, the *Ner* follows an upward trend which means that the Algerian Dinar is deteriorating over time. We can clearly observe that the Algerian Dinar was deteriorating from 1994 to 2003, because its nominal exchange rate has been increased from DZ35.05 to DZ79,68 per $ (127% as a rate of increase), due to the intervening of the Algerian authorities by devaluing the currency. The exchange rate was then, decreased in 2002 and 2003 when its value has reached DZ79.68 and DZ77.39 per $ respectively, with 2.8% as rates of decrease, while there was a slight decrease in 2004 (DZ72.06 per $) due to the increase in oil revenues resulting from higher oil prices that recorded $28.1 in 2003 and $36.05 per barrel in 2004 leading to the appreciation of the Dinar value against the Dollar.

From 2004 to 2006, the exchange rate of the dinar remained stable at DZ72 per $, then it began to fall down gradually, from DZ69.29 in 2007 to DZ64.58 per $ in 2008 with a decrease rate of 6.7%, therefore, the appreciation of the dinar against the dollar due to oil exports resulting from the increase of oil prices ($69.08 in 2007 and $94.45 per barrel in 2008). After that date, the value of the currency continued to decline gradually due to the global financial crisis, the sharp decline in oil prices from $94.45 in 2008 to $77.45 per barrel in 2010 and the appreciation of the Dollar against the Euro, causing a decline in the currencies' values of countries that follow a managed float system such as Algeria then due to the Eurozone, the imports' growth and recession of the fuel sector between 2010 and 2014. After 2014, the Dinar scored a bigger drop against the Dollar from DZ80.57 in 2014 to DZ89.6 in 2015, then to DZ99.35 per $ in 2016 with a rate of increase of 11.2% and 10.88% respectively in the exchange rate, due to the significant drop in oil prices from $96.26 in 2014 to $49.49 in 2015 and then to $40.76 per barrel in 2016 resulting from the shale-gas revolution and the intervention by monetary authorities to reduce the difference between the official and parallel exchange rates.

Section 03: The State of Algeria's Trade Balance:

Algeria is a member of the Organization of Petroleum Exporting Countries, OPEC; it is the 3rd largest oil producer in Africa after Nigeria and Angola and the 11th largest oil exporter in the world and occupies the 15th world place in terms of oil reserves and 18th world oil producer. It is also Africa's largest gas producer (over 50% of Africa's gas production) and ranked as the 10th largest gas producer in the world. Thus, it is the 2nd natural gas supplier of Europe, after Russia; and through this section, we will examine the characteristics of this economy in terms of the trade balance.

I. The Algerian Economy

In order to integrate the global economy, Algeria has opted in the process of opening up its foreign trade and engaging in international trade agreements through economic reforms initiated by the government. The liberalization of foreign trade was achieved in the 1990s by the abolition of the State monopoly on foreign trade, the lifting of all non-tariff barriers, the simplification of the customs tariff by reducing the number of tariff rates to four (0%, 5%, 15%, 30%) and reducing the maximum rate to 60% initially instead of 100% previously and 30% since 2002.

1. The Characteristics of the Algerian Economy: Foreign trade in the Algerian economy is linked to the international market, either with regard to imports, especially industrialized, semi-industrialized and food materials, or with regard to exports, particularly hydrocarbons. The movement of exports and imports and their impact on the balance of payments is the most important index of the external equilibrium, and in the case of Algeria, the evolution of the trade balance has been linked to fluctuations in the hydrocarbon yields, that is, oil and gas, in addition to the reflection of the fluctuations of the imports on the situation of this balance since it is the centre of currencies accumulation and its deterioration, is due to the economic crises that Algeria has experienced, therefore the increase in its balance was the most important goal of the related reforms because its balance is the basis of the balance of payments.[1]

In fact, the Algerian economy is undoubtedly among the most important African economies, by virtue of the nature of resources and material wealth that characterizes it (energy, mining and other important raw materials); the volume of powers and human skills by which it is characterized; the industrial sectors that are not underestimated despite the need for development; the availability of important and considerable infrastructures such as port and airport infrastructure

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[1] Raffinot, M. & Venet, B. op.cit. p20.

and the availability of important agricultural areas.[1] Nevertheless, the succession of the contradictory economic choices sometimes and their adverse effects generated economic situations which returned the Algerian economy having negative properties, contributing to weakening their combinatorial effectiveness in the international economy: [2]

1.1. Economics of Debts: in which the majority of economic policies focus on the management and stewardship of the debt crisis which is still a restriction and a modality influencing the taken economic decisions. Despite the decrease in debt rates resulting from the increase in the volume of exports due to the appreciation of oil prices, the volume of debt is not depreciated in terms of capacity to pay, particularly after the trade liberalization;

1.2. The Economics of Rent: based on an attrition strategy of oil and gas wealth at the expense of the industrialisation strategy, that makes the Algerian economy hostage to the rentier funds realized in the international markets where hydrocarbons contribute 35% of the domestic product and by 64% of the total state revenue as well as by 5% of the total exports;

1.3. The economy in which the corruption mechanisms are developed by influencing on the dynamism of economic activity and their domains and by restricting the economic policy effectiveness, what enlarged the black market networks by developing the treasures' volumes that move in their channels. This situation weakened the institutional power of the state and trembled the trust element in it.

2. The Impact of Hydrocarbons on the External Position:[3]
The trade balance recorded, until 1973, a deficit. However, the increase in oil prices had a positive effect on this later; these effects accelerated in 1979 with the second readjustment of oil prices, which allowed a growing inflow of foreign currencies used to fund several projects internally. Nevertheless, the fall of prices of 1986 questioned this development policy, worse still; the adverse-shock has highlighted some macroeconomic imbalances due to the vulnerability of the country.

The share of hydrocarbons in total exports has never been below 90% since the first readjustment of oil prices. The polarization of foreign exchange earnings around hydrocarbons makes the country dependent on two exogenous factors: the oil price on the one hand (decided

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[1] خالدي خديجة. (2005). *أثر الانفتاح التجاري على الاقتصاد الجزائري*. *مجلة اقتصاديات شمال إفريقيا*، 02 ، الجزائر، ص ص87-88.

[2] Ibid. p88.

[3] Chebbah, M. K. (2001). Evolution du Commerce Extérieur de l'Algérie: 1980-2005. U.M.M.T.O, *Review of Campus, 07,* pp. 46-48.

according to the law of the world's supply and demand) and the price of the US dollar on the other hand. This situation has made Algeria a mono-exporting country. Thus, the rise in these prices triggered by the second shock of 1979 succeeded in increasing export earnings by 75% between 1979 and 1985, thus reaching DZ64.5 billion. A year later, that is, in 1986, Algeria, like all mono-hydrocarbon exporting countries, had found that the continual increase in oil prices was only a "mirage" for attracting it finally in a "trap". Indeed, this adverse-shock was at the base of an unprecedented fall in the price of a barrel of its oil, bringing it down to an average of $13.53 per barrel after having reached the average of $27.01 per barrel in 1985. This situation has shown to the Algerian authorities that export revenues based on a high price are neither a safe nor a sustainable source of financing. As a result, export earnings fell by 45% in a year. These fluctuations explain Algeria's sensitivity to the international "shocks". Indeed, the delicacy of foreign trade is due to the homogeneity of the hydrocarbons whose prices are fixed internationally, and to the heterogeneity of the products imported by Algeria whose prices are fixed unilaterally by the suppliers. In the interior, the oil rent decreases the importance of the productive effort, according to a phenomenon studied by economists on the Netherlands economy (after the discovery and exploitation of gas in the North Sea), called: "Dutch Disease". This phenomenon does not affect only Algeria but almost all countries that have significant natural (and especially petroleum) resources such as Venezuela, Nigeria, etc. In 1985, Algeria launched a second five-year plan that will not be completed because of the oil crisis; the budgets dedicated to its financing came from hydrocarbon revenues, and the recourse to the external debt itself contracted by counting on the hydrocarbon sector to repay it; but the sudden fall in their prices has shattered all hopes of the state.

At the beginning of the 1990s, it found itself compelled to call on external financing, in this case, that of the IMF, to ensure the commodities import. This situation leads us to pose another problem that has a relation to foreign trade and constitutes a threat to the Algerian economy; it is that of the external debt. The analysis also shows that there is a narrow relation between foreign debt and hydrocarbon revenues: First, because the contracted debt, after the implementation of "industrializing industry" strategy, developed after the oil adverse-shock, in other words, after the decline in hydrocarbon revenues. Then, because the refund of this last is the result of hydrocarbon revenues. Today, the prepayment constitutes the end of the nightmare of the foreign debt, so putting an end to problems that have been debated for a long time. The analysis of foreign trade would be complete only by integrating the geographical factor, to be able to define the subject.

The following Figure shows the evolution of oil rent, oil prices and debt in Algeria from 1970 to 2016.

Figure n° 03-03: Oil Rent, Oil Price and Debt in Algeria from 1970 to 2016
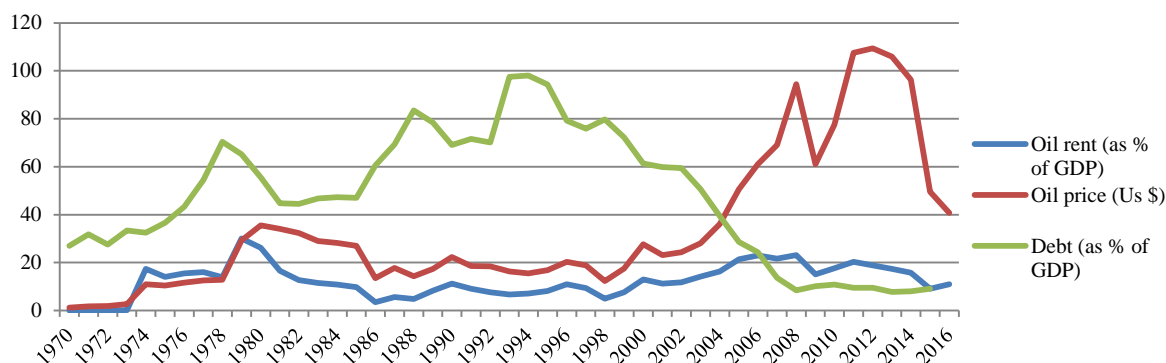
Source: Made by the author based on the World Bank, OPEC and IMF databases.

The previous figure shows clearly that the oil returns and prices are not stable over the period 1970-2016. We can clearly observe that the oil revenues as a share of GDP were continuously improved from 0.04%, with $1.21 per barrel in 1970 to 30.10% with $29.19 per barrel in 1979, then started to fall down gradually till 1986 recording 3.53%, with $13.53 per barrel due to the severe crisis in the global market. Thereafter, they continued to fluctuate and the price of oil did not rise much reaching the highest value of $22.26 per barrel in 1998, then, began to fall again reaching $12.28 per barrel, which is a very low value due to the imbalances in supply and demand at that time.

The oil revenues were consistently growing from 2002 to 2008 with a rate of increase of 96% because of the higher oil prices in this period, that reached the ceiling of $94.45 per barrel in 2008 and the promulgation of the new hydrocarbon sector law 05-07 that includes new taxes, fees and a more liberal tax system. In 2009, the oil price decreased to $61.6 per barrel in parallel with the oil revenues (from 23.13% to 15.12%) due to the global crisis, but they have been rising again until 2013 due to the booming petroleum prices and stabilized demand. Thereafter, oil prices collapsed sharply from $15.71 per barrel in 2014 to $10.92 per barrel (57.65% rate of decrease), thus, the oil revenues have shrunk from 15.7% to 9.06%.

The key reasons for such high volatility include: the emergence of shale oil production that contributed to causing a glut of global supply; falling global demand of the emerging markets such as China given the pattern of economic hardship and the collapse of their exports and investments due to the loss of competitiveness in international markets; the use of alternatives to oil and the change in the strategic behaviour of OPEC through focusing on maintaining its market share over prices such as increasing oil production despite the global excess supply.

These fluctuations in the hydrocarbon sector have exacerbated the external indebtedness problem in Algeria. Through the Figure we observe that Algeria's debt as a share of GDP has been increased from 31.83% in 1970 to 33.39% in 1973 then to 70.35% in 1978; this due to the development policy that was implemented in Algeria and required huge investments that exceeded the local funding possibilities, therefore authorities were forced to recourse to borrowing in order to finance these investments.

After 1978, the indebtedness dropped progressively due to the improvement in the oil revenues reaching 47.5% in 1985, thereafter, it started to increase again with the fall in oil prices in 1986, the collapse of oil rent, the balance of payments deficit, the inability to cover the national debt payments and Standby Credit Facility (1989-1991), reaching a peak at 97.97% in 1994, while it is clearly visible from the Figure that it began to decrease continuously after this date from 79.78% in 1998 to 24.3 in 2006 due to the increase in oil revenues and foreign exchange reserves. By 2008, Algeria has paid off a very significant part of their debts reaching 8.39% then, 7.96% in 2014 and 10.92% in 2016 because of the debt rescheduling and it has recently been classified among the ten least indebted countries according to the Global Competitiveness Report.

II. Foreign Trade Situation of Algeria

The Algerian trade has undergone a pronounced development can be summarized in two phases, namely:

1. The Evolution of Algeria's Trade from 1991 to 2005: The share of hydrocarbons in Algerian export earnings increased from 72% in 1962 to 98% between 1978-79 as a result of the rise in oil prices during the period 1973-74 due to the Arab-Israeli war, when the trade balance registered a surplus in 1974, and the same thing happened in the period 1979-80 following the Iranian Islamic Revolution; however, a deficit of trade balance occurred in the late 1970s, that is 1977-78, due to rising domestic demand for goods and services, but during the period 1979-85, the trade balance recorded a surplus where the import coverage rate by exports was 147%, on the other hand, the collapse of oil prices in 1986 led to a reduction in the trade surplus of 96% compared to the previous year. This event has highlighted the weaknesses in the national economy's structure and in order to get out of this crisis, the state has increased borrowing rates and restrictions on borrowing imports.[1]

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[1] زيرار سميّة وآخرون. مرجع سابق، ص361.

Since 1990, Algerian foreign trade has been characterized by a very important evolution; the liberalization of foreign trade seems to be the essence of the implemented reforms to respond to the need to adhere to a free and open market economy in the context of globalization. For this purpose, trade policy is implemented, focusing on the objective of diversifying exports by expanding the range of products exported to agricultural products and industrial products. Nevertheless, this measure faces competition-related challenges facing domestic firms. On the other hand, the situation in Algeria remains troubled, because of the social and security crisis that has affected it for a long decade called a black decade. The economic sector did not escape this crisis.[1] But despite the reform policies pursued by Algeria in the period 1992-93, it was unable to contain the growing imbalances, especially the decline in foreign exchange reserves that have reached $1.1 billion,[2] and the continuing decline in export earnings causing a deficit of $0.68 billion and $1.5 billion in 1993 and 1994 respectively, due to lower fuel prices, as well as the coverage ratio of import, reached 94.14%, 86.84%, and 90.34 respectively. It is noteworthy that the Dinar was devalued by 50.17% in 1994.

In such difficult circumstances, the Algerian authorities were obliged to implement a global economic reform concluded with the IMF (the commitment of structural stabilization, its duration 1 year then 3 years from 1995 to 1998) in the context of the consolidated facility of the fund; this economic reform program aims to restore the equilibrium of the balance of payments balance by applying appropriate levels of foreign exchange reserves where the current account has expressed a deficit of 5% of GDP in 1995 due to the increase in imports following the implementation of the import liberalization measures, in addition to the depreciation of the currency that raised the debt servicing costs in US dollar, despite the slight improvement in oil prices in 1995 that reduced the deficit in trade balance by $0.22 billion.

The current account deficit turned into a surplus in 1996 and 1997 because of the increase in hydrocarbon exports after the increase in oil prices to $21.7 per barrel in 1996, and a deflation of imports by 10% and 11% in 1996 and 1997 respectively, resulting in a surplus in the overall balance of payments of $1.16 billion but a deficit occurred in 1998 and 1999 due to the sharp drop in oil prices, reaching 12.9 and 17.8 in these two years. Which in turn, makes the Algerian current account in deficit in 1998 but this account began to record financial surpluses until 2008, when it reached $34.54 billion due to the significant improvement in oil prices that approached a hundred

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[1] Chebbah, M. K. op.cit. p44.

<div dir="rtl">[2] دريس رشيد. مرجع سابق، ص28.</div>

dollars per barrel in the same year, and the capital account continued to record deficits reaching a maximum of $11.22 billion when the authorities paid their debts of $12.9 billion in 2006 in advance, while it recorded a surplus from 2008, due to the increase in equivalent net foreign investments of $5.3 billion in 2010 and the increase in the short-term loans that were estimated at $1.77 billion in the same year.

However, the overall equilibrium of the balance of payments recorded a surplus of $7.5 billion in 2000, then stabilized on the same level in 2003 and then it multiplied almost five times reaching its highest level in 2008, then fell sharply in 2009, reaching $3.8 billion, then increased to $20.1 billion in 2011, it can be seen that Algeria's balance of payments situation has not been stable and has remained volatile especially in the period 2009-12 as a result of external shocks to the Algerian economy due to the rise and fall in oil prices and exchange rate volatility, but it has improved remarkably during the period 2003-08, which makes economic policies unable to maintain the stability of the balance of payments, that still subject to the evolution of the international economic situation.[1]

We can say that the Algerian economy is undoubtedly linked to the changes in the international economy, especially to the evolution of oil prices, this is evident through the monitoring changes in the oil price and its impact on economic development, once the oil market was improved in 1996, the export earnings and foreign exchange reserves were sharply increased, therefore the pressure of import growth continues in 1997, despite the occurrence of a fundamental change in imports through to the structural adjustment program. The depreciation of imports' level is mainly due to the procedure of refining inefficient institutions that relied on importing through further customs' reductions under the free trade agreement being negotiated with the European Union, and in addition to joining Algeria in the future in the World Trade Organization. Indeed, benefiting from the liberalization of foreign trade and making gains, are directly linked to the flexibility of production factors, the level of skill of the labour force, the degree of competition and the level of the technical production means, all these elements are not available in developing countries in general, and particularly in Algeria.[2] Finally, the Algerian economic scene will be marked by: [3]

a. The external debt management through the call to the IMF;

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[1] Ibid. p29.

[2] شامي رشيدة .(2006). المنظّمة العالمية للتّجارة والآثار المرتقبة على الدّول النّامية حالة الجزائر. أطروحة مقدّمة لنيل شهادة دكتوراه دولة في العلوم الاقتصادية وعلوم التّسيير، جامعة الجزائر، ص201.

[3] Chebbah, M. K. op.cit. p44.

b. The management of the external debt between 1994 and 1998 by the structural adjustment plan;

c. The economic recovery plan 2001-04: At the end of the 1990s, the Algerian economy experienced a fairly satisfactory economic climate, which materialized in positive macroeconomic indices, resulting from the various adjustments and reforms implemented throughout this decade. Notwithstanding this situation, the social remains spared by these reforms: high unemployment rate, declining purchasing power, social crisis, etc. It is in the perspective that a program to support economic recovery is set up spreading over a period of four years (2001-04), the plan differs completely from the planning of the years of socialism; it is only a support instrument or a complement to the State budget. It has an envelope of just over $7 billion;

d. The second plan to support economic growth 2005-09: of an amount of $60 billion, the second program to support the economic recovery spreads over a period of five years, 2005-09.

1.1. The Trade Balance between 1990 and 2005: Exports have usually been limited to the international oil and natural gas markets, and precisely on oil prices. The following table shows the numerical evolution of Algeria's imports and exports, as well as its trade balance, over the period 1990-05.

Table 03-01: Algeria's Balance of Trade (in Billion US$) and Coverage Rate in% during the 1990- 2005 period.

	GDP	Imports	Exports	Balance of Trade	Coverage rate%
1990	62.04	15.47	14.546	-0.93	94.01
1991	45.71	10.79	13.31	2,52	123.38
1992	48	11.46	12.15	0.69	106.08
1993	49.95	11.56	10.88	-0.68	94.14
1994	42.54	11.08	9.58	-1.50	86.48
1995	41.76	12.11	10.94	-1.17	90.34
1996	46.94	11.24	13.97	2.73	124.29
1997	48.18	10.28	14.89	4.61	144.84
1998	48.18	10.85	10.88	0.03	100.28
1999	48.64	11.08	13.69	2.61	123.58
2000	54.79	11.39	23.05	1.17	202.37
2001	54.74	12.05	20.08	8.03	166.64
2002	56.76	14.55	20.15	5.61	138.53
2003	67.86	16.20	25.95	9.75	160.20
2004	85.32	21.88	34.17	12.3	156.16
2005	103.2	24.84	48.71	23.9	196.09

Source: The authors' own calculations based on the World Bank Database

The previous Table is showing that the trade balance for 1990 and from 1993 to 1995 has been in a deficit while for the rest of the period, it recorded positive balances according to the World Bank. The deficit can be explained by the following facts: On the one hand, the external situation of Algeria at the beginning of the 1990s, as its resort to the IMF; and on the other hand, the fluctuations that have marked the oil markets where, the oil price declined from $22.6 per barrel to $15.83 in 1994 and $16.86 in 1995 leading to a decrease in exports that reached about $9.58 billion in 1994 compared to $14.54 billion in 1990, whereas, the imports increased from $11.08 billion in 1994 to $12.11 billion in 1995 due to the decline in the dollar value against the other currencies and the rise in the prices of the imported goods, mainly the grain, thereafter, in 1998, the oil price declined to $12.38 compared to $18.86 per barrel in 1997 which affected the exports volume and decreased the coverage rate from 144.84% to 100.28% (a very slight surplus of $0.03 billion in the trade balance). This situation will not last; from 1999 to 2005, prices resumed their rise again reaching $50.64 per barrel at the end of the period. Shortly, the trade balance has remained in a surplus until the end of the period, as well as the exports have remained dependent on the international oil and natural gas markets. Exports follow the evolution of hydrocarbon prices in almost a perfect manner; this calls into question the will of government for diversifying exports. Although their impact cannot be seen directly in the quantitative evolution of the trade balance, the advent of the Euro, as an international currency, affects Algerian foreign trade. Importing in € (almost 55% of total imports) and exporting hydrocarbons essentially in $ (nearly 98% of export earnings), Algeria suffers a loss, especially as the Euro is more expensive, in terms of price, than the dollar. (€1= $1.25). [1]

Figure n° 03-04: Evolution of GDP, Exports, Imports and Trade Balance in Algeria from 1990 to 2005.
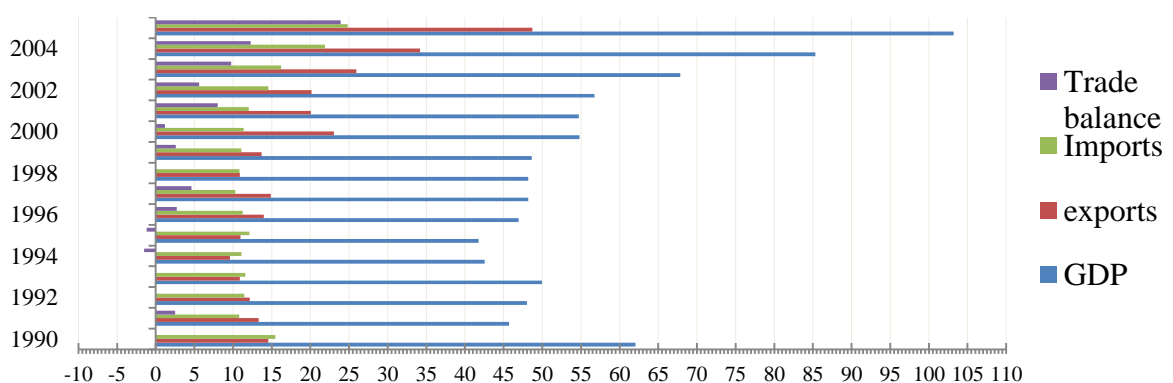
Source: Author's calculations based on the World Bank database.

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[1] Ibid. p45.

1.2. The Structure of Algeria's Exports and Imports by Groups of Products

1.2.1. Exports: Algerian exports are mostly made up of fuels and lubricants representing a rate of around 98% over the period 1980-2005. This situation made Algeria a mono-exporter of hydrocarbons, hence its vulnerability to external shocks. The level of hydrocarbons in the structure of exports is quite high, creating a situation of dependence on the outside world. This situation nevertheless, requires being closely apprehended and developed. The following Figure shows the structure of Algeria's exports more precisely.

Figure n° 03-05: The Structure of Algeria's Exports in 1990 and 2005.
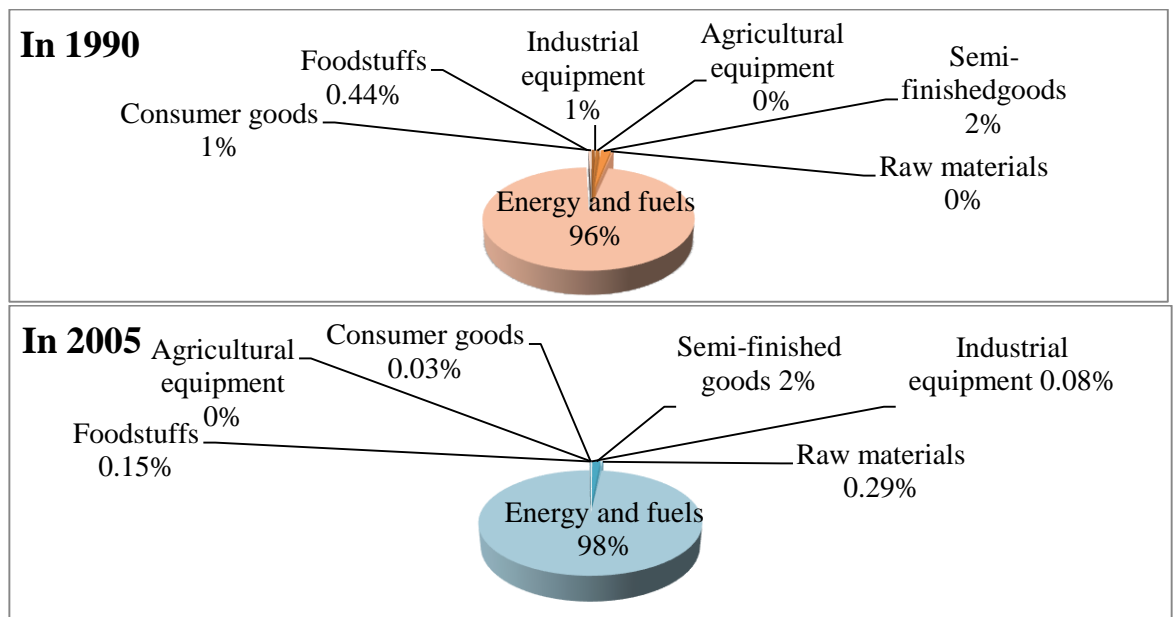
Source: Made by author base on the ONS database

As shown in the Figure above, the Energy and fuels dominate the highest percentage of exports, reaching a share of 98% in 2005 after reaching 96% in 1990, while the semi-finished goods has been ranked in the second position with a stable share of 2% of the total exports throughout 15 years, then, the industrial equipment and consumer goods have been in a third place with 1% for both in 1990 while they reached 0.08% and 0.03% respectively after the raw materials 0.29% and foodstuffs 0.15% in 2005 compared to 0% and 0.44% respectively in 1990.

1.2.2. Imports: The beginning of the 1990s is marked by high consumption of food and beverages. This is due to the government policy that was faced with a critical situation of lack of liquidity. The government has, therefore, begun to reduce the imports' growth rate and focused mainly on necessities. From 2001, the structure of imported products takes

place years before 1990, namely, industrial supplies and machinery and other capital goods.[1] The following Figure shows the main components of Algeria's exports structure.

Figure n° 03-06: The Structure of Algeria's Imports in 1990 and 2005 respectively.
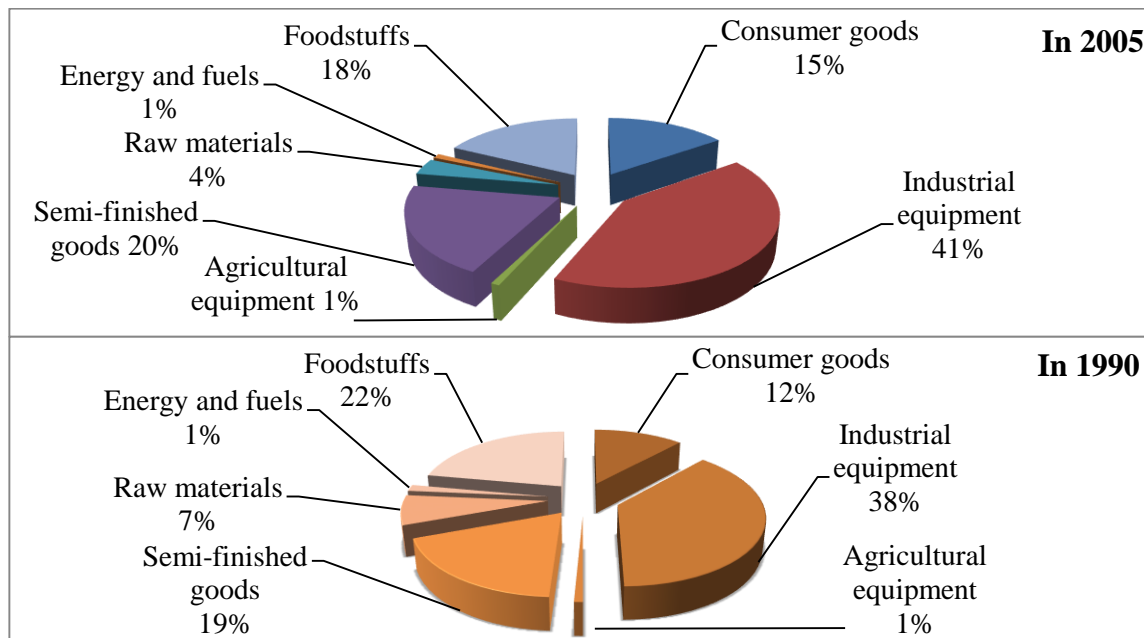
Source: Made by author base on the ONS database.

The previous Figure demonstrates the main imports of Algeria, classified into seven groups. According to the data shown in Figure, Industrial equipment had the largest share of imports reaching 38% and 41% in 1990 and 2005 respectively (increase of about 3% over 15 years); in a second position, Foodstuffs reached 22% in 1990 while were ranked after the Semi-finished goods, (a decrease of 4%), that record a share of 20% of the total imports (an increase of 1%) in 2005; then, the Consumer goods were ranked in the fourth position with 15% in 2005 after being 12% in 1990 (an increase of 3%) followed by the raw materials that decreased by 3%, while the energy and fuels and agricultural equipment, both remained stable at 1%.

1.3. The hydrocarbons Weight Problem in the Total Exports: The negative consequences of the Algerian economy openness to the outside world are many because of the predominant position of hydrocarbons in total exports, accounting for almost all of their revenues. This situation is very delicate as it represents a risk for the entire internal economic situation.

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[1] Ibid. p46.

2. The Evolution of Algeria's Trade from 2006 to 2016

2.1. The Balance of Trade between 2006 and 2016: Algeria's exports structure is dominated by the hydrocarbon sector, that represents more than 96% of the total value of exported goods during the first decade of this century, while exports of other products have remained far from expectations representing only the marginal values of total exports. As for imports, they have been divided mainly into four basic components are food products, industrial and agricultural equipment, capital equipment and also non-food consumer products.[1] Algerian exports have increased significantly and continued to reach almost $82 billion in 2007, compared to $57.1 billion in 2005 that Algeria has not achieved since the independence because of the historical rise of oil prices in the world market. In contrast to this oil boom, Algerian imports continued to increase progressively, due to the economic stimulus program implemented by Algeria, which has required huge private funds, especially with regard to the capital goods to develop the infrastructures and achieve the desired development by authorities. As we can see from the following Table since 2005 the Algerian trade balance has recorded a surplus in a progressive direction until 2008 when a deficit of $0.79 billion had been registered due to the negative impact of the external shock. The world financial crisis that was manifested by a sharp decline in oil prices, and this in parallel with the entry of advanced economies into the recession stage, which confirms the dependence of the national economy of the hydrocarbon sector.

Table n° 03-02: Algeria's Trade Balance (in Billion US$) and Coverage Rate from 2006 to 2016.

	GDP	Imports	Exports	Trade balance	Coverage rate%
2006	117.03	33.6	63.5	30.0	189.26
2007	134.98	49.1	82.0	32.9	167.09
2008	171	49.3	48.5	-0.79	98.38
2009	137.21	50.7	62.0	11.3	122.35
2010	161.21	57.4	77.6	20.2	135.22
2011	200.02	59.6	77.1	17.5	129.38
2012	209.06	63.8	69.7	5.89	109.24
2013	209.76	68.3	64.6	-3.65	94.65
2014	213.81	60.6	38.5	-22.2	63.44
2015	165. 87	56.1	33.4	-22.7	59.55
2016	159.05	61.9	40.9	-21	66.14

Source: The authors' own calculations based on the World Bank Database

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[1] Ibid. p51.

Thereafter, from 2009 to 2012, the trade balance recorded a surplus of $20.2 billion in 2010, representing a rate of increase of about 76.7% compared to 2009 due to the slight increase in exports by $15.6 billion, then this balance declined to $5.89 billion, representing a decrease of 70.84% compared to 2010, given that the imports coverage rate by exports has been 135.22%. Although, the trade balance showed a deficit of $3.65 billion in 2013 (against a surplus of $5.89 billion in 2012), with a decrease of 38% from the one recorded in 2012 and a coverage rate of 94.65% after it has been 109.24% in the same year, because of the decline in export earnings by 7.32% and the increase in imports by 7.05% compared to 2012.

However, during the period 2013-16, Algeria's trade balance has been in an increased deficit reaching $21 billion in 2016, representing an increase of $17.35 billion compared to 2013. More precisely, the Table above is showing a total export volume of $40.9 billion in 2016 with a decrease of $23.7 billion, compared to 2013 and an overall import volume of $61.9 billion in 2016, with a decrease of 6.4% compared to 2013 as the coverage rate of imports has thus decreased from 109.24% in 2012 to 66.14% in 2016 due to the deterioration of the oil prices following the shale gas revolution in the United States of America. The following Figure helps to demonstrate the importance of exports, imports and Trade balance with respect to GDP.

Figure n° 03-07: Algeria's Balance of Trade (in Billion US$) and Coverage Rate from 2006 to 2016.
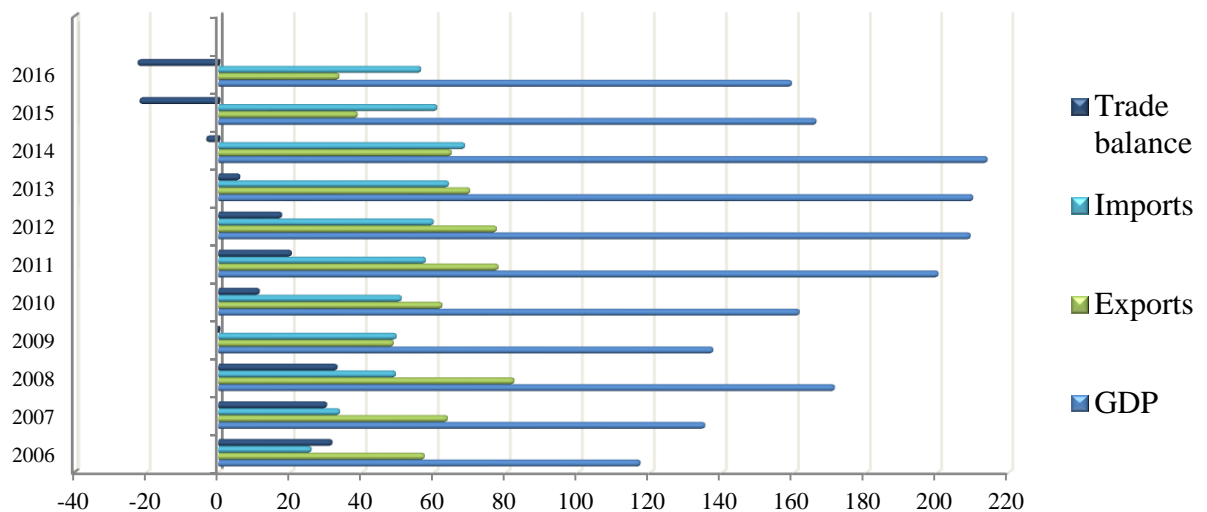
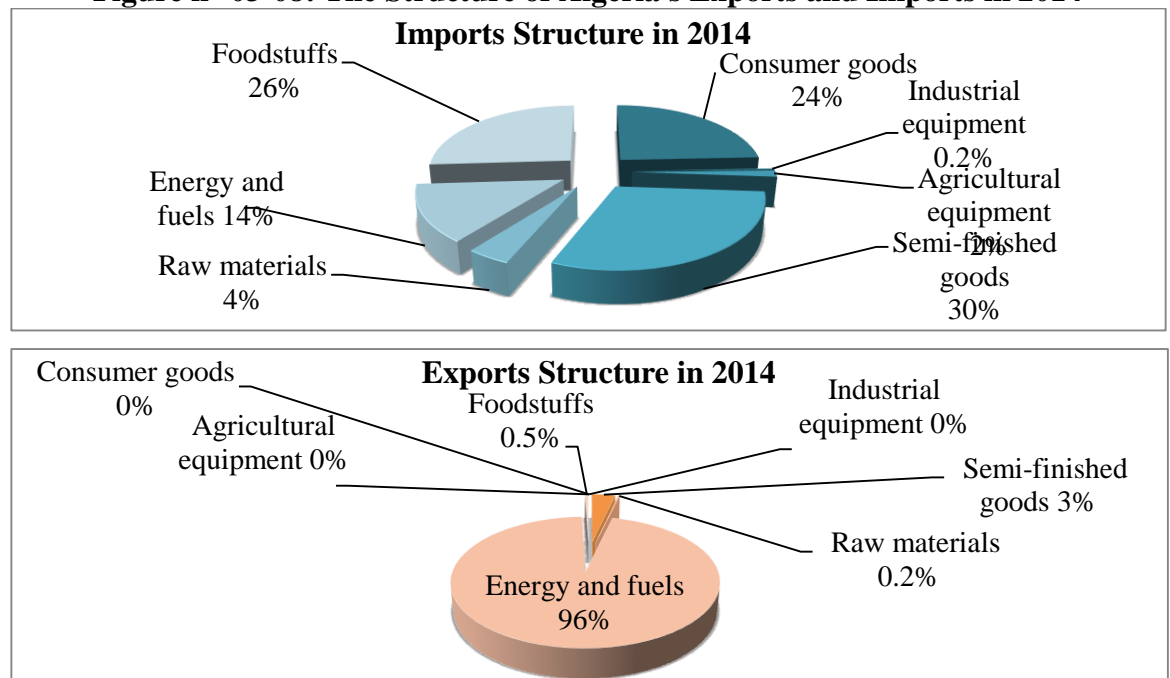**Source:** The authors' own calculations based on the World Bank Database

2.2. The Structure of Algeria's Exports and Imports- by-Products:

2.2.1. Exports: Algeria's dependence on oil rent has been increased in the last decade recording more than 97% ($53.17 billion) of the global volume of exports and about 20.35% share of GDP in 2010 representing the highest value recorded since the 1980s. As

for the share of the rest, which is already low, has decreased significantly: The main exported non-hydrocarbon products are essentially composed of the semi-finished product group that has been 3% of the total volume of exports, i.e. the equivalent of $274 million in the same year. The group of foodstuff came at a second place with only 0.5% of the overall volume of exports being worth $14.54 billion in 2014. Thereafter, the raw materials group has recorded a share of 0.2% or $109.63 Million followed by the consumer products, industrial and agricultural equipment groups with 0%. Shortly, the non-hydrocarbon exports, still marginal, with only 3.7% of the total volume of exports, which is the equivalent of $2.03 billion, showing a slight increase of 12.46% compared to 2013.

In fact, the lack of diversification is one of the major problems raised by the mono-producing economies of the developing countries in general, including oil-producing countries as Algeria. However, considerable sums have been spent in the industrial sector in order to break free from its dependence on a single product and thus obtain hard currencies by substituting oil for manufactured products. Nevertheless, Algeria seems doomed to export for a long time almost exclusively oil and gas. The next Figure is showing the share of each group in both total exports and total imports in 2014.

Figure n° 03-08: The Structure of Algeria's Exports and Imports in 2014

Imports Structure in 2014
Foodstuffs 26%
Consumer goods 24%
Industrial equipment 0.2%
Agricultural equipment 2%
Energy and fuels 14%
Raw materials 4%
Semi-finished goods 30%

Exports Structure in 2014
Consumer goods 0%
Agricultural equipment 0%
Foodstuffs 0.5%
Industrial equipment 0%
Semi-finished goods 3%
Raw materials 0.2%
Energy and fuels 96%

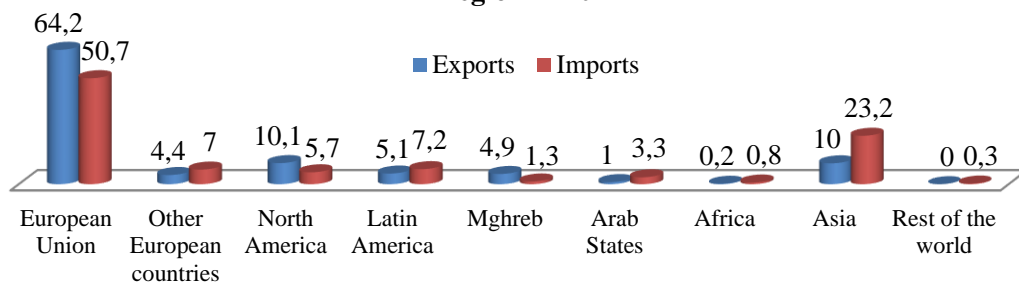**Source:** Made by author base on the ONS database

The energy and fuels remained the main group in the structure of exports with a share of 96% (a decrease of 2% compared to 2005), then the semi-finished goods with 3%,

foodstuffs with 0.05% and raw materials with 0.2%, while the industrial equipment, the consumer goods and agricultural equipment have not been exported.

2.2.2. Imports: Imports consist mainly of the semi-finished products, foodstuffs, consumer goods and energy and fuels representing respective shares of 30%, 26%, 24% and 14% of the total of imports in 2014 with increases of 10%, 8%, 9% and 13% respectively compared to 2005, followed by the raw materials, the agricultural equipment representing 4% and 2% respectively with 0% and 1% compared to 2005, while the industrial equipment has been recorded at 0,2% with a high decrease of 41.8% of total imports.

3. The Geographical Distribution of Algerian Trade: Algerian trade is mainly made with the Organization for Economic Cooperation and Development countries (OECD), particularly the European Union with nearly 50% of the total foreign trade because France has been the largest supplier of Algeria for decades for historical reasons on the one hand and geographical on the other. The geographical distribution of Algeria's trade in 2014 is detailed as demonstrates the following Figure:

Figure n° 03-09: The Structure of Algeria's Imports and Exports by Region in 2014

Source: Made by the author based on the ONS database.

The countries of the European Union members are still the first partners of Algeria, representing 64% of Algeria's total foreign trade in terms of exporting and 50.7% in terms of importing, where France, Italy, Spain and Germany are the leading contributors of 37.8% of the total exchanges in terms of imports; followed by Asia from which China, South Korea and Japan have contributed by 10.8%, 2.5% and 3.73% respectively for imports while exports towards these countries were estimated at 10%. Thereafter, in terms of importing Latin America came in the third place from which Algeria imported approximately 7.2%, then Other European countries with 7% of total

imports, including Turkey with 3,6%, followed by North America (5.7%), Arab states (3.3%), Maghreb (1.3%), Africa (0.8%) and finally the rest of the world (0.3%). In terms of exporting North America and Asia were ranked in the second position with 10% for both, while the third position was for Latin America (5.7%) followed by Maghreb (4.9%), Other European countries (4.4%) then Arab states (1%) and Africa (0.2%).

4. The Trade Openness Degree and Liberalization Policies: The index of the relative importance of foreign trade can be represented by the openness degree of the economy to the outside world, which is expressed mathematically as follows: Trade Openness Degree = (exports of goods + imports of goods) / GDP. The Algerian economy is not open to a large extent in the world, where there were fluctuations in the foreign trade contribution to GDP of 40% by increasing and decreasing, and it seems that the Algerian economy was open during period 1973-84, but the period 1985-90 knew a decline in the proportion of the contribution of foreign trade to GDP relative to GDP and this rate is fluctuated by 40% during the period 1991 to 1995 due to currency devaluations, but subsequently improved continuously.

Algeria is still in transition, which means that their trade policies to the outside world have undergone multiple and different stages, as the reality of trade openness in Algeria requires the analysis of various developments in the liberalization of the international trade it knew. From 1989, the authority implemented a progressive program for the liberalization of trade, by cancelling the restrictions on central imports that were replaced by a more flexible system serving to allocate a specific amount of currency and credit for each company, and it does enter the additional funding law in August which removed import monopolies and all restrictions on import licenses, although some imports remained under administrative control because of local trade restrictions while restrictions remained imposed on trade in services - tourism, health and education expenditures abroad.

In 1992, the renewal of financial imbalances led authorities to tighten restrictions on foreign exchange rate and to expand the scope of import ban as well as the government contained since the oil crisis of 1986 until 1994 imports through the imposition of restrictions on trade and payments, after certain increases in imports as a result of the liberalization of trade in 1989, exchange controls and restrictions were tightened again in 1992 to guarantee the servicing of the external debt, by carrying out the removal of the restrictions in 1994, cancelling the rule that requires the financing of certain imports of consumption in unlimited private currency of the importer, he minimum limits imposed on the deadlines for the payment of importers' credits and

freeing imports of industrial and professional materials used, in addition to this, customs protection has reduced the maximum tariff limits on imports from 60% in 1996 to 50%, then to 45% in 1997, and decided to apply the customs' reductions under the Free Trade Agreement that Algeria has signed with the European Union, in addition to the possibility of accession of Algeria to the World Trade Organization, as in 2009, Algeria, that joined the Free Arab Trade Agreement in 2008, began to apply for the full exemption on customs' duties and taxes and taxes that have a similar impact to imported products of Arab origin, as well as members of the region have also implemented the customs' exemptions for imports of Algerian origin. By virtue of this system that has great flexibility in determining the rate at which the monetary authority sets the value of the local currency against a basket of currencies and the Central Bank intervenes in the determination of ceilings of purchase and sale prices. The following Figure shows the evolution of the openness degree in Algeria from 1990 to 2016.

Figure n° 03-10: The Trade Openness Degree in Algeria
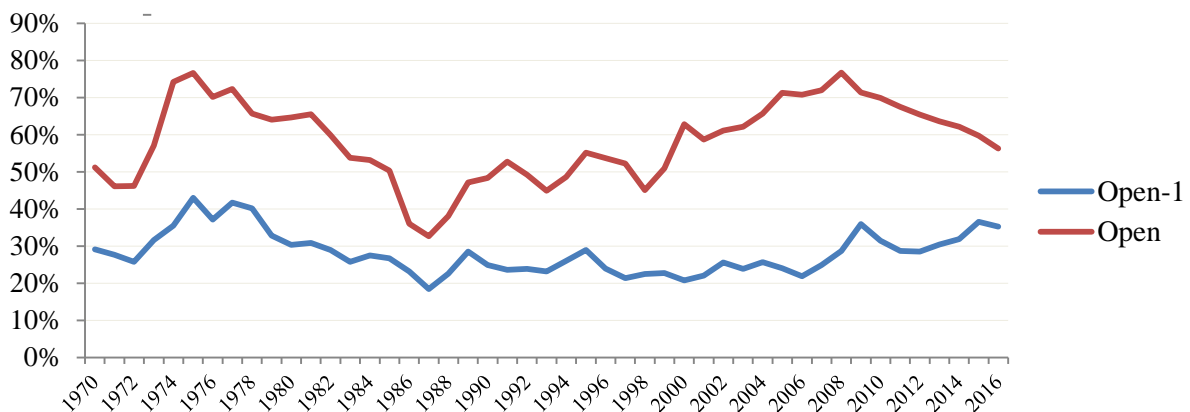
Source: Author's own calculations based on the World Bank database.

Based on what the Figure shows, Algeria has a commercially open economy since the 1970s. The *Open_1*, that reflects the extent to which imports contribute to meeting aggregate demand, that is, the scale of reliance on the outside to meet the local demand, decreased gradually from 43% in 1975 to 18.41% in 1987, which is the lowest value in the studied period, due to the weak structure of imports, thereafter, this index increased gradually recording their highest values in 1989, 1995, 2009 and 2015 with 28.51%, 29%, 35.95% and 36.55% respectively. This shows the important role that imports play in meeting national needs. The trade openness rate was also represented by the index of Open that reached 76% in 1975 after it has been 50% in 1970 due to the oil boom of that period, then, it decreased gradually reaching 32.68% in 1986 due to the weak structure of imports and the steady drop in the prices of oil especially that hydrocarbons represent approximately 97% of Algeria's exports structure, thus, the openness degree is linked to the

fluctuations in oil prices. After 1987, this degree has been improved gradually reaching 50% in 1994 and 55.19% in 1995 after it has been 44.92% in 1993 because of the rise in imports caused by the followed policies for opening increasingly to the outside world, the continued rise in oil prices in this period and the conditions of accession to the World Trade Organization, then it fell again in 1997 and 1998 because of the oil crisis.

Over 1998, it was increasing continuously reaching a peak of 76.68% in 2008 compared to 62.86% in 2000. However, due to the 2008 global financial crisis, it fell to 71.32% in 2009 and continued decreasing until 2016 reaching 56.27%. In fact, there is a huge difference between the trade openness outside the hydrocarbon sector represented by *Open_1* and the trade openness including hydrocarbon represented by *Open.* More precisely, *Open_1* represents approximately half on average of Open*,* which confirms the importance of the hydrocarbon sector in Algeria's economy.

III. The Contribution of Different Sectors in GDP and their Employment Share

1. The Contribution of Different Sectors in GDP: The revival in the Algerian economic sectors is mainly influenced by the hydrocarbon sector because the growth factors in these sectors depend mainly on the resources of the hydrocarbon sector, either directly or indirectly, through the redistribution of oil revenues depending on the mechanism of government consumption expenditure (employees ' wages in the public sector) and the capital expenditure (development projects, infrastructures and services). The Figure below illustrates the evolution of the contribution of different sectors in GDP and the nature of their association with the hydrocarbon sector.

Figure n° 03-11: The Share of Diffrent Sectors in GDP %
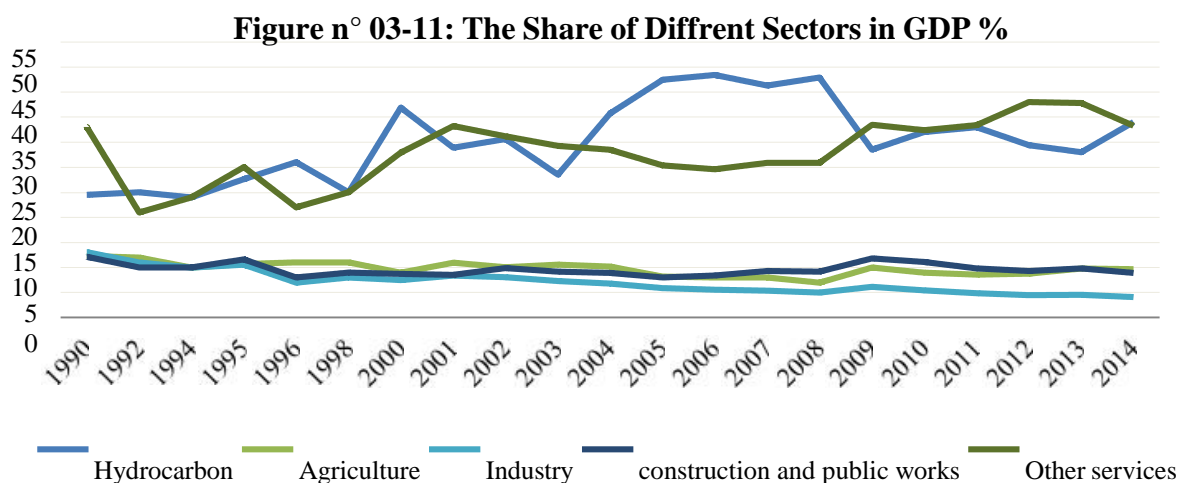
Source: Data from different reports of the ONS (See the table shown in the Annex n° A-01)

**1.1. Fuels and Services:** Through the shown figure, the dominance of the GDP share of the hydrocarbon sector in parallel with the services sector is clearly visible, where the first recorded an increasing contribution of almost 17.5% during 10 years after 1990, then, it has been fluctuated up and down reaching 39% in 2014 compared to 41.9% in 2000 noting that it peaked in 2006 at 48.4%, due to the oil prices fluctuation in the world market or the reduction of production within the oil price hike strategy; while the contribution of the services sector declined by 5% over 1990-2000 reaching a peak at 30.4% in 1995, thereafter, it has been fluctuated recording 42.8% and 38.3% in 2013 and 2014 respectively.

1.2. Industry, Agriculture and Public Works: The industrial sector (Manufacturing) suffers from a severe weakness depending on the percentage of its contribution to GDP that peaked at 10.97% in 2001 compared to 13.1% in 1990 and 4.1% in 2016, perhaps due to the crush of many projects and the political instability during the 1990s in addition its inability to manufacture strategic goods that simulates the international developments as a result of the limited productivity of employment, the lack of attention to quality and the inflexibility of productive apparatus. Similarly, the agricultural sector suffers also from a severe weakness in a decreasing direction of 2.6% over 27 years, although it has recorded a modest growth about 1% starting from 2011 but it remains below the required level the agricultural nature of the state, mainly due to the political instability and rural displacement especially in the 1990s. Whereas, the construction and public works sector reached its highest value of 11.8% in 2009 that declined later to 8.9% in 2014. It should be noted that the fall in the contributions of industry, agriculture, public works and services sector simulates the increase in the contribution of the hydrocarbon sector. These sectors can be arranged in terms of their importance in contributing to GDP, the lion's share was for the hydrocarbon and services sectors, representing 36.59% and 35.69% respectively after 2000 followed by the agricultural and public works sectors representing 9.2% and 9.39% respectively and finally the industrial sector with 5.99%.

The value added to GDP by economic sector also shows the absolute dominance of the hydrocarbon sector that has recorded 42% in 1999 compared to 24% in 1990 while the value added of the manufacturing sector declined from 11% in 1990 to 8% in 1999 for several reasons, among which many foreign companies have abandoned their activities due to the political circumstances and recession in most industries due to lack of liquidity and high debt volume as well as the privatization procedures. The value added of the service sector has reached 25% in 1998 compared to 20% in 1990 and that of the public works has decreased by 1% during the

period 1990-98, but the value added of the agricultural sector remained stable at 11%. From 1999 to 2016, the value added of the industrial sector contributed more through the extractive industries that reached 28% in 2014 compared to 42% in 2000 and peaked at 47% between 2006 and 2008 and despite this decline that may be due to lower prices or lowering production to raise prices, it remains high against the manufacturing industry, that achieved a value added of 4.1% in 2014 compared to 6% in 2000 representing a decrease of 1.9% in 14 years. Therefore, the Algerian economy is rentier with distinction and considered a subject to changes in international markets since it relies on more than 97% of hydrocarbons in exporting, in contrast to other sectors that are deteriorating due to the foreign competition caused by the trade openness, especially that the hydrocarbon sector is increasingly expanding due to the new discoveries of important resources of natural wealth and the technological progress leading to increase state revenues in foreign currencies, thus, increasing the state demand for non-tradables in order to boost the government *spending*, thereby attracting the labour from the other sectors.

2. Share of Employment by Sector: According to the Dutch Disease theory, *the resource movement effect* under the transmission of production factors (labour, capital) arises when the marginal productivity of labour in the booming (non-tradable) sector improves or when the labour force is transferred from the manufacturing (tradable) sector to the booming sector. The figure below is showing the evolution of employment share by sector in Algeria over 1990-2016.

Figure n° 03-12: The Share of Employment by Sector (in per cent %)
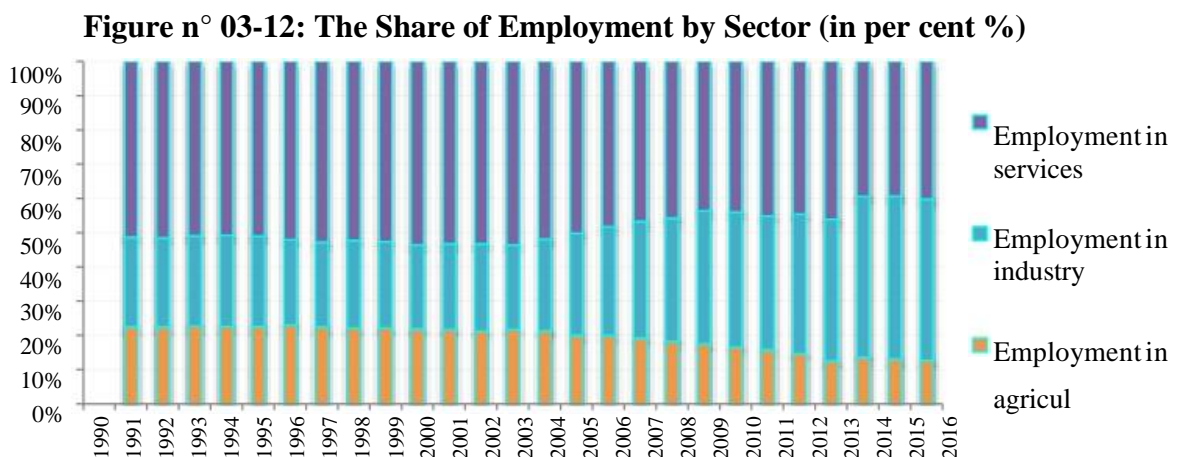
Source: The web site of Jobs Data: http://datatopics.worldbank.org/jobs/country/algeria, see the table shown in the Annex n° A-02.

2.1. The Tradable Sector (T): Through the figure above, we note that the agricultural and industrial sectors do not contribute strongly to the labour market, the first evolves in a decreasing trend recording 12.73% (949 employee) in 2016 compared to 22.45% in 1991

representing a decrease of about 9.72%, while the industrial sector attracted 47.09% of labour force (1414 employee) in 2016 compared to 26.19% in 1991 and since the share of hydrocarbons in GDP reached 39% in 2014 against only 4.1% for manufacturing industry (for example iron, cement and food industries), this latter has attracted a very small share of labour compared to the extractive (Oil and gas extraction) and the state-owned major manufacturing industries (Oil refining and petrochemical industries).

2.2. The Non-Tradable Sector (NT): This sector has the largest share of the economy since 1990 that is, the labour market is characterised by a dominant service sector that absorbed about 35.69% of employees in 2014 compared to 38.01% in 1990 and 45% in 2012, representing about 6224 of employees depending on the ONS[1]. However, according to the IMF the employment share of the construction and public works sector has been characterized by a relatively stable growth since 2000 reaching 8% in 2004 compared to 3% in 2001 due to the increase in government capital spending resulting from rising oil revenues,[2] as it was estimated by the ONS at 1813 employee in 2016 and 1776 employee in 2015 compared to 1212 employees in 2005.[3]

Generally, the change in employment share by sector between 1990 and 2016 shows a significant increase of almost 21.71% in industry (1414 employee), inversely to agriculture that decreased by 9.72% (949 employees). It should be noted that the improvement in the employment share of the industrial sector has been due mainly to the improvement in oil prices coupled with the increase in oil production, leading to an increase in the major extractive and major manufacturing industries that have contributed by 39% in GDP against only 4.1% for the minor manufacturing industries.

Based on the above results, it is clear that the labour element is moving more towards the NT sector, which corresponds initially to the Dutch disease theory, but cannot be confirmed because this transition has resulted under a significant share of the unemployed labour force, which does not correspond to such a theory that assumes the full-employment, in addition to the increasing share of informal employment.

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[1] ONS. (2016). *Activité, Emploi et Chômage*. Report 784. pp. 12-13.

[2] IMF. (2007). *Algeria selected issues*. Report n° 07/61. p19.

[3] ONS. (2016). op.cit. pp. 12-13.

3. The Labour Force, Unemployment and Informal Employment: The next figure is showing the evolution of the unemployment rate compared to the labour force and the share of informal employment in total employment.

Figure n° 03-13: Labour Force, the Share of Informal Employment and Unemployment in Algeria from 1990 to 2016
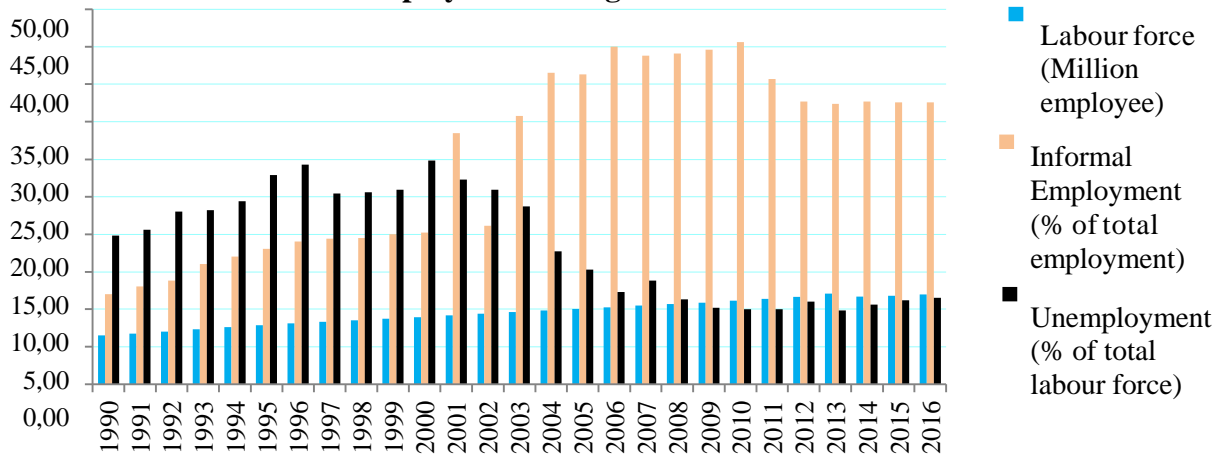
Source: Made by the author based on the World Bank and ONS databases

The labour force in Algeria has been estimated at 11.94 million in 2016 representing a rate of increase of almost 84% during the studied period, whereas government spending is considered the main source of job creation. However, the unemployment accounted for a significant share that peaked at 29.8% in 2000 due to the problems identified by the industrial sector (low wages and workers' conditions) as well as the political developments during the 1990s, although it reached the lowest value of about 9.8% in 2013 compared to 19.80% in 1990, then declined remarkably to 11.5% in 2016. This decline has been referred to the renewed recruitment in the public sector through, for example, the national employment agency "ANEM" and to many other reasons among which the IMF mentioned the economic growth, working at home and the role played by the private sector in creating employment,[1] even the informal one that recorded a slight drop of approximately 21.1% in 2002 then peaked at 45% and 45.6% in 2006 and 2010 respectively, thereafter, it declined to 37.6% but it remains high, meaning that 4 in every ten employed people do not have a social security coverage. It should be noted that theoretically and according to the Dutch disease hypothesis since the Algerian economy has not been under the full employment for the labour force, this indicates the absence of *the resource movement effect* throughout the studied period.

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[1] IMF. (2007). Op.cit. p19.

Section 04: The Empirical Study

In this section, we will perform the ARDL model to investigate the impact of Dutch disease on the equilibrium real exchange rate in Algeria from 1990 to 2016.

I. The Theoretical Overview of the Model:

1. Time Series: A time series is a set of observations on the values that a variable takes at different times, which may be regular (daily, weekly, monthly, quarterly or annually). Usually, a time series can be symbolized by $\{y_{(t)}, t \in T\}$ and it consists of two variables, one is illustrative (time) and the other called the response variable as it can be expressed mathematically as follows: $y = \int(t)$ but if there are any other illustrative variables next to the time, then the function becomes as follows: $y = \int(t, x_1, x_2, \dots x_n)$.

Before choosing the appropriate econometric model to employ in analysing and measuring the impact of the used variables on the exchange rate performance, it is necessary to study the characteristics of the time series in terms of stationarity, in order to avoid measurement problems. Their importance lies in verifying if stationary or not and identifying the order of non-stationarity (Trend stationary, deterministic) process TSP or Difference stationary process DSP). It should be made clear that if a time series is TSP, but treated as DSP, this is called *over-differencing*. On the other hand, if a time series is DSP, but treated as TSP; this is referred to as *under-differencing*. The implications of these types of specification error can be serious, depending on how the serial correlation properties of the resulting error terms are handled.[1]

More precisely, the property of stationarity in a time series has a major impact on its behaviour; in a stationary time series, shocks will be temporary, and their effect over time will fade as it returns to the mean values in the long-run. On the other hand, if a series is non-stationary one, then the persistence of shocks will be infinite, hence leading to a wrong estimation of the terms; in contrast in a time series, the shocks declined to zero over time. Accordingly, the mean and/or the variation of a non-stationary time series will depend on time, leading to situations where the time series does not have a long-term mean to return to it; and the variation will depend on time and will reach infinity as time reaches infinity. Additionally, the non-stationarity in a time series can lead to the problem of spurious regression. By which, we mean that over through the variables are unrelated and the R2 may still be very high. It should be noted that the time series often tend to

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[1] Emeka, N. & Uko, v(2016). Autoregressive Distributed Lag (ARDL) Cointegration Technique: Application and Interpretation. *Journal of Statistical and Econometric Methods, 5(4),* p67.

be non-stationary. So before choosing the appropriate model to assess and measure the impact of each variable on the *Reer*, the characteristics of the time series must be studied in terms of stationarity (secular trend and unit root).

2. Tests for Stationarity

2.1. The Graphical Analysis: It is one of the simplest ways to test the stationarity of a series by merely looking at it. It can depict the time series is stationary or not. Its mean remains constant over time; if the mean is variable over time, it would imply that the series is non-stationary in nature. However, there is a problem about this graphic method and that problem is that, it is not a confirmatory test, meaning that it may not give conclusive results regarding the series nature and characteristics, but just an indicating method.

2.2. The Autocorrelation and Partial Autocorrelation Functions

2.2.1. The Autocorrelation Function: Among the confirmatory tests, we apply the Autocorrelation Function ACF that is also one of the simplest ways to test stationarity. First, the Autocorrelation means that the error terms are related to each other over time or in other words the value of the error term in one period is correlated with its value in another period, in this case, they are said to be serially correlated or autocorrelated. Due to the presence of AC, the OLS estimators are no longer efficient and to avoid AC the series need to be fitted into a correct functional form and should be stationary;

2.2.2. The Partial Autocorrelation: To judge the significance of the relationships shown through the ACF and PACF, we resort to the calculation of the confidence interval of the correlation coefficient between x and x_{t-1}, as follows:[1]

$$IC= \bar{X} \pm 1.96 \, \sigma/\sqrt{n} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(3.1) where:}$$

$\bar{X}$ is the mean; and σ is the standard deviation.

2.3. *Ljung Box* Statistic (Q_{LB}): represents the number of the series values multiplied by the square sum of the relationship of X with X_{t-k}, while the *Ljung Box* statistic is an adjustment to the *Q-statistic* for small samples and is given as follows:[2]

$$Q_{LB} = n(n + 2) \sum_{k=1}^{m} \frac{r_k^2}{(n-k)} \aleph_{(m)}^2 \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(3.2)}$$

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[1] Paul N. P. & al. Statistics for Business and Economics. (2010), *Pearson Education*, Inc. publishing as Prentice Hall, chapter 7, the United States of America. p247.

[2] Régis, B. (2015). *Économétrie Cours et Exsercies Corrigés* (9th ed.). Paris: Dunod edition. p243.

r_k The estimated autocorrelation between observations separated by k periods of time; and

N The number of observations.

2.4. Unit Root Tests: The most common methods to check the stationarity are the unit root tests that enable us, due to its accuracy, to examine the properties of the time series in question, to ascertain the extent of stationarity, and to determine the order of integrity of each variable separately,[1] in order to avoid the spurious regression and misleading results. Among these tests, the *Dicky Fuller* tests: DF & ADF (*Dicky-fuller, 1979*) and Philips Peron (PP) test, through which the variables will be judged according to whether the probability value is greater than 5 % or not, if greater so the underlying time series is non-stationary, as well as by comparing the absolute calculated values with the absolute critical ones, if the first is greater than the second, the time series is considered stationary at the level and it is said to be integrated at the level *Y~I(0).*

However, the null hypothesis cannot be rejected about non-stationarity based on ADF test, since its power is not strong as such. If not, then we should take the first difference 1st Dif I(1), $\Delta y_t = y_t - y_{t-1}$………..(3.3), and test Δy_t that is, if stationary, said to be integrated of the 1st order $y_t \sim I(1)$, if not $y_t \sim I(d)$ $d > 1$, we take the 2nd Difference I(2) $\Delta^2 y_t = \Delta y_t - \Delta y_{t-1}$….…...(3.4), and test $\Delta^2 y_t$, that is, if stationary, said to be integrated of the 2nd order $y_t \sim I(2)$, if not $y_t \sim I(d)$ $d > 2$ etc. In a general way, we keep taking d Difference till we reach the difference that make the series stationary that is here said to be integrated of d order *Y~ (d)* with *d>0.* This decision can be verified using other related tests, such as *Kwiatkowski-Phillips-Schmidt-Shin* KPSS (1992) or *Philips-Perron* PP test. PP test has the same null hypothesis as ADF, and its asymptotic distribution is the same as the ADF test statistic,[2] but it deals with the error terms' autocorrelation in a different way.[3]

It should be noted that, in practice, we use the simple DF test for variables with a lag equal to zero *(lag=0)* and the ADF for variables with a lag greater than or equal to one *(lag≥1)*, based on the AIC, SCH and log likelihood criteria. For that, before performing any test, the optimum lag period must be determined so that we can find out which exam we apply.[4]

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[1] عابد بن عابد العبدلي. (2007). محدّدات الطّلب على واردات المملكة العربية السّعودية في إطار التّكامل المشترك وتصحيح الخطأ. *مجلة مركز صالح عبد الله كامل للاقتصاد الإسلامي، (23)*، جامعة الأزهر، مصر، ص ص 18-19.

[2] Emeka, N. & Uko, A. K. op.cit. p73

[3] Roman, K. (2010). Financial Econometrics. Ventus publishing Aps. p73.

[4] Régis, B. (2004). *Économétrie* (5th edition). Paris: Dunod edition. p233.

3. The Autoregressive Distributed Lag ARDL Specification

3.1. The Autoregressive Distributed Lag ARDL: The common cointegration tests such as *Engle & Granger* or *Johanon*, require that the variables are being integrated of the same order, therefore, it is not possible to perform them in case these variables are integrated of different orders, that's why the ARDL model appeared as an alternative that doesn't require the same order of integration. It has been proved to be an efficient technique for determining cointegrating relationships in small samples and also can be applied regardless of the regressors' order of integration. That is, it can be applied regardless of the variables' stationarity property in the model, thus allowing for statistical inference on long-run estimates that are not possible under alternative cointegration techniques.[1]

The Autoregressive Distributed Lag ARDL model approach to cointegration or bound testing for a long-run relationship was first introduced by *Pesaran & Shin* (1995) and *Pesaran & al.* (1996), irrespective of whether the underlying variables are I(0), I(1) or a combination of both. In such a situation, the application of the ARDL approach to cointegration will give realistic and efficient estimates. Unlike the *Johansen & Juselius* (1990) cointegration procedure, the ARDL approach to cointegration helps in identifying the integrating vector(s). [2]

3.2. Advantages of ARDL Approach: It is argued that ARDL has a number of advantages over conventional *Johansen* cointegration techniques, amongst which it is a more statistically significant approach for determining integrating relationships in small samples, while the *Johansen* cointegration techniques still require large data samples for the purposes of validity. A further advantage of the ARDL is that while other cointegration techniques require all of the regressors to being integrated of the same order, the ARDL can be applied whether the regressors are I(1) and/or I(0), i.e. whether the results are all unit root or all stationary or, indeed, even if mixed results are obtained. This means that it avoids the pre-testing problems associated with standard cointegration, which requires that variables are already classified I (1) or I (0).[3] The major advantage of this approach lies in its identification of the cointegrating vectors where there are multiple cointegrating vectors and the Error Correction Model (ECM) can be

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[1] Hany, A. & Mishra, T. (2016). Asymmetric Growth Impact of Fiscal Policy: A Post-Shock Policy Scenario for Egypt. *Economic Research Forum, Working Paper, 1035*, p05.

[2] Emeka, N. & Uko, A. K. op.cit. p76.

[3] Mosayeb, P. & al. (2005). Trade-GDP Nexus in Iran: An Application of the Autoregressive Distributed Lag (ARDL) Model. *American Journal of Applied Sciences 2 (7)*, p1159.

derived from the ARDL model through a simple linear transformation that integrates short-run adjustments with long-run equilibrium without losing long-run information. The associated ECM model takes a sufficient number of lags to capture the data generating process in general to specific modelling frameworks.[1]

3.3. The ARDL Cointegration Approach Steps: There are two stages in the estimation of the ARDL model:[2] The first stage consists in verifying the optimal number of lags for the first difference of variables with the *Akaike* Information Criterion (AIC) or the *Schwarz* Bayesian Criterion (SBC). The optimal and sufficient lag structure is a fundamental test in ARDL models to eliminate any endogeneity problems. The second step refers to testing the existence of the long-run relationship between variables under investigation by computing the Bound F-statistic (Bound test for cointegration) in order to establish a long-run relationship among the variables, then compare it with the computed critical t-values for the F statistic (lower and upper bounds) by *Pesaran & al. (2001)* to test the validity of cointegration, therefore, the cointegration is accepted when the corresponding critical values lie above the upper bounds. Moreover, the coefficient of the Error Correction Model (ECM) must be significantly negative, which indicates that the exogenous variables return to long-run equilibrium levels.

3.4. Diagnostic and Stability Tests: One of the requirements for well specified ARDL model is passing all the diagnostic tests namely the serial correlation, the functional form, the normality, the heteroscedasticity and finally the validity of the results which is dependent on the fit and stability of the estimated coefficients of the error correction model that should be empirically investigated. When analysing the stability of the long-run coefficients together with the short-run dynamics, the cumulative sum (CUSUM) and cumulative sum of squares (CUSUM) are applied, the null hypothesis (i.e. That the regression equation is correctly specified) cannot be rejected if the plot of these statistics (the CUSUM and CUSUMQ) remains within the critical bound on the 5% significance level.[3]

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[1] Emeka, N. & Uko, A. K. op.cit. p79.

[2] Miguel A.T. Z. & al. (2014). Growth, Bank Credit and Inflation in Mexico: Evidence from an ARDL-Bounds Testing Approach. *Lat Am Econ Rev, 23(8),* pp. 07-08.

[3] Mosayeb, P. & al. (2005). Trade-GDP Nexus in Iran: An Application of the Autoregressive Distributed Lag (ARDL) Model. *American Journal of Applied Sciences 2 (7)*, p1163.

II.Data

According to the majority of the fundamental contributions of the economic literature, the presence of the Dutch syndrome 'Dutch disease' can be often explained by changes in the ratio of the T prices on those NT, that is, the real exchange rate. Algebraically, the index of the Real Exchange rate equals to the ratio of the domestic index of the consumer prices compared to the index of producer prices abroad of the partners), multiplied by the effective nominal exchange rate (NEER) of the Algerian dinar against the partners' currencies.

$RER = P/EP^*$……………...……………………………………………..…… (3.5), where:

P The domestic price index, measured by the consumer price index;
P^* The foreign price index, measured by the consumer price index of the United States;
E The nominal exchange rate defined under uncertainty.

The realization of the equilibrium exchange rate is the result of the RER and some other economic variables of the country. It is defined as the relative price of the tradable goods compared to the non-tradable ones, which ensures simultaneously the realization of the internal and external equilibriums. The internal equilibrium is that of the non-tradable goods market, associated with a rate of unemployment established on a natural level, whereas the external equilibrium results from the satisfaction of the intertemporal budgetary constraint which stipulates that the upgraded sum of the current balance is null (the microeconomic approach).

Edwards, Sebastian (1988)[1]*,* has developed a dynamic model of three properties (importable, exportable and non-tradable) in order to describe the equilibrium real exchange rate and misalignment in a small developing economy with a dual exchange rate system. Then, he tested his model in a sample of twelve countries having fixed exchange rate systems over the period 1960-85. Using the instrumental variables' technique with fixed effects; Edwards found out that an improvement in the terms of trade raises the observed real exchange rate and equilibrium one. Tariffs do not necessarily and capital flows induce a real appreciation non-significant statistically. There is no systematic and significant effect associated with government consumption. On the other hand, the technical progress depreciates significantly the equilibrium real exchange rate; for the nominal variables, expansionary and unsustainable monetary and fiscal policies value the real exchange rate and ultimately contribute to its overvaluation. A year thereafter *(1989),* his studies on the developing countries show that the evolution of the real effective exchange rate is linked to the macroeconomic policies implemented by Governments and to the international economic environment. The author insists on the need for

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[1] See: Edwards, S. (1988). op.cit.

carefully choosing the economic variables that are interacting with this indicator. According to him, the long-term equilibrium exchange rate is only affected by real variables classified into two categories, namely external structural (or fundamental) variables and the world interest rate; the internal or domestic fundamentals cover variables that depend on government policy, such as the budget deficit, import taxes, import quotas and exchange controls. This author has empirically tested a model that reveals that the real or the nominal factors affect the exchange rate in the short term while in the long-term; only the real factors affect the sustainable equilibrium exchange rate. He also examines the relationship between the misalignment of the equilibrium exchange rate and macroeconomic performances. He found out that, countries that maintain their exchange rate closer to their equilibrium exchange rates perform better than those who misaligned their exchange rates.

In this study, we will develop a simple econometric model that determines the real equilibrium exchange rate in Algeria in order to estimate the impact of Dutch Disease via several factors on its performance. The suggested model is inspired from the framework developed by (*Edwards. S, 1988*) that forms the equilibrium real exchange rate in the developing countries as a function of four variables considered the most important fundamentals in determining the behaviour of Equilibrium RERs (Terms of trade, Capital flows, government consumption, Tariffs) in addition to Technological progress and other.

1. Data Definition:
The process of selecting variables that affect the studied phenomenon depends primarily on the economic theory and then on the previous studies, therefore, Algeria's real effective exchange rate *Reer* is influenced by several variables, namely:

1.1. Terms of Trade *ToT*:
ToT shocks influence the equilibrium real exchange rate through the NT prices relative to T prices. Theoretically, this influence cannot be signed a priori (ambiguous (?)), as this depends on whether the income effect or substitution effect is dominating and whether ToT shock is due to a change in export price or import price. A positive ToT shock (permanent increase in export prices) would increase the national income by generating additional export revenues and consequently improve the trade balance and results in a higher demand for importable and NT goods (reduce the supply of NT goods). Thus, increasing their prices (NT become more expensive) and pushing for a real appreciation in the exchange rate. (*The income effect).* On the other hand, a positive shock in ToT (a decrease in import tariffs) lets the price of importable goods lower than the NT goods, thus, the NT production decreases and contributes in a real depreciation of the exchange rate. (*The substitution effect).* (*Edwards, 1989).*

This variable is taken to be a major variable explaining the equilibrium exchange rate since it shows the country's competitiveness and captures the Dutch disease following a rise in oil prices in the international market. According to *(Aron & al. 1997)* and *(Elbadawi, I. & Soto, R. 1997), (Shahid, H. J. 2011);* a higher TOT can increase the country's wealth and thus appreciate the REER while according to *(Marc-Antoine Adam 2003),* High oil prices lead to improving the terms of trade and increasing the export revenues, which in turn lead to an increase in spending on the national level as well as an increase in the domestic prices compared to the international prices causing a decrease in the real exchange rate.

▪*Terms of Trade = Export price index relative to the import price index.*

In our study, we will use another similar proxy for TOT that is based on oil price:

▪*Terms of Trade = the price of the primary commodity (oil price) with respect to the intermediate foreign good*[1]

Tot Data is calculated by the author based on the OPEC and World Bank databases.

1.2. The Government Spending *Gs*: The theoretical effect of government spending on the real exchange rate is ambiguous (?) and difficult to be determined a priori, that is, its coefficient can be either positive or negative. It would be necessary to determine if it is directed more toward T or NT. In particular, if we assume that the government spending is mainly directed towards NT goods, thus, its increase affects negatively the demand for sector's goods leading to an increase in their prices and therefore, a real appreciation in the exchange rate. *(Edwards, 1989).* Empirical studies confirm that if the government spending is biased toward NT goods, an appreciation in the real exchange rate is expected through the increase in their prices; but, there are exceptions, as in the non-industrialized countries, the increase in public wages may come from government spending that can indirectly depreciate the real exchange rate if the rise in private spending due to the increase in wages is oriented towards tradable goods. Similarly, an increase in the government spending financed by debt leads to an increase in the prices of NT goods; thereafter, the payment of state debts by increasing taxes, reduces the disposable income and overall demand. This decline in overall demand results in the reduction of NT prices and the depreciation of the real exchange rate. The government spending GS is proxied by the

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[1] See: Cashin, P. & al. (2002). Keynes, Cocoa and Copper in Search of Commodity Currencies. *IMF Working Paper 02-223,* 01-63

total government consumption expenditure as a per cent of GDP. GS Data is taken from the World Bank.

1.3. Capital Flows *Cf*: The capital flows affect the relative prices of T and NT goods and consequently the equilibrium exchange rate. *(Edwards,1989); (Saborowski, CH. 2009), (Shahid H. J. 2011),* show in their studies related to the developing countries that an increase in an economy's capital flows leads to a real appreciation of the domestic currency - except if the country is heavily indebted. Consequently, a relaxation of the capital flows control would lead to depreciating the real exchange rate. Similarly, according to (*Saborowski, CH. 2009*), (*Shahid, H. J. 2011),* Capital flows in the economy involve the appreciation of the real exchange rate by increasing the demand for NT goods and thus raising their prices. Also, the study of *Emmanuel K.K. Lartey (2007)* shows that an appreciation of capital flows implies the effects of the Dutch Disease while the monetary policy is designated to maintain the nominal exchange rate. In order to define capital flows, there are several proxies could be used among which we will choose the first one:

▪ *CF = -(Export - Imports)/GDP*;

▪ *Net Capital Flows = [-(Export - Imports)/GDP] – (The fall in the international reserves, including gold, in current dollars)/GDP)*;

The expected sign of capital flows is positive (+). *Cf Data* is made by the author based on the World Bank database.

1.4. Technological Progress *Prod*: Differences in technological progress could affect REERs**.** Advancement in technology implies an increase in productivity, thus an increase in wages and relative prices of NT goods to T that improves the country's competitiveness, *(The Balassa-Samuelson effect). (Ricci L. A. & al. 2008),* and (*Gnansounou, S. U. & Verdier-Chouchane, A. 2012). Balassa & Samuelson (1964)* shown that high productivity is associated with a reduction in the relative production cost and in the relative price of these goods to NT, and leads to an appreciation of the RER. However, *Edwards (1989)* shows that the effect of the technological progress on the RER depends on its effect on the different sectors of the economy. Indeed, the technological progress can lead to a depreciation of the RER, when the resulting supply effect dominates the demand effect. In fact, technological progress could be presented in two forms:

▪ *Product augmenting (income augmenting)(+):* results in an increase in the real incomes and prices of NT and the appreciation of RER;

- *Factor Augmenting (-):* an increase in production with the same capacity in the economy result in a reduction in the NT prices and RER depreciation.

It is anticipated that countries with higher per capita incomes will experience a real appreciation in their currencies. The real GDP per capita is a possible approximation for the productivity differentials.

- *Prod=Real GDP per capita.*

The expected sign of productivity is negative (+). Data of *Prod* is made by the author based on the IMF and World Bank databases.

1.5. Trade Openness *Open*: Most studies have used various openness indicators such as proxies to measure the degree of restrictiveness of a country's trade policy. The effect of this variable is theoretically mixed and ambiguous as it cannot be signed a priori. For small dependent economies, the trade openness will cause a real depreciation (appreciation) if it reduces (rises) the demand for NT. An improvement in openness variables usually associated with external and internal imbalances as it is assumed to be arising from a decline in tariff rates leading to a fall in the domestic prices of importable goods. This will lead to a high demand for foreign currency (to take advantage of cheap imports), and less demand for domestic currency. Moreover, the countries having a limited domestic industrial capacity should benefit from the abolition of the trade barriers, by appreciating their imports. Nevertheless, if the capacity to spend in these countries is relatively decreased, the demand for the imported goods will be of little importance, with no-effects or negative ones on the RER. (*Chnaina, Kh. & Makhlouf, F. 2012), (Shahid, H. J. 2011).* Generally, we can distinguish two proxies of openness, namely:

- **OPEN:** It leads to a strong movement of foreign currencies. Usually, the degree of trade Openness is the main proxy for OPEN and can be expressed by the ratio: *(Imports + Exports)/GDP.* For the developing countries, it is marked by a stronger increase in imports;

- **OPEN_1:** The case of the oil countries as Algeria is specific. A sharp rising in oil prices can be misinterpreted as an improvement of trade openness. Oil exports can depend on completely exogenous factors non-related to openness as the world oil demand. Therefore, we will use, in our study, the following ratio as a proxy for openness: *Open_1= Importations/GDP. Open-1.*

Data is made by the author based on the World Bank database. The expected sign of *Open_1* is ambiguous (?).

Since the Algerian economy is highly relying on the oil sector, *Sorsa, P. (1999)* investigated the relationship between the real exchange rate, exports diversification and trade protection and using oil price and oil production next to capital flows and trade restrictiveness in determining the equilibrium real exchange rate in Algeria. According to her changes in the oil price have important effects on overall spending. Discoveries of new oil reserves or gas deposits can also affect overall spending over time by increasing permanent income. Similarly, declines in oil prices should result in lower spending with corresponding effects on relative prices. The impact on the permanent income of changes in oil prices is likely to be smaller than that of oil production as the latter is in general perceived to be of a more permanent nature.

In addition, the increased demand for non-traded goods by the government will tend to increase wages in these sectors and attract resources from the traded goods sectors. This *resource effect* will, in turn, contribute to the real appreciation of the exchange rate, and make the development of other exports more difficult. In Algeria, where the oil sector is government owned, much of the spending effect is likely to take place via government budgets. The effect of changes in oil prices on demand for the traded goods (or the current account) in Algeria has been small, as the *spending* by the government is mostly on non-traded goods. Given the present high unemployment levels, the impact of changes in oil prices on wages in the non-traded goods sector and thus on the real appreciation is likely to be smaller than expected by theory. Similarly, regarding the oil price importance many other studies focused on it, such as *Koranchilian, T. (2005)*, *Benhabib, A. & al. (2014)* who found a negative impact of oil price on RER which emphasizes how the Algerian dinar is a non-oil currency and explains how the foreign exchange receipts from hydrocarbon exports help swell Algerian public spending that would cater to public budget deficit curtailment. Therefore, taking into account the empirical literature on the matter and the specificity of the Algerian economy, other specific variables have been selected as factors that are likely to be significant in order to estimate their empirical relationship with the real effective exchange rate over the period 1999-2006, namely:

1.6. Oil Rent *Oilrent*: Theoretically, the increment of Oil rent is stemming mainly from a boom in fuel price and allows for an increase in the NT output and rents. The real oil price has a significant impact on the real exchange rate behaviour in the oil exporting countries, which is proven by many studies such as of *(Jahan, P. & Mohammadi, H. 2008)*, *(Al-Mulali, U. & CheSab, N. 2009) and (Fakhri, H. 2010).* As long as oil export revenues have a prevailing role in the trade balance of oil exporting countries, an increase in the oil price will increase the real oil revenues and thus, causing the real exchange rate to appreciate *(Amir. H. & Sanaz. P. 2016)*;

this is mostly the *income effect* explained in the Dutch-disease literature, and supposing wage resistance, the result will be an increase in the number of employees in the NT sector. *Oilrent* Data is taken from the World Bank database; the expected sign of oil rent is positive (+).

1.7. The Employment Share in the Informal Sector *Emp*: The increase of employment in the NT sector is surely a second stage in the Dutch Disease process. The resource-movement effect initially brought about by the excess inflow of revenues in foreign currency, allows for significant losses in the manufacturing sector, with possible consequent dismissal of the employees, i.e. a relative improvement in the NT sector (here considered just as the share of the informal sector in the total employment). Indeed, the loss of competitiveness in manufacturing often leads to the informalization of production so as to compress the wage rate that is lower in the informal sector. However, changes in the extent of informalization of production can occur for regulation, taxation and other reasons; the excess foreign currency inflow allows for significant losses in the manufacturing sector. Hence, the *resource-movement* effect would shift labour to the NT sector (i.e. Firms would "informalize" production by means of delocalization or another form of sub-contract). *(Lo Bue Maria, C. 2011). EMP* Data is from the National Office of Statistics - Algeria ONS.

2. Study Period and Data Source: Yearly time series data for the period 1990-2016 were used in this research to perform econometric estimations for the equilibrium real exchange rate and investigate whether its performance has been affected by the Dutch disease in Algeria based on seven economic variables. The study was limited to this period due to the unavailability of some data and the difficulty of measuring and calculating other data, however, it is considered to be enough. The data for this study was taken from several sources; the real effective exchange rate' yearly index (2010=100) values introduced by the IMF database, were considered. The data on Informal employment was obtained from the Office for National Statistics ONS for 1992 and 1997 to 2016 while the rest of employment data were obtained from economic research,[1] because of the lack of data about this variable. Oil rent, Net capital flows, Government spending (all expressed as a % of constant GDP) and Productivity were calculated based on the World Bank database which is the case also for Trade openness and terms of trade.

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[1] نسرين يحياوي. (2016). الاقتصاد الموازي في الجزائر، الحجم الأساس والنتائج. مجلّة الدّراسات المالية والمحاسبية والادارية، (06).

III. Methodology

1. Variable Description:

1.1. The Correlation Matrix Analysis: The importance of the independent variables depends on the extent to which they could aid in explaining changes in the dependent variable, *Reer.* It is therefore important to determine if the relationship between them and this was done by statistically correlating each variable with *Reer* in order to provide more information on the relationships. The correlation coefficient *r,* generated by the *Spearman*, is a measure that determines the degree to which two variables' movements are associated in a defined range between (-1) and (+1), whereby (+1) indicates a perfect positive correlation, meaning that both variables are correlated and moving in the same direction, On the contrary -1 indicates a perfect negative correlation, meaning that both variables are moving in opposite directions, while the value of *r* is close or equals to zero both variables are said to have no relationship, there could be a nonlinear correlation or a very weak relationship. In addition, the t-statistic is also considered important in detecting the correlation and measuring the statistical significance of an independent variable in explaining the dependent one; and statistically, any absolute t-value greater than 2 is acceptable and means that the relationship is statistically significant. The table below illustrates the results of the statistical correlation test between the dependent variable *Reer* and its explanatory variables.

Table n° 03-03: The *Spearman* Correlation Matrix

Correlation t-statistic Probability	Reer	Emp	Oilrent	Tot	Prod	Open_;	Cf	Gs
Reer	1.000000 ----- -----							
Emp	-0.891269 -9.827082 0.0000	1.000000 ----- -----						
Oilrent	-0.823728 -7.264117 0.0000	0.843053 7.837550 0.0000	1.000000 ----- -----					
Tot	-0.800490 -6.678036 0.0000	0.832366 7.509274 0.0000	0.885836 9.545697 0.0000	1.000000 ----- -----				
Prod	0.749734 5.664866 0.0000	-0.814351 -7.015764 0.0000	-0.725275 -5.267373 0.0000	-0.918193 -11.58944 0.0000	1.000000 ----- -----			
Open_;	-0.640576 -4.170985 0.0003	0.636031 4.121163 0.0004	0.605006 3.799236 0.0008	0.747253 5.622331 0.0000	-0.788767 -6.415945 0.0000	1.000000 ----- -----		
Cf	-0.623759 -3.990182 0.0005	0.733435 5.394814 0.0000	0.619048 3.941204 0.0006	0.835165 7.592411 0.0000	-0.948107 -14.90969 0.0000	0.666667 4.472136 0.0001	1.000000 ----- -----	
Gs	-0.094450 -0.474369 0.6394	0.193539 0.986345 0.3334	0.025716 0.128621 0.8987	0.372265 2.005468 0.0559	-0.517069 -3.020465 0.0057	0.311650 1.639922 0.1135	0.093679 0.470462 0.6421	1.000000 ----- -----

Source: Author's own calculations using Eviews.

Through the results of the previous Table, concerning the correlation coefficients *r*, the *t*-statistic and its corresponding *p*-value between variables, we find out that the dependent variable *Reer* is very highly correlated to *Emp*(-0.89, -9.83), *Oilrent*(-0.82, -7.26) and *Tot*(-0.80, -6.68) as it has a strong correlation to *prod*(0.75, 5.66) and *Open_1*(-0.64, -4.17), while it is moderately correlated to *Cf*(--0.62, -3.55) but, it has a low or a very weak correlation with *Gs*(-0.09, -0.47). Furthermore, we can deduce that *Reer* is negatively correlated to all variables but positively to *Prod*. In addition, all variables, excluding *Gs,* have the absolute *t*-statistic greater than 2 and their corresponding p-values are less than 0.05 meaning that they are all significant at the level α=5%.

1.2. Descriptive Statistics of the Series: It is always necessary and essential to run summary statistics before engaging any regression analysis because we need to understand the central tendency and spread of the variables. The table n° 03-04 below demonstrates the descriptive statistics of the raw data that we will be working with, in this study from 1990 to 2016.

Table n° 03-04: Summary of Descriptive Statistics

	Reer	*Emp*	*Oikrent*	*Tot*	*Prod*	*Open_1*	*Cf*	*Gs*
Mean	116.870	0.3010	13.564	0.624	9679.9	0.244	4.792	0.160
Median	105.000	0.358	12.900	0.512	7056.7	0.229	4.738	0.163
Maximum	223.000	0.456	23.210	1.302	44045	0.367	6.839	0.184
Minimum	96.000	0.120	4.940	0.183	3589.8	0.167	1.789	0.130
Std. Dev	26.489	0.120	5.452	0.376	8988.9	0.064	1.409	0.012
Skewness	2.593	-0.153	0.292	0.531	2.506	0.566	-0.270	-0.313
Kutosis	10.693	1.337	1.905	1.865	9.3165	1.960	2.321	2.998
Jarque-Bera	96.866	3.217	1.731	2.719	73.146	2.658	0.846	0.442
Probability	0.000	0.200	0.420	0.257	0.000	0.264	0.655	0.801
Sum	3155.500	8.129	366.230	16.857	261357.9	6.608	129.39	4.342
Sum Sq. Dev	18243.80	0.378	772.984	3.677	2.10E+09	0.107	51.631	0.0042
Observations	**27**	**27**	**27**	**27**	**27**	**27**	**27**	**27**

Source: Author's own calculations using Eviews.

The first raw of the table, shows us the mean that represents the annual average rates of *Reer, Emp, Oilrent, Tot, Prod, Open_1, Cf,* and *Gs;* thereafter the median, in the second raw, represents the middle values for each variable while the maximum and minimum values represent the highest and lowest value in each variable. The standard deviation (Std. Dev.)

indicates the deviation from the sample mean, in the first raw, with respect to each of the variables. The Skewness statistic measures the degree of asymmetry of a particular series and for a normal Skewness, the value is zero 0 but if its value is greater than zero 0, then the distribution will be positively skewed and if it is less than zero 0, then the distribution will be negatively skewed. According to the previous Table, the variables *Reer, Oilrent, Tot, Prod* and *Open_1* have a positive Skewness *(*2.593, 0.292, 0.531, 2.506 and 0.566 respectively); that reflects a long distribution tail on the right meaning that there are higher values than the sample mean, while *Emp*, *Cf* and *Gs* are negatively skewed (-0.153, -0.27 and -0.313 respectively), reflecting a long distribution tail on the left meaning that there are lower values than the sample mean. Accordingly, the Kurtosis provides information on the tails (the extremes, or outliers) of a distribution. It measures the peakness or the flatness of the series distribution and to be normally distributed, the kurtosis value should be equals to 3 (*mesokurtic*). The results of the table n° 03-04 reveal that *Gs* is mesokurtic (2.998 ≈3)*,* *Reer* and *Prod* variables have positive kurtosis values greater than 3 (10.693, 9.3165 respectively), so, they are said to be *leptokurtic* distributions with more extreme possible data values than a normal distribution thus fatter tails (Peaked curve), while *Emp, Oilrent, Tot, Open_1,* and *Cf* variables have positive kurtosis values less than 3 (1.337, 1.905, 1.865, 1.960 and 2.32 respectively) so they are said to be *platykurtic* distributions with less extreme possible data values than a normal distribution thus thinner tails (flatted curve).

The *Jarque-Bera* statistic measures the difference of the Skewness and kurtosis of the series with those of the normal distribution. In general, a large J-B value indicates that errors are not normally distributed and if the P-value is less than 5%, the null hypothesis H_0 of normal distribution will be rejected as for *Reer* and *Prod,* inversely to the rest of the variables. Based on the previous results, our data should be transformed into *logarithm* in order to deal with their skewness (reduce it or eliminate it) and improve their distribution normality.

1.3. The Graphical Investigation

Figure n° 03-14: Evolution of the Chosen Variables during 1990-2016
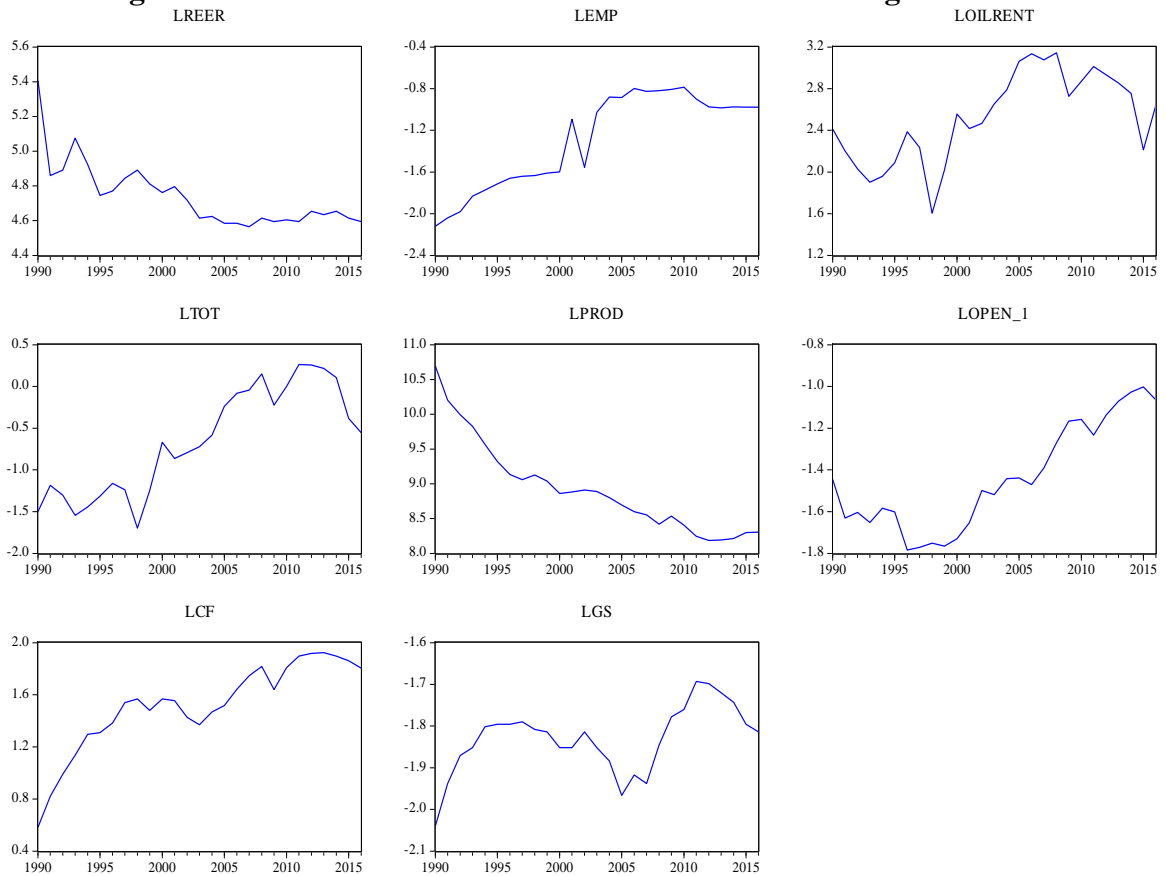
Source: Author's own calculations using Eviews

According to the previous Figure, all of our series have trends, in other word, the observations' trends downward or upward as time passes. It is clearly visible that the variables *Lreer* and *Prod* showed falling trends in their movements, while *Lemp*, *Loilrent*, *Ltot, Lprod, Lopen_1*, *Lcf* and *Lgs* have been on an upward trend over the sample period 1990-2016, meaning that our data are not revolving around a constant mean and variance, therefore, the series seems to be non-stationary.

1.4. The Autocorrelation ACF and Partial Autocorrelation PAC Functions: In this test, we have taken the maximum number of lags[1] k=6, the following Figure shows the autocorrelation function ACF of our series:

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[1] A rule of thumb: compute the ACF up to 1/3 to ¼ lengths of the time series. In this study, k=1/4(n) = ¼ (27)≈6.

Figure n° 03-15: The Autocorrelation ACF and Partial Autocorrelation PAC Functions

Source: Author's own calculations using Eviews.

The ACF Figures illustrate the relationship of each variable Y to its previous value $Y_{(t-p)}$, for a lag of $p = 6$, for example, the relationship of the variable *Lemp with Lemp$_{t-p}$* is strong, the Autocorrelation AC started with (0.847, 0.000) in the first period *Lemp$_{t-1}$*, i.e. $p = 1$, then it decreases gradually to become (0.775, 0.000) in the second period *Lemp$_{t-2}$* until reaching (0.346, 0.000) in the period *Lreer$_{t-6}$*. So, since we have at least two AC coefficients different from zero, we can conclude that our data are probably non-stationary; which is the case for all the other series.

The Autocorrelation function ACF of the studied series shows clearly the existence of secular trends which means the series are not stationary, but this is not sufficient, so, we resort to the *Ljung-Box* test to check the global significance of the autocorrelation function coefficients for each series, which is already calculated based on the following formula:

$$Q = n(n + 2) \sum_{i=1}^{p} \frac{r_p^2}{(n-p)} = 27(27 + 2) \sum_{i=1}^{6} \frac{r_i^2}{(27-i)} \dots\dots\dots\dots\dots\dots\dots(3.6) \text{ with n=27 and p=6.}$$

The results of the *Ljung-Box* Q- statistic test for autocorrelation that corresponds to the last value in the column Q-stat shown in Figure n° 03-15 for each variable may be summarized in the next Table:

Table n° 03-05: *Ljung-Box* Q-Statistic

Variables	*Lreer*	*Lemp*	*Loilrent*	*Ltot*	*Lprod*	*Lopen_1*	*Lcf*	*Lgs*
Q-statistic	30.39	77.29	56.09	84.31	54.99	81.51	43.65	29.35
P-Value	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Source: Author's own calculations using Eviews.

According to Table n°03-05, we observe that all *Ljung-Box* Q-statistic values are statistically significant as long as their corresponding P-values are less than 0.05, meaning that we can reject the null hypothesis H_0 {H_0: Error terms are not auto correlated} and accept the alternative hypothesis H_1 {H_1: Error terms are auto correlated}, therefore, the series are non-stationary (mean and variance are not constant over time) and must be differencing *d* times. Furthermore, in order to identify the relationship's significance of each variable X_t to X_{t-p}, we calculate their confidence intervals at 5% level through the following formula:

$$\overline{X} \pm Z_{a/2} \times \frac{\sigma}{\sqrt{(n)}} \dots\dots\dots\dots\dots (3.7),$$ where: a=0.95 (95%); $Z_{a/2}$ = 1.96; σ represents the standard deviation and *n* represents the sample size; here *n*=27. The following table demonstrates the confidence intervals of all variables

Table n° 03-06: The Confidence Intervals

	$\mathbf{Mean\,\overline{X}}$	Std. dev. (σ)	$\sigma/\sqrt{27}$	$Z_{a/2} \times \frac{\sigma}{\sqrt{(27)}}$	Intervals of Confidence
Lreer	4.741953	1.059592	0.0362	0.0709	(4.74) ± 0.0709
Lemp	-1.291497	0.452778	0.0871	0.1708	(-1.29) ± 0.1708
Loilrent	2.523869	1.229868	0.0823	0.1613	(2.52) ± 0.1613
Ltot	-0.659114	1.265528	0.1229	0.2409	(-0.66) ± 0.2409
Lprod	8.924297	1.282860	0.1264	0.2478	(8.92) ± 0.2478
Lopen1	-0.268286	0.254715	0.0490	0.0961	(-1.44) ± 0.0961
Lcf	1.517156	0.340093	0.0654	0.1283	(1.52) ± 0.1283
Lgs	-0.561221	1.150188	0.0156	0.0306	(-1.83) ± 0.0306

Source: Author's own calculations.

The Figure n° 03-15 also shows that the partial autocorrelation function PACF values that measure the correlation between observations that are *p* times period apart after removing the correlation from the intervening lags are significantly positive when *p=1* then, slowly decrease until they become negative indicating that the relationships are of the type:

$$y = y_{t-1} + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{(3.8)}.$$

2. Unit Root Tests (Checking the Integrated Level of Data):

It is very important to test for the stationarity of variables when dealing with time series data that is rarely considered to be stationary in level. This can be realized using *Augmented Dickey-Fuller (ADF)*, *Phillips Perron (PP)* or other tests as *Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test*… etc., but to ensure reliable results, the research will employ both ADF and PP. The following two tables show the calculated *t*-statistic values and their corresponding probability *p*-values, based on both tests.

2.1. Augmented *Dickey-Fuller* Test ADF

Table n° 03-07: ADF Test Outcomes

Seri	Level I(0)				1st Difference I(1)			
	Intercept	Trend+ Intercept	None	Result	Intercept	Trend+ Intercept	None	Result
Lreer	-4.78994 (0.0007)	-6.25638 (0.0001)	-1.38870 (0.1494)	Accept H0: *Lreer* has a unit root. *Lreer* is non-stationary at level	-8.89477 (0.0000)	-4.34708 (0.0143)	-9.04141 (0.0000)	Accept H1: *Lreer* has not a unit root. *Lreer* is I(1)
Lemp	-1.93871 (0.3103)	-0.591587 (0.9706)	-2.63744 (0.0106)	Accept H0: *Lemp* has a unit root. *Lemp* is non-stationary at level	-8.51446 (0.0000)	-9.13162 (0.0000)	-7.7855 (0.0000)	Accept H1: *Lemp* has not a unit root. *Lemp* is I(1)
Loilren	-1.66341 (0.4372)	-2.36068 (0.3896)	-0.10903 (0.6366)	Accept H0: *Loilrent* has a unit root *Loilrent* is non-stationary at level	-5.03776 (0.0005)	-4.98448 (0.0028)	-5.09797 (0.0000)	Accept H1: *Loilrent* has not a unit root. *Loilrent* is I(1)
Ltot	-1.46521 (0.5349)	-1.29496 (0.8667)	-1.55725 (0.1103)	Accept H0: *Ltot* has a unit root. *Ltot* is non-stationary at level	-4.57707 (0.0013)	-4.55483 (0.0067)	-4.65328 (0.0001)	Accept H1: *Ltot* has not a unit root. *Ltot* is I(1)
Lprod	-5.81525 (0.0001)	-4.13068 (0.0164)	-4.03021 (0.0003)	Reject H0, *Lprod* has not a unit root. *Lprod* is I (0)	Not applicable			
Lopen_1	-0.10098 (0.9394)	-3.19782 (0.1067)	-0.92073 (0.3083)	Accept H0: *Lopen-1* has a unit root. *Lopen-1* is non-stationary at level	- 5.07522 (0.0004)	-4.91880 (0.0030)	-4.78130 (0.0000)	Accept H1: *Lpen-1* has not a unit root. *Lpen-1* is I(1)
Lcf	-3.89459 (0.0065)	-3.20579 (0.1052)	-1.53874 (0.9658)	Accept H0: *Lcf* has a unit root. *Lcf* is non-stationary at level	-4.01954 (0.0050)	-4.37651 (0.0100)	-3.80709 (0.0005)	Accept H1: *Lcf* has not a unit root. Lcf is I(1)
Lgs	-2.49885 (0.1281)	-2.7883 (0.2144)	-1.07948 (0.2462)	Accept H0: *Lgs* has a unit root. *Lgs* is non-stationary at level	-3.93124 (0.0062)	-3.8588 (0.0299)	-4.0451 (0.0003)	Accept H1: *Lgs* has not a unit root. *Lgs* is I(1)

Note: All times series' regressions are estimated with intercept, with trend and intercept and without any of them, the selection of lag is based on Schwartz information criterion (SIC). Eviews software (9.5V.) automatically selects the most significant lag length based on this criterion given that the maxlag is 6.

Source: Author's own calculations using Eviews.

Table n°03-07 shows the results of the unit root test based on the Augmented *Dickey-Fuller* test ADF, which is applied to check whether data are stationary or not in order to avoid spurious results. This table represents that the unit root is checked at the level and at the 1st difference. *Lprod* is stationary at level I(0) as the calculated *t*-statistic value is greater than the critical one and its corresponding *p*-value is less than 0.05 which means accepting the null hypothesis H_0, while all the other variables are stationary at 1%, 5% and 10% after the first differencing I(1), because the calculated *t*-statistic values are less than the critical ones and their corresponding p-values are greater than 0.05, thus the null hypothesis H_0 is rejected because there is no trend and accept the alternative hypothesis H_1.

2.2. *Phillips & Perron* Test, PP

Table n° 03-08: PP Test Outcomes

Seri	Level I(0)				1st Difference I(1)			
	Intercept	Trend+ Intercept	None	Result	Intercept	Trend+ Intercept	None	Result
Lreer	-4.62269 (0.0011)	-6.25637 (0.0001)	-1.92071 (0.0537)	Accept H_0: *Lreer* has a unit root *Lreer* is non-stationary at level	-22.0907 (0.0001)	-23.4861 (0.0000)	-11.0223 (0.0000)	Accept H_1: *Lreer* has not a unit root. *Lreer* is I(1)
Lemp	-1.79950 (0.3724)	-1.66901 (0.7360)	-2.41701 (0.0178)	Accept H_0: Emp has a unit root *Lemp* is non-stationary at level	-8.55185 (0.0000)	-9.44215 (0.0000)	-7.48144 (0.0000)	Accept H_1: *Lemp* has not a unit root. *Lemp* is I(1)
Loilrent	-1.56494 (0.4857)	-2.39985 (0.3710)	0.029503 (0.6832)	Accept H_0: *Loilrent* has a unit root. *Loilrent* is non-stationary at level	-5.35633 (0.0002)	-5.92667 (0.0003)	-5.31210 (0.0000)	Accept H_1: *Loilrent* has not a unit root. *Loilrent* is I(1)
Ltot	-1.43240 (0.5509)	-1.3917 (0.8394)	-1.58931 (0.1039)	Accept H_0: **Ltot** has a unit root. *Ltot* is non-stationary at level	-4.56638 (0.0014)	-4.542580 (0.0069)	-4.65317 (0.0001)	Accept H_1: *Ltot* has not a unit root. *Ltot* is I(1)
Lprod	-5.747688 (0.0001)	-4.40372 (0.0090)	-3.2593 (0.0022)	Reject H_0: *Lprod* has a unit root. *Lprod* is stationary at level I (0)	Not applicable			
Lopen-1	-0.10098 (0.9394)	-3.20628 (0.1051)	-0.92073 (0.3083)	Accept H_0: *Lopen-1* has a unit root. *Lopen-1* is non-stationary at level	-5.09939 (0.0004)	-4.94972 (0.0028)	-4.78130 (0.0000)	Accept H_1: *Lopen-1* has not a unit root. *Lopen-1* is I(1)
Lcf	-3.79838 (0.0082)	-3.20194 (0.1059)	1.24398 (0.9413)	Accept H_0: *Lcf* has a unit root. *Lcf* is non-stationary	-3.98526 (0.0055)	-4.35738 (0.0104)	-3.78720 (0.0005)	Accept H_1: *Lcf* has not a unit root. *Lcf* is I(1)
Lgs	-2.94461 (0.0539)	-2.65858 (0.2600)	-0.89219 (0.3202)	Accept H_0: *Lgs* has a unit root. *Lgs* is non-stationary at level	-3.92678 (0.0063)	-3.86572 (0.0294)	-4.04184 (0.0003)	Accept H_1: *Lgs* has not a unit root. *Lgs* is I(1)

Source: Author's own calculations using Eviews.

Similarly to the ADF test, the same results are shown in Table n°03-08, that reports the results of *Philip Perron* PP unit root test. *Lprod* seems to be stationary at the level I(0) and all the other variables are non-stationary but became stationary at 1%, 5% and 10% when they are the first-differenced I(1). These results are consistent with the econometric theory that assumes that most macroeconomic variables are non-stationary at the level and become stationary after they are first differencing.

IV. Model Specification and Estimation Procedure:

1. Model Specification: Including the above-stated variables as fundamentals for the equilibrium real exchange rate, our study's model is specified as follows:

$$\text{Reer}_t = \int (\text{Emp}, \text{OilRent}, \text{ToT}, \text{Prod}, \text{Open}_1, \text{Cf}, \text{Gs},)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3.9)$$

$$\text{Reer}_t = \beta_0 + \beta_1 \text{Emp}_t + \beta_2 \text{OilRent}_t + \beta_3 \text{ToT}_t + \beta_4 \text{Prod}_t + \beta_5 \text{Open}_{1_t} + \beta_6 \text{Cf}_t + \beta_7 \text{Gs}_t + \varepsilon_t \,..(3.10),$$

Where:

β_0	The intercept;
$\beta_1, \beta_2, \ldots \beta_i$	The slope coefficients to be estimated; i =0, 1, 2... $I + 1$
Reer	The Real Effective Exchange Rate (Consumer Price Index (100=2010);
Emp	Informal Employment (as % of total employment);
OilRent	Oil Rent (as % of GDP);
ToT	Terms of trade (Index 100=2010);
Prod	Productivity (proxied by real GDP per capita in US$);
Open$_1$	Trade Openness (%);
Cf	Capital Flows (as % of GDP);
Gs	Government Spending (as % of GDP); and
ε	The error term.

For the estimation purpose, as we mentioned previously, the equation (3.10) can be represented by the following logarithmic reduced form equation:

$$\text{Lreer} = \beta_0 + \beta_1 \text{Lemp} + \beta_2 \text{Loilrent} + \beta_3 \text{Ltot} + \beta_4 \text{Lprod} + \beta_5 \text{Lopen}_1 + \beta_6 \text{Lcf} + \beta_7 \text{Lgs} + \varepsilon_t \ldots$$
(3.11)

2. The Estimation Procedure: According to the previous analysis, we have only one stationary variable I(0) that represents *Lprod* and seven other non-stationary variables I(1) which are: *Lreer, Lemp, Loilrent, Ltot, Lopen_1, Lcf* and *Lgs* but we have no variable which is I(2). In such a case the appropriate model is the Autoregressive Distributed Lags (ARDL) model, of which the preconditions are that the dependent variable should be I (1) and no variable should have an integration order of I (2). (*Pesaran & al., 2001),* in order to empirically analyse the short-run relationships and long-run dynamic interactions among the mentioned variables. Furthermore, the

ARDL model is relatively more efficient in the case of small sample data sizes, as it is the case of our data *n*=27 observations.

2.1. ARDL Model: According (*Pesaran & al.,2001),* the ARDL model of unrestricted error correction, to be used in this study, is expressed as follows:

$$\Delta y_t = c + \sum_{i=1}^{p} a_i \Delta y_{t-i} + \sum_{i=0}^{q} \delta_j \Delta x_{j,t-i} + \lambda_1 y_{t-1} + \sum_{j=1}^{m} \beta_j x_{j,t-1} + \varepsilon_t \dots \dots \ (4.12), \text{Where:}$$

Δ	represents the first difference;
j=1…m,	m is the number of the independent variables;
p	The lag length of the independent variable;
q	The lag length of the independent variables;
$\alpha_i, \delta_{j,i}$	The short-run parameters;
c, λ_1, β_j	The long-run parameters; and
ε_t	The error term.

Now, in order to check the presence of the possible long-run equilibrating relationships amongst our 8 variables, equation (3.12) had to be estimated applying OLS by considering each variable as a dependent variable, then performing the bound test; given that the maximum lag order is 2 since the data used in our model is annual while the optimal lags are selected automatically based on the *Akaike* information criterion. Table n° 03-09 reports the bound testing results:

Table n° 03-09: ARDL Bound Testing for the Possible Long-run Equilibrating Relationships

K=6	Dependent Variable	F-Statistic	Decision
(1) Selected ARDL (1, 2, 2, 2, 0, 1, 2, 2)	$F_{\textbf{Lreer}}$(Lreer|Lemp, Loilrent, Ltot, Lprod, Lpen_1, Lcf, Lgs)	4.32	Cointegration
(2) Selected ARDL (2, 2, 2, 2, 2, 1, 2, 2)	$F_{\textbf{Lemp}}$(Lemp|Lreer, Loilrent, Ltot, Lprod, Lpen_1, Lcf, Lgs)	3.20	Inconclusive
(3) Selected ARDL (1, 1, 2, 2, 2, 2, 2, 2)	$F_{\textbf{Loilrent}}$(Loilrent| Lreer, Lemp, Ltot, Lprod, Lpen_1, Lcf, Lgs)	3.62	Inconclusive
(4) Selected ARDL (1, 2, 2, 0, 2, 0, 0, 1)	$F_{\textbf{Ltot}}$(Ltot|Lreer, Lemp, Loilrent, Lprod, Lpen_1, Lcf, Lgs)	4.09	Inconclusive
(5) Selected ARDL (1, 2, 2, 2, 2, 2, 2, 2)	$F_{\textbf{Lprod}}$(Lprod|Lreer, Lemp, Loilrent, Ltot, Lpen_1, Lcf, Lgs)	32.18	Cointegration
(6) Selected ARDL (1, 1, 2, 2, 0, 0, 2, 2)	$F_{\textbf{Lpen}_1}$(Lpen_1|Lreer, Lemp, Loilrent, Lprod, Ltot, Lcf, Lgs)	2.429	Inconclusive
(7) Selected ARDL (1, 2, 2, 2, 2, 2, 2, 2)	$F_{\textbf{Lcf}}$(Lcf|Lreer, Lemp, Loilrent, Ltot, Lprod, Lpen_1, Lgs)	3.49	Inconclusive
(8) Selected ARDL (2, 1, 2, 2, 2, 0, 1, 2)	$F_{\textbf{Lgs}}$(Lgs| Lreer, Lemp, Loilrent, Ltot, Lprod, Lpen_1, Lcf)	0.58	No Cointegration
	Lower-bound critical value |0	Upper-bound critical value |1	
10%	2.03	3.13	
5%	2.32	3.5	
1%	2.96	4.26	

Source: Author's own calculations using Eviews.

Implying the long-run cointegration relationships amongst the variables when the regressions are normalized on *Lreer_t, Lemp, Loilrent, Ltot, Lprod, Lopen_1, Lcf* and *Lgs* variables, we reject the null hypothesis that there is no equilibrating relationship in the long-run for the ARDL selected model (1) and (5) that have the calculated *Wald* F-statistic higher than the upper bound critical value 4.26 at the 1% significance level (4.32 and 32.18 respectively), while for the ARDL selected model (8), there is no equilibrating relationship because its corresponding calculated F-statistic (0.585) is less than the lower bound critical value (2.03) and for the calculated F-statistic of the ARDL selected models (2), (3), (4), (6) and (7), the test results are inconclusive. However, based on the Dutch Disease theory, we will use *Lreer_t* as a dependent variable. Thus, based on the equation (3.12), the model to be estimated in this research is presented as follows:

$$\Delta Lreer_t = c + \sum_{i=1}^{p} \alpha_1 \Delta Lreer_{t-i} + \sum_{i=0}^{q} \delta_1 \Delta Lemp_{t-i} + \sum_{i=0}^{q} \delta_2 \Delta Loilrent_{t-i} + \sum_{i=0}^{q} \delta_3 \Delta Ltot_{t-i} +$$

$$\sum_{i=0}^{q} \delta_4 \Delta Lprod_{t-i} + \sum_{i=0}^{q} \delta_5 \Delta Lopen1_{t-i} + \sum_{i=0}^{q} \delta_6 \Delta Lcf_{t-i} + \sum_{i=0}^{q} \delta_7 \Delta Lgs_{t-i} + \lambda_1 Lreer_{t-1} +$$

$$\beta_1 Lemp_{t-1} + \beta_2 Loilrent_{t-1} + \beta_3 Ltot_{t-1} + \beta_4 Lprod_{t-1} + \beta_5 Lopen1_{t-1} + \beta_6 Lcf_{t-1} + +\beta_7 Lgs_{t-1} +$$

$$\varepsilon_t \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.13)$$

2.2. The Appropriate Lag Length Selection: The main practical question is about choosing the appropriate lag length *p* for dependent variable and *q* for the independent variable, and since the data used in our model are annual, the maximum lag orders should be specified at 2 lags. While among the well-known criteria to be used in determining the optimum lag length, there are *Akaike* Information criterion AIC, *Schwartz* criterion SIC, or *Hannan-Quinn* information criterion HQ, Log Likelihood… etc., bearing in mind that the optimum lag length corresponds to the lowest values of the first three criteria but corresponds to the highest value of the last criterion. In our study's regression model, we will let Eviews select automatically the appropriate lags for both dependent and independent variables based on the *Akaike* criterion regarding its advantages for small and finite sample sizes. The following table shows that one lag is optimal for the dependent variable *Lreer.*

Table n° 03-10: Optimal Lag *(p)* for the Dependent Variable *Lreer* based on different criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	19.32353	NA	0.010225	-1.745098	-1.695359	-1.734304
1	35.31885	28.94390*	0.002453*	-3.173223*	-3.073745*	-3.151634*
2	35.33385	0.025718	0.002698	-3.079414	-2.930197	-3.047030

Source: Author's own calculations using Eviews.

Furthermore, the next Figure n° 03-16 illustrates how AIC has chosen the best twenty models:

Figure n° 03-16: Akaike Information Criterion

Akaike Information Criteria (top 20 models)
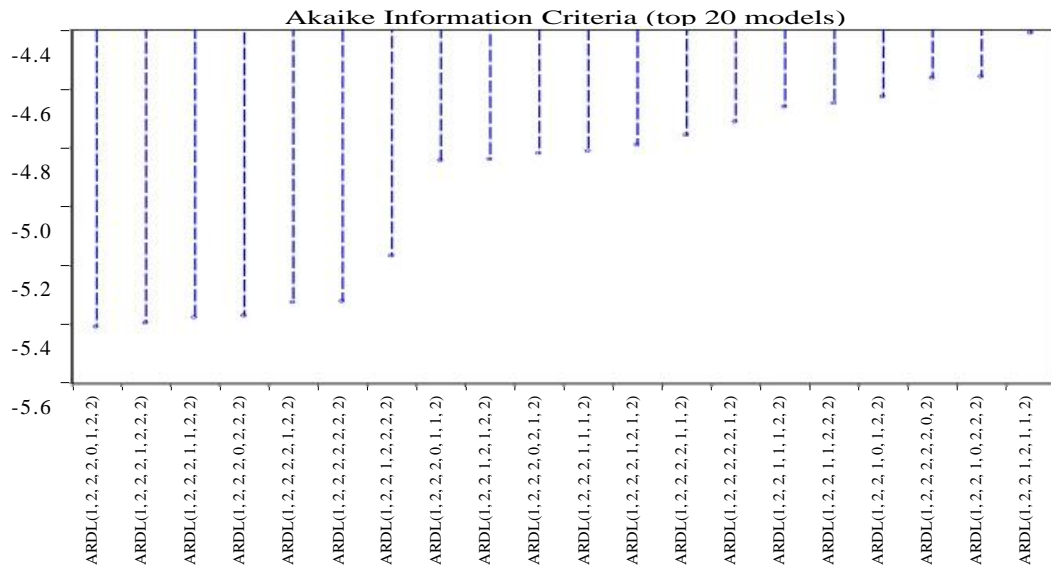
Source: Author's own calculations using Eviews.

According to the results illustrated in the previous Figure, we can clearly see that the AIC criterion indicates that for the dependent variable *Lreer* 1 lag is suitable and for the independent variables 2 lag are suitable. Furthermore, according to the previous figure, the minimum AIC value of (-5.41) corresponds to the specified ARDL model (1, 2, 2, 2, 0, 1, 2, 2).

2.3. Bound Testing for Long-run Cointegration is based on the joint *Wald* test (F-Statistic): Based on this test, we have two hypotheses that are:

H₀: $\theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = \theta_7 = \theta_8 = 0$, meaning that there is no equilibrating relationship. (F-statistic is less than the lower critical value I0 Bound);

H₁ $\theta_1 \neq 0 \ or \ \theta_2 \neq 0 \ or \ \theta_3 \neq 0 \ or \ \theta_4 \neq 0 \ or \ \theta_5 \neq 0 \ or \ \theta_6 \neq 0 \ or \ \theta_7 \neq 0 \ or \ \theta_8 \neq 0$,meaning that here is an equilibrating relationship. (F-statistic is higher than the upper critical value I1 bound).

The table below demonstrates the Bound test results for the ARDL (1, 2, 2, 2, 0, 1, 2, 2) model:

Table n° 03-11: The Selected ARDL (1, 2, 2, 2, 0, 1, 2, 2) Bound Testing for Cointegration

Test Statistic	Value	K
F-statistic	4.324192	7

Critical Value Bounds

Significance	I₀ Bound	I₁ Bound
10%	2.03	3.13
5%	2.32	3.5
2.5%	2.6	3.84
1%	2.96	4.26

Source: Author's own calculations using Eviews.

The cointegration analysis suggests that there exist a long-run relationship between the real effective exchange rate and their identified fundamentals in Algeria. The F-statistic value 4.32 is evidently greater than the upper critical value bound I₁ at the significance level 1%; this implies that the null hypothesis is rejected; rather we accept the alternative one that there is an equilibrating relationship.

2.4. Diagnostic Tests

Table n° 03-12: Diagnostic Tests for Serial Correlation, *Ramsey*, Heteroscedasticity and Normality

Residual serial correlation- *Breush-Godfrey* Serial Correlation LM Test			
LM Test stataistics	238.9967	Prob.	0.0510
Heteroscedasticity-*Breush-Godfrey* Test			
F-statistic	1.322426	Prob.	0.4079
Obs*R-squared	20.85077	Prob.	0.3451
Scaled explained SS	0.714710	Prob.	1.0000
Model specification – *Ramsey*'s RESET Test			
F-statistic	3.749174	Prob.	0.1528
Normality of residuals - *Jarque Bera* Normality test J-B			
J-B	0.237864	Prob.	0.888

Source: Author's own calculations using Eviews.

These tests show that there is no evidence of autocorrelation, i.e. since the null hypothesis is that the residuals are serially uncorrelated, the F-statistic p-value of 0.0510 indicates that we fail to reject this hypothesis. We, therefore, conclude that we do not have a problem with serial correlation as the residuals are serially uncorrelated.

Moreover, the null hypothesis of the residuals' homoscedasticity test is that the residuals are homoscedastic, meaning that the variance of the residuals is constant and the alternative hypothesis of the residuals' heteroscedasticity is that the residuals are heteroscedastic, meaning that the variance of the residuals is not constant. In fact, the F-statistic p-value of 0.407>0.05, as well as the p-value of Obs*R-squared 0.345>0.05, indicate that we cannot accept the alternative hypothesis for a significance level of 5%. We, therefore, conclude that the residuals are homoscedastic at the 5% significance.

The F-statistic is also reported by *Ramsey* test for checking the coefficients on the power of the fitted values from regression and according to the outputs of this test, we cannot reject the null hypothesis, since the p-value is greater than 0.05 that is, the model is correctly specified.

The residuals are normally distributed as evidenced by the non-rejection of the null hypothesis of normality using the *Jarque–Bera* test because the corresponding p-value is greater than 0.05 (0.888). (See Figure n° 03-17).

Figure n° 03-17: *Jarque-Bera* Test

Series: Residuals	
Sample 1992 2016	
Observations 25	
Mean	-1.56e-15
Median	-0.000734
Maximum	0.011470
Minimum	-0.017939
Std. Dev.	0.007423
Skewness	-0.191362
Kurtosis	2.713869
Jarque-Bera	0.237864
Probability	0.887868
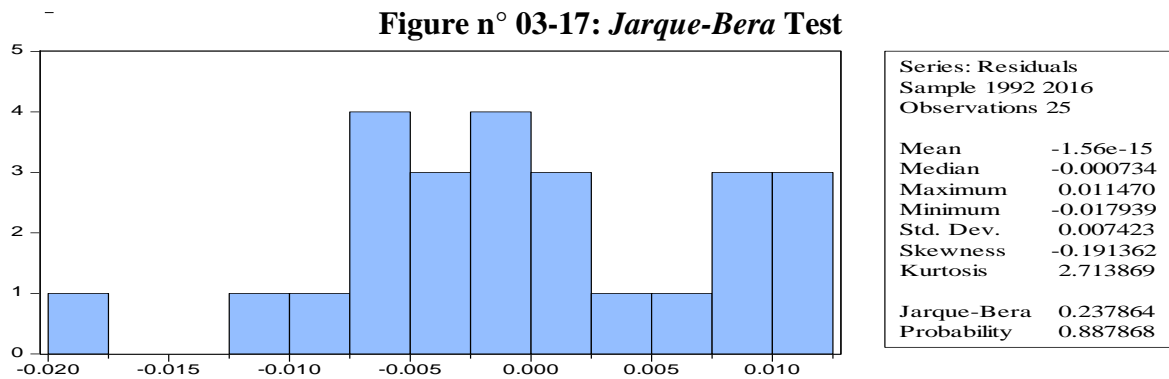
Source: Author's own calculations using Eviews

In short, the regression for the underlying ARDL (1, 2, 2, 2, 0, 1, 2, 2) passes all the diagnostic tests against serial correlation, heteroscedasticity, functional form mis-specification, and non-normal errors at 5% level.

3. Estimation Results:

3.1. Long-run ARDL Model Estimation: Since there is cointegration between the variables of the model, the long-run relationship to be estimated takes the following formula.

$$Lreer_t = \lambda_0 + \lambda_1 Lreer_{t-1} + \beta_1 Lemp_{t-1} + \beta_2 Loilrent_{t-1} + \beta_3 Ltot_{t-1} + \beta_4 Lprod_{t-1} +$$
$$\beta_5 Lopen1_{t-1} + \beta_6 Lcf_{t-1} + +\beta_7 Lgs_{t-1}………….....…………………………..…… (3.14)$$

In order to determine the long-run relationships between the variables, equation (3.14) will be estimated by the ARDL model by using their optimal lags that were selected previously based on the *Akaike* information criterion (AIC). The results of the estimated ARDL (1, 2, 2, 2, 0, 1, 2, 2) obtained by normalizing on the real effective exchange rate (*Lreer_t*), are reported in the following Table:

Table n° 03-13: Unrestricted Estimates of the Long-run Coefficients ARDL (1, 2, 2, 2, 0, 1, 2, 2) Selected based on the *Akaike* Information Criterion

ARDL (1, 2, 2, 2, 0, 1, 2, 2) selected based on AIC. The dependent variable is Lreer				
Regressors	**Coefficient**	**Standard Error**	**Absolute t-statistic**	**Prob.**
C	-6.153223***	0.269934	-22.795270	0.0000
LEMP	0.310280***	0.056401	5.501337	0.0027
LOILRENT	-0.219171**	0.063869	-3.431576	0.0186
LTOT	0.221987***	0.054551	4.069374	0.0096
LPROD	1.045554***	0.120416	8.682867	0.0003
LOPEN$_{-1}$	-0.179579**	0.067223	-2.671402	0.0443
LCF	0.849618***	0.141085	6.022029	0.0018
LGS	0.891052***	0.127694	6.978047	0.0009
$R^2 = 0.92$	$\overline{R^2} = 0.62$	F-Stat. F=3.05	Prob. F (0.11)	DW= 2.12

Notes: Model selection method: AIC, Maximum dependent lags=1 (Automatic selection). Asterisk***, **, * indicate the coefficients significance at 1%, 5% and 10% significant level respectively.

Source: Author's own calculations using Eviews.

The long-run results of the estimated ARDL cointegration model (1, 2, 2, 2, 0, 1, 2, 2), selected automatically by *Akaike* criterion (AIC) out of 512 models are reported in the Table n°03-13, and show that the model fits very well at $_2$=0.92, that is 92% of the variation in the real effective exchange rate are explained by changes in *Lemp, Loilrent, Ltot, Lprod, Lpen$_{-1}$, Lcf* and Lgs. The results also indicate that the relationship between the dependent and independent variables is not spurious because the F-statistic value for the significance of the determination coefficient is reaching 3.05 at the 10% level of significance. The DW generally, tells us about the error autocorrelation, but in this case, it is not useful because the model is performed by applying more than 1 lag. Furthermore, the table reports the feedback coefficient estimates and their corresponding t-statistic indicating that all variables in the model exert significant long term influences on the long-run real effective exchange rate, implying that this latter was largely determined by *Lemp*, *Loilrent, Ltot, Lprod, Lopen_1, Lcf* and *Lgs* in Algeria. According to the estimated results shown in the previous table, the equation n°06 becomes:

$$\text{Lreer} = -6.1532 + 0.3103 * \text{Lemp} - 0.2192 * \text{Loilrent} + 0.2219 * \text{Ltot} + 1.0456 * \text{Lprod} - 0.1796 * \text{Lopen}_1 + 0.8496 * \text{Lcf} + 0.8911 * \text{Lgs} \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots (3.15)$$

The resulting coefficients of the cointegration equation excluding those of *Loilrent* nd *Lemp,* are consistent with the economic theory, that is, the estimated coefficients have the expected signs and are strongly significant.

Lemp is positively associated with *Lreer* suggesting that a 10% increase in the share of employment in the informal sector will lead to a 3.1% increase in the long-run real effective exchange rate. This result could be interpreted by the loss of competitiveness in the manufacturing sector leading to a shift of labour to the NT sector, informal one here. However, this result is not sufficient to confirm the resource movement effect, especially in the absence of full employment of the labour force as assumed by the Dutch Disease theory.

Loilrent has a highly significant negative association with *Lreer*, indicating that a 10% improvement in oil rent following either raised oil prices or new discoveries will depreciate the real effective exchange rate by almost 2.2%. The sign of Oil Rent is unexpected in particular for a high commodity exporting country such as Algeria, therefore, the economy of this latter does not exhibit the major symptom of the traditional form of the Dutch Disease, reflecting the role of the exchange rate policy in Algeria and that the DZ *Reer* is a subject to the will of the national and international economic organizations as the Central bank of Algeria or the IMF, in accordance with their economic policy's strategic objectives in general and those of the monetary and financial policies in particular. Shortly, Algeria's real exchange rate does not serve as a channel through which high oil rent or oil prices could affect the economic structure. (The absence of the spending effect)

Ltot has a highly significant positive (appreciating) association. A 10% improvement in the terms of trade will lead to a 2.22% increase in the long-term real effective exchange rate; indicating that the income effect is more important than the substitution effect. This effect occurs either due to a decrease in import prices or to an increase in exports earnings (because of the rise of oil prices in international markets) relative to imports payment following a rise in demand for the Algerian currency, thus shifting the trade balance into surplus that increase the income leading to a greater spending on NT and an increase in the relative price of NT to T;

The sign of the technological progress *Lprod* proxied by real GDP per capita has a significant positive (appreciating) effect at 1% significance level on *Lreer* and corresponds with economic theory. A 10% increase in technological progress will lead to 10.45% real appreciation in the long-run exchange rate. Although, its impact captured by Productivity confirms the *Balassa Samuelson effect* according to which, higher productivity lowers production costs and thus the tradables' prices relative to the NT, pushing up the domestic price level and rising wages which in turn, cause a real appreciation of the DZ exchange rate in the long-run;

Lopen_1 has a statistically significant negative impact on *Lreer*, indicating that a 10% increase in openness will lead to a 1.79% decrease in the real effective exchange rate, which means as Algeria increases its international trade, its local currency depreciates or in another word, the larger trade balance deficit is associated with an over-appreciation of REER, thus, it supports strongly the hypothesis that an improvement in the trade openness produces a real depreciation for exchange rate in order to facilitate the correction of balance of payments, whereas, this could be due to the reason that increasing Algeria's trade openness or in another word, compressing the trade restrictions by rising the imports penetration rate through diminishing exports taxes, signing trade agreements and reducing imports tariffs, is instrumental in achieving a competitive real effective exchange rate in the long-run.

The *Lcf* variable seems to be a key determinant of Algeria's long term real effective exchange rate since it has a significant positive association with *Lreer*, that is, a 10% increase in the capital flows will lead to 8.5% increase in the real effective exchange rate. This finding indicates that capital flows are spent on the NTs and confirms the contention of existing literature that capital flows could result in an appreciation of the REER that tend to weaken the competitiveness

Similarly, the real effective exchange rate is highly elastic to the government spending *Lgs;* they have a significant positive association. A 10% increase in the government spending provokes 8.91% increase in the real effective exchange rate. Such a sign suggests that Algeria's exchange rate experiences a real appreciation indicating a bias towards NT goods.

3.2. The Error Correction Model (Short-run Error Correction Estimates): The fact that the variables in our model are integrated provides support for the use of an error correction

$$\Delta Lreer_t = c + \sum_{i=1}^{p} \alpha_1 \Delta Lreer_{t-i} + \sum_{i=0}^{q} \delta_1 \Delta Lemp_{t-i} + \sum_{i=0}^{q} \delta_2 \Delta Loilrent_{t-i} + \sum_{i=0}^{q} \delta_3 \Delta Ltot_{t-i} +$$

$$\sum_{i=0}^{q} \delta_4 \Delta Lprod_{t-i} + \sum_{i=0}^{q} \delta_5 \Delta Lopen1_{t-i} + \sum_{i=0}^{q} \delta_6 \Delta Lcf_{t-i} + \sum_{i=0}^{q} \delta_7 \Delta Lgs_{t-i} + \psi ECT_{t-1} \ldots\ldots\ldots\ldots(3.16)$$

Where: ψ explains the speed of adjustment; and ECT_{t-1} is the error correction term.

The estimation results, still based on the AIC criterion, and they are presented in Table n° 03-14:

Table n° 03-14: Unrestricted Estimates of the Short-run Coefficients ARDL (1, 2, 2, 2, 0, 1, 2, 2) Selected based on the Akaike Information Criterion

ARDL (1, 2, 2, 2, 0, 1, 2, 2) selected based on AIC. The dependent variable is *Lreer*				
Regressors	**Coefficient**	**Standard Error**	**Absolute t-statistic**	**Prob.**
(Lemp)	0.036834*	0.017807	2.068538	0.0934
(Lemp (-1))	-0.302822***	0.023023	-13.153057	0.0000
(Loilrent)	0.093787***	0.022077	4.248095	0.0081
(Loilrent (-1))	0.327929***	0.028406	11.544245	0.0001
(Ltot)	0.076200**	0.023610	3.227510	0.0233
(Ltot (-1))	-0.201444***	0.027643	-7.287378	0.0008
(Lprod)	1.892220***	0.079440	23.819454	0.0000
(Lopen_1)	0.221635***	0.047176	4.698008	0.0053
(Lcf)	0.873096***	0.041768	20.903299	0.0000
(Lcf (-1))	-0.226866***	0.040454	-5.607952	0.0025
(Lgs)	0.299417***	0.064074	4.672977	0.0055
(Lgs (-1))	-1.456235***	0.102631	-14.189040	0.0000
ECT (-1)	-1.838447***	0.080499	-22.838129	0.0000

Asterisk ***, **, * denotes the coefficients significance at 1%, 5% and 10% significant level respectively.

Source: Author's own calculations using Eviews.

Table n° 03-14 presents the short-run parameters (elasticities) of the equilibrium real effective exchange rate model. It is clear from the model that all the elasticities are statistically significant. Based on the estimated results shown in the previous Table, equation n°08 becomes:

$\Delta Lreer = +0.0368 * \Delta(Lemp) - 0.3028 * \Delta(Lemp(-1)) + 0.0938 * \Delta(Loilrent) + 0.3279 * \Delta(Loilrent(-1)) + 0.0762 * \Delta(Ltot) - 0.2014 * \Delta(Ltot(-1)) + 0.2216 * \Delta(Lopen\_1) + 1.89221 * \Delta(Lprod) + 0.8731 * \Delta(Lcf) - 0.2269 * \Delta(Lcf(-1)) + 0.2994 * \Delta(Lgs) - 1.4562 * \Delta(Lgs(-1)) - 1.8384 * Ect(-1)$ …………………………………………………………….. (3.17)

Generally, most of the variables bear the expected signs in the short-run, and no variables found to be insignificant.

In equation (3.17), the error correction term $ECT(-1)$ is the lagged error correction term that is the one period lagged value of the error terms derived from the long-run equilibrium model. The coefficient of lagged ECT is negative and highly significant as expected (-1.84 (0.000)) which confirms our earlier findings that cointegration exists between the variables and

implies that there is a long-run causality running from the independent variables to the dependent variable *Lreer*. In fact, it represents the gap between the long-run equilibrium and actual values of the real effective exchange rate, indicating that almost 184% of the short-run errors (disequilibrium) due to the previous year's shocks resulted from the change in the explanatory variables, could be adjusted back to the long-run equilibrium in the time unit (year), therefore, the speed of adjustment is 54% i.e. about six and a half months (1÷184%).

It should be noted that we have ECT (−1) coefficient between (-1) and (-2), indicating that the lagged error correction term produces dampened fluctuations in the real effective exchange rate about the equilibrium path. As seen from the results of the short-run model, the ECT(−1) coefficient is found to be -1.84, which implies that instead of monotonically converging to the equilibrium path directly, the error correction process fluctuates around the long-run value in a dampening manner, however, once this process is complete, convergence to the equilibrium path is rapid.[1]

On the other hand, the results of the ECM reveal that the ***Lemp*** elasticity stands at (0.0368) at 1the 0% significance level, suggesting a positive relationship between the *Lemp* and *Lreer* rate in the short-run. A 10% increase in the share of employment in the informal sector will, indeed, appreciates the real exchange rate of about 0.37%.

Based on our estimation results of ECM, the positive coefficients of ***Loilrent*** and *Loilrent (-1)* with respect (0.094 and 0.328) are highly significant in the statistical term, meaning that a 10% increase in the oil rent leads to approximately 0.94% increase in the real effective exchange rate as well as a 10% increase in the oil rent of the previous year leads to 3.28% increase in the short-run real effective exchange rate;

However, according to the ECM, ***Ltot*** is positively signed and statistically significant at 5%, meaning that a 10% improvement in terms of trade leads to approximately 0.76% appreciation in the real effective exchange rate; while the previous year's terms of trade is negatively signed and statistically significant at 1%, indicating that a 10% improvement in terms of trade leads to 2% depreciation in the short-run real effective exchange rate;

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[1] Narayan, P. K. & Smyth, R. (2006). What Determines Migration Flows from Low-Income to High Income Countries? An Empirical Investigation of Fiji–US. Migration 1972-2001. *Contemporary Economic Policy, 24 (2),* p 339.

Although, the estimated coefficient of ***Lprod*** (1.89) is positively significant at the1% level, indicating that a 10% improvement in the technological progress will lead to 18.9% increase in the short-run real effective exchange rate;

Similarly, ***Lopen_1*** appears to play an important role in improving *Lreer* in the short-run. The trade openness has a significant positive effect on the real effective exchange rate at 1%. A 10% increase in the trade openness will lead to 2.22% appreciation in the real exchange rate.

As we expected, the estimate of ***Lcf*** variable bears a significant positive sign (0.87) at the 1% level of significance. A 10% increase in the capital flows will appreciate the real effective exchange rate by approximately 8.73%. This impact, due to increasing demand for NT and raising their prices given that Algeria's economy is not heavily indebted, is suggesting that the most of capital flows are more directed to be invested in the NT sector in the short-run; while the previous year capital flows have a significant negative sign (-0.22) at the 1% level of significance indicating that A 10% increase in the capital flows will depreciate the short-run real effective exchange rate by 2.2%.

Finally, ***Lgs*** is positively associated with *Lreer* at the 1% level of significance, indicating that a 10% increase in government spending will lead to a 2.99% appreciation in the real effective exchange rate. This result is suggesting that most of the government spending is directed towards NT in the short-run and that the income effect is less important than the substitution effect according to which the rise in oil prices leads to increasing both real wages levels and government spending as increases the non-tradables relative prices leading to a rise in the profitability of the NT sector and contracts the non-resource tradable goods sector, therefore, hinders the state efforts to enhance the economic activities rather than the hydrocarbon sector. (Spending effect). In fact, the increase in the Algerian government spending was mainly through three programs, namely: the plan for supporting economic revitalisation 2001-2004 with $7 billion, the growth consolidation program 2005-2009 with $193.8 billion and the new program for supporting economic growth 2010-2014 with $202.41 billion, while after 2015, the processing budget was estimated at $64.3 billion; as well as the previous year government spending is significantly positive that its increase by 10% will lead to 14.5% depreciation in the short-run real effective exchange rate.

The model also showed that the past or the lagged values of the studied variables were found to be statistically significant in determining the *Lreer.*

4. Stability Diagnostic: In addition to the above diagnostic tests, the stability of the long-run and short-run estimates as one of the requirements for the specified ARDL could be tested by performing the cumulative sum (CUSUM) and cumulative sum of squares (CUSUMSQ) of recursive residuals. The first one helps to show whether the coefficients are changing systematically or not; while the second one is helpful to showing whether the parameters are changing suddenly or not; as shown in the next Figure n° 03-18:

Figure n° 03-18: Plots of the Cumulative Sum CUSUM and Cumulative Sum of Squares CUSUMSQ
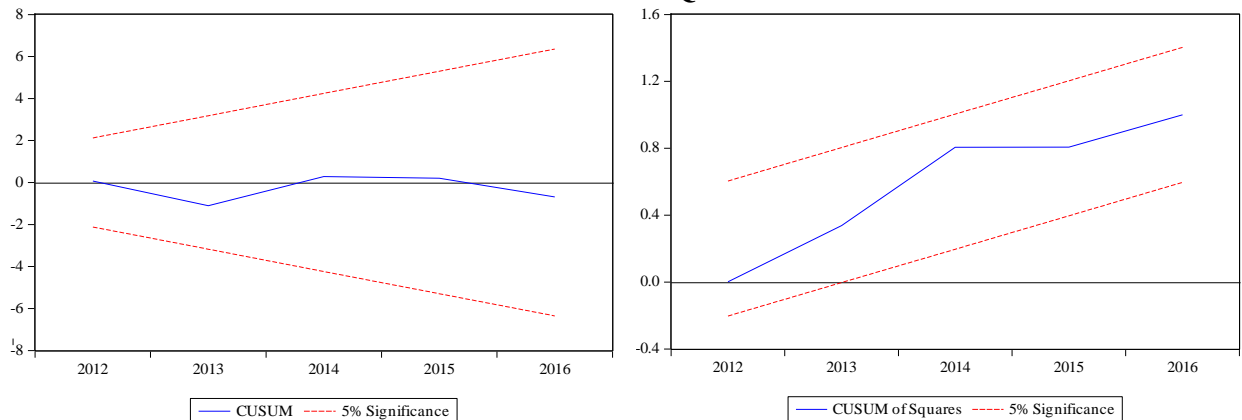
Note: The straight line represents the critical bounds test at 5% significance level.

Source: Author's own calculations using Eviews

According to those plots, the estimated long and short-runs parameters estimated by ARDL model and its residual variance are said to be stable as there is no structural break because the CUSUM and CUSUMSQ plots (blue lines) are not falling outside the critical bounds of 5% (red lines) and did not cross them, furthermore, such a result provides evidence of the existence of an integrating relationship among variables. Similarly, it is clear from the Figure shown in the Annex n° A-03 that each coefficient is also individually stable because no one is crossing the boundaries of the critical limits. Therefore, the above results indicate that the long-run ARDL (1, 2, 2, 2, 0, 1, 2, 2) model passes all the diagnostic tests.

V. Algeria's Exchange Rate Misalignment:

1. The *Hodrick-Prescott* Filter: In order to estimate the degree of misalignment, the long-run estimates of the fundamentals have been used to obtain the fitted values of the equilibrium real exchange rates. Figure n° 03-19 displays the evolution of the actual and estimated equilibrium real

exchange rate BEER for Algeria from 1990 to 2016. The actual LREER appears to have been very close to its estimated equilibrium during the studied period.

Figure n° 03-19: Plot of the Actual and Fitted Values of LREER
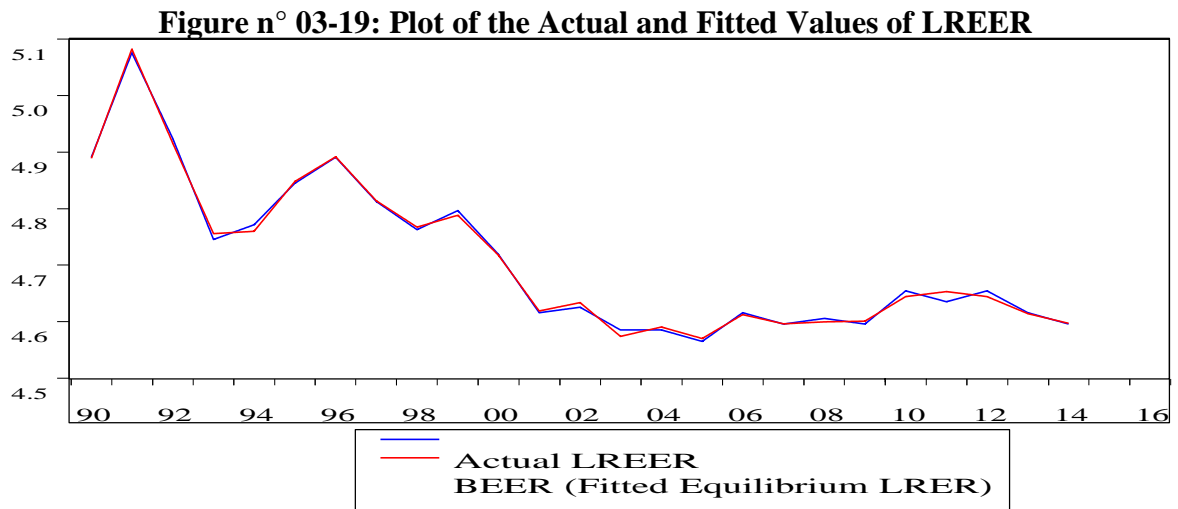
Source: Author's own calculations using Eviews.

The above long-term relationships obtained by estimating the equation of *Lreer* with their fundamentals permits the calculation of ERER or BEER that represents the *Lreer* level that is consistent with the long-run equilibrium values of those fundamentals. The rationale of using sustainable economic fundamentals is to neutralize the impact of temporary fluctuations in the explanatory variables and only use long-term equilibrium values of the variables. The *Hodrick-Prescott* (HP) filter allows us to obtain the long-run, permanent or sustainable values of the economic fundamentals by decomposing the time series into a trend and stationary component. Hence, the equilibrium RER equation can be depicted via the following model: $Ln\ e_t^* = \hat{\beta} F_t^p$ where: e_t^* is the equilibrium exchange rate; F is the vector of permanent or sustainable values of fundamentals obtained using the HP flter and $\hat{\beta}$ is the vector of long-run parameters.[1]

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[1] Ebaidalla M. E., (2014). Real Exchange Rate Misalignment and Economic Performance in Sudan. *African Review of Economics and Finance, 6(2)*, p122.

The HP filter is used to remove the short-run variations from the explanatory variables.[1] Its use is justified by the fact that the original series of fundamentals contain noise or short-run fluctuations that do not correspond to the behaviour a variable should exhibit when it is at its equilibrium level.[2] Figure n° 03-20 displays the evolution of the actual and equilibrium real exchange rate for Algeria over the period 1990-2016.

Figure n° 03-20: Plot of the Real Exchange Rate and its Equilibrium Level based on *Hodrick-Prescott* HP Filter
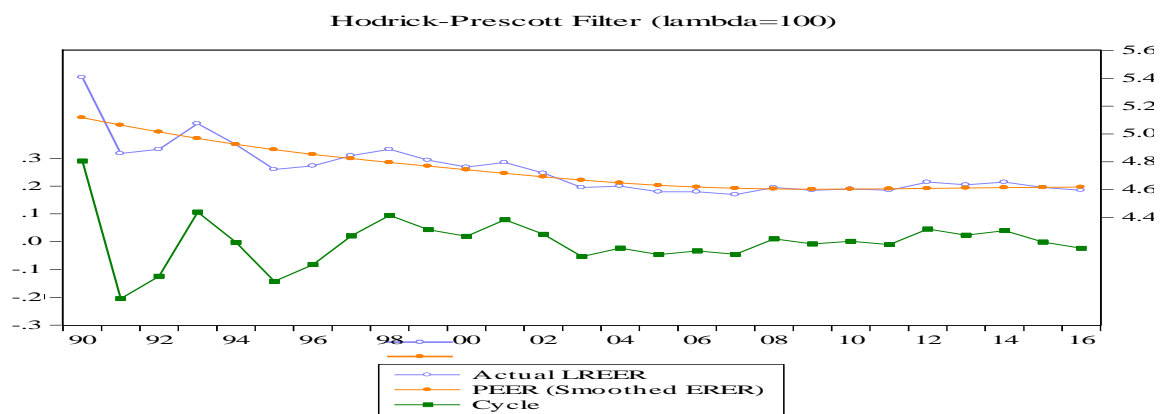
Source: Author's own calculations using Eviews.

The estimated long-run relationship between the real effective exchange rate and its fundamentals is decomposed into permanent (PEER) and cyclical components. The Figure (above) presents the actual LREER and smoothed ELRER (PEER) derived by evaluating the coefficients of the economic fundamentals at the *Hodrick-Prescott* HP filter with a smoothing factor of 100 (annual data). The smoothed ELRER reflects the divergence in both directions from the actual LREER in the first part of the sample 1990-2001, while the divergence between the forecasts of the LREER and smoothed ELRER appears to have diminished during the period 2002-07. However, the behaviour of the actual LREER remained very close to equilibrium in the latter part of the sample 2008-16.

2. Estimating the Degree of Misalignment: The level of the real exchange rate is not sufficient in itself to say whether the currency is in a situation of overvaluation or undervaluation. This requires defining a level of the real exchange equilibrium, which would provide for example the balance of external accounts and/or growth without inflation. If we can, however, define this

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[1] Ashraf J. (2001). Pakistan's External Trade: Does Exchange Rate Misalignment Matter for Pakistan?. *The Lahore Journal of Economics (Issue Special Edition),* p142.

[2] Harold A. V. R. & Cueto, R. A. (2014). Analysis of the Real Exchange Rate in the Dominican Republic: A Study Based on the International Monetary Fund's Assessment Methodologies. *Avenida Coyoacán, 1450*, p146.

equilibrium, any level of the observed real exchange rate above the equilibrium level defines a situation of the currency overvaluation.[1] The long-run relationship obtained by estimating the real effective exchange rate *Lreer* with their fundamentals allows the calculation of the equilibrium real exchange rate that is consistent with the long-run equilibrium values of the fundamentals based on the results of the cointegration regressions, therefore, the exchange rate misalignment is calculated as deviations of the actual LREER from its equilibrium level over time using the following formula:[2]

$$MIS = 100 * (REER - ERER/ERER)\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \text{(3.18), where:}$$

REER is the actual real exchange rate presented by the logarithmic form LREER in our study; ERER is the equilibrium real exchange rate (here, we will use the permanent equilibrium PEER values suggested by *Hodrick-Prescott*). Based on the previous equation, If the actual LREER is more appreciated than the equilibrium rate ERER (LREER>ERER), the LREER is considered to be overvalued (Mis>0). Conversely, if (LREER<ERER) the LREER is considered undervalued (MIS<0). In short, the positive (negative) divergence from the equilibrium reflects Overvaluation (Undervaluation) of the real exchange rate while the null value indicates its alignment. Whenever the LREER deviates from its equilibrium level, due to a specific shock, it reverts to its equilibrium level fairly quickly in the absence of further shocks. Depending on the cause of the gap, the adjustment requires that the real exchange rate has either moved progressively towards a new equilibrium level or returned from its temporary deviation to the initial equilibrium. The misalignment can attribute to the structural changes in the country and to the choices of economic policies (monetary and fiscal instability). In fact, the importance of misalignment could be shown in the following points:[3]

- It could be used to predict the future shift of REER;
- It may decrease the need to adjust the exchange rate;
- A likely prelude to the financial crisis;
- May affect economic growth; and
- May boost the economic growth as was the case for Japan, Germany and recently China.

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[1] Candau, F. & al. (2010). Taux De Change Réel et Compétitivité de l'Economie Réunionnaise. *CERDI series Working Paper, E10*, p12.

[2] Badamasi, U. B. Real Exchange Rate Misalignment and Macroeconomic Performance in Nigeria: A Bilateral Real Exchange Rate in Foreign Currency Approach 1970–2007, p09. Retrieved frm the web site: https://www.academia.edu/846549/Real_Exchange_Rate_Misalignment_and_Macroeconomic_Performance_in_Nigeria.

[3] Zmeu O. (2010). Real Exchange Rate Misalignment and Trade Competitiveness: The Case of Romania. *The Academy of Economic Studies*, p02.

The results of misalignment are discussed below in detail. (See the following Figure):

Figure n° 03-21: Algeria's Exchange Rate (LREER) Misalignment
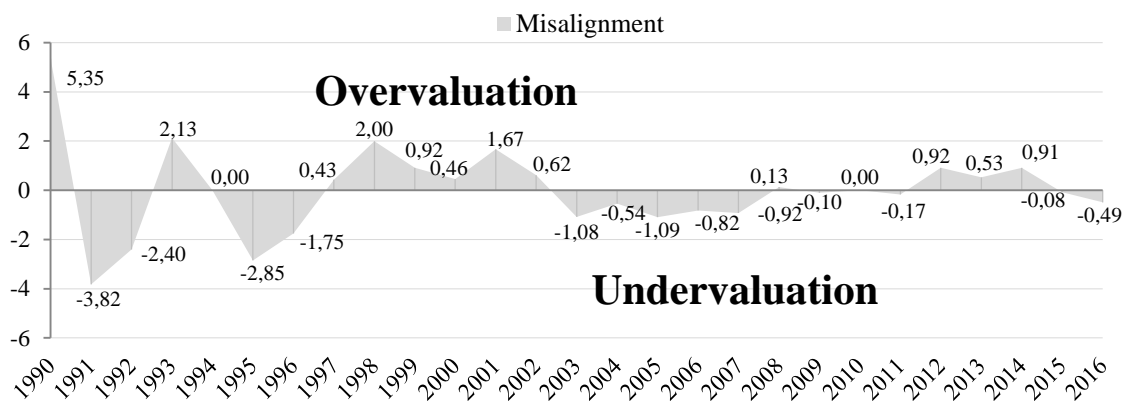
Source: Author's own calculations.

According to the previous Figure, we observe that the DZ real exchange rate has been overvalued and undervalued in a number of episodes due to different reasons that could be summarized in the following Table:

Table n° 03-15: Episodes of the Real Exchange Rate Misalignment in Algeria

Range	Outcome	Min %	Max %	Average %	Narration
1990	Over-valuation	-	-	5.35	- The promulgation of the Money and credit law; - The DZ currency's nominal exchange rate became DZ12 after the devaluation; - The trade balance deficit of 0.93% GDP share;
1991-92	Under-valuation	-5.12	-1.10	-3.11	- Devaluing the DZ currency again through introducing the controlled progressive sliding system; - Restricting the purchase of foreign exchange in 1992;
1993	Over-valuation	-	-	2.13	- The trade balance deficit
1994	Alignment	-	-	0.00	- The great two-step devaluation of the DZ currency by firstly 7.3% in March 1994, and 40.17% in April from the same year; - The adjustment program in 1994 applied by the authorities as proposed the IMF and World Bank, to correct the former DZ currency appreciation along with trade liberalization standards; - The trade balance deficit - The debt servicing cessation and its rescheduling; - The liberalization program

1995-96	Under-valuation	-4.41	1.34	-1.54	- The implementation of the *managed float regime* through fixing sessions between bank of Algeria and the commercial banks and signing free trade agreements (The Structural Adjustment Programme Agreement) with the European Union in 1995; - The establishment of an interbank foreign exchange market to allow a free determination of the dinar in 1996; - Allowing the establishment of exchange offices dealing in hard currency from Dec.1996; The improvement of oil prices from $15.5 per barrel in 1994 to $20.8 in 1996 contributed significantly in restoring the external disequilibrium and reducing the divergence; - The REER has appreciated by about 2.16% over 1995-96.
1997-2002	Over-valuation	-0.32	2.35	1.01	- The REER continued to appreciate till 1998 reaching 133.44 with an increase rate of about 13.31% compared to 1996, thereafter, it began depreciating for the rest of the period reaching 112.58 in 2002 due to the appreciation of the euro against the U.S. dollar; - The euro creation in 1998; - Balance of payments equilibrium due mainly to improved oil prices - The DZ currency depreciation in order to reduce the gap between the nominal and the informal exchange rates, thus diminish the role of the black market; - the improvement of the trade balance by about 87.5% over the period 1997-2001; - The structural excess of liquidity over the period 2001-08;
2003-07	Under-valuation	-1.34	-0,44	-0,89	- Appreciating the nominal exchange rate, therefore, a real depreciation of the DZ currency in 2003 due to the appreciation of the euro which lead the authorities to intervene in the foreign exchange market to bring the REER back to close to its end-2002 level and diminish the role of the black market; - The high rise of oil pieces by 146% in 2007 compared to 2003;
2008	Over-valuation	-	-	0,13	- The appreciation of the DZ currency (DZ64.58 per $) due to the depreciation of the US $ against the euro € following the world financial crisis; - The rise of oil prices recording $94.45 per barrel with an increase rate of about 36.7% compared to 2007; - The trade balance deficit of 0.79% GDP share;
2009	Under-valuation	-	-	-0,10	- The appreciation of the Euro €; - The decline of oil price by almost 35.4% compared to 2008; - Shrinking Bank liquidity by 14.1% in 2009 due to the world financial crisis; - Budget and Treasury deficits;
2010	Alignment	-	-	0,00	- The continuing budget deficits; - High excess in Trade balance with an increase rate of about 78.8% compared to 2009;

2011	Under-valuation	-	-	-0,17	- The continuing budget deficits due to the significant increases in current budget expenditures (wages and transfers), reaching a peak in 2012;
2012-14	Over-valuation	0.34	1.47	0.79	- Treasury deficit in 2012; - Shrinking Bank liquidity again by 6.3% in 2013; - The depreciation of the DZ currency against both the US $ and the euro €; - The decline of oil prices from $109.45 per barrel to $96.26; - The trade balance deficit in 2013-14;
2015-16	Under-valuation	-0,28	-0,86	0.29	- The deterioration of oil prices reaching $40.76 per barrel; - High budget and Treasury deficits; - The trade balance and balance of payments' deficits;

Note: Positive MIS denotes Overvaluation; negative MIS denotes Undervaluation and null MIS denotes Alignment; The Min=Mean-2*Std.Dev; the Max=Mean+2*Std.Dev.

Source: Author's own calculations.

In fact, from the precedent Figure n° 03-21 (See also Table n°03-15), we can distinct between overvaluation periods (1990; 1993; 1997-2002; 2008 and 2012-14) and undervaluation periods (1991-92; 1995-96; 2003-07; 2009; 2011 and 2015-16), as well as two times of alignment (1994 and 2010). Furthermore, we can see that the misalignment values over these different episodes either of overvaluation or of undervaluation did not exceed the relative interval of critical values [-3.11, 5.35]. The highest overvaluation episode occurred in 1990 while the highest undervaluation episodes were in 1991 and 1995. Generally, the misalignment has declined steadily over the period from 2002-16. However, in the period 2008-11, the extent of divergence of the real exchange rate from its equilibrium level varies between an overvaluation of 0.13% and an undervaluation of -0.17%, implying that we cannot talk about misalignment since both are very close to the equilibrium22 level and they do not prove to be of a large extent. Indeed, in both 1994 and 2010, the DZ real exchange rate has been aligned.

Conclusion of the Chapter:

T his chapter aimed primarily at assessing to what extent the equilibrium real exchange rate's performance could be affected by Dutch disease symptoms in Algeria through testing the main research hypotheses. Thereafter, estimating the exchange rate misalignment using annual data from 1990 to 2016. In this chapter, an attempt has been made to achieve this aim with the ARDL bound testing approach that is recommended to be appropriate since the variables under consideration are found of mixed order of integration (I(0) and I(1)) by performing both Augmented Dickey-Fuller (ADF) and Philips Perron (PP) tests for stationarity. Thereafter, evidence of integrating relationship among variables has been provided by performing the Wald test. Our analysis showed that the long-run estimates of the model variables are highly significant. Informal Employment, Terms of Trade, Technological Progress, Capital Flows and Government Spending are significantly positive at 1% level of significance with expected signs. A 10% increase in the latter variables proves to appreciate Algeria's equilibrium real exchange rate by 3.1%, 2.2%, 10.45%, 8.49% and 8.91% respectively. While both Oil Rent and Trade Openness are significantly negative at 5% level of significance. A 10% increase in those variables enhances a real exchange rate depreciation of about 2.19% and 1.79% respectively.

The Error Correction Model ECM revealed that the ECT is highly significant and has the expected sign, meaning that, in every year, 184% of the divergence of the short-run REER from its long-run path, is eliminated which in turn, means that the short-run disequilibrium in the model is corrected within six and a half months. The ECM results further indicate that all variables under consideration have significant positive effects on ERER in the short-run. However, the results showed that the lagged values of informal employment, terms of trade, capital flows and government spending exert significant negative effects at the 1% level of significance.

Diagnostic tests revealed that the short-run model passes through all tests indicating that there is no evidence of serial correlation, heteroscedasticity and mis-specification among variables as well as they are normally distributed. Furthermore, we examined the stability of both long and short-runs parameters based on CUSUM and CUSUMSQ tests from which we can see that the critical bounds for all equations did not exceed the critical boundaries confirming the long-run relationship between variables as well as it showed the stability of the coefficients. Finally, we also tried to detect the different misalignment episodes in Algeria from 1990 to 2016. The results demonstrated that the country witnessed significant overvaluation in 1990, 1993 and over the periods of 1997-2002, with an average of about 5.35%, 2.13% and 1.01%, respectively, while the DZ currency has been undervalued during the periods: 1991-92, 1995-96, 2003-07, 2009, 2011 and 2015-16 reaching its highest value in 1991-92, with an average of about - 3.11% However, it has been in full conformity with the equilibrium level in both 1994 and 2010.

Conclusion

Conclusion:

The present study contributes to the existing literature that concentrates on the Dutch disease by investigating its impact on the performance of Algeria's equilibrium real exchange rat from 1990 to 2016. In fact, high oil prices provoke a large appreciation of the real exchange rate and since rents from the hydrocarbon sector are the main source of income for the Algerian economy as the oil price movement determines a lot of government revenues regardless of the diversification of economic activities, one may say that theoretically, the Dutch disease occurred if we refer to Algeria's export sector. However, this study shows that the evolution of the real exchange rate cannot be explained according to the Dutch disease theory, despite the improvement in oil prices and thu , its corresponding revenues because it has been already influenced by the fiscal and monetary policies as it has approached much of its equilibrium value which means the absence of the Dutch disease

The study investigated the relationship between relevant macroeconomic variables and the real exchange rate in Algeria. At the beginning of the research, we assumed two hypotheses, the first that is, shocks that affect the equilibrium real exchange rate do refer mainly to the Dutch disease, *has not been proven*, while the second that is, shocks that affect the equilibrium real exchange rate in Algeria do not refer to the Dutch disease, *has been proven*. Our results are in line with those of some earlier studies such as for example, *Marc-Antoine, A. (2003), Djoufelkit, C. H. (2008), Derbal, A. & Dekkiche, M. (2011) and* they are different from those of other studies such as *Chekouri, S. M. & al. (2013).*

In fact, Getting such a result is done through several stages are as follows:

After performing the unit root tests for the studied variables, using both augmented *Dickey-Fuller* ADF and *Philips Perron* PP, it turns out that the *Lprod* variable is stationary at the level I(0) while the rest of the variables are stationary at the first differencing I(1). These tests for integration revealed that the variables under consideration are of mixed order of integration, which enables us to, initially, apply the Autoregressive Distributed Lags ARDL model.

After finding order of integration, our findings suggest that there is an equilibrating long-run relationship between the real effective exchange rate and informal employment, oil rent, terms of trade, technological progress, trade openness, capital flows and government spending in Algeria, hence, the null hypothesis of no cointegration has been rejected after performing the bound testing for cointegration through the F-statistics from Wald test of ARDL model which allows us to complete the process and estimate the error correction model ECM. Indeed, the F-statistics of the Wald test is higher than the upper bound critical value at 1 per cent level of significance.

Furthermore, the diagnostic tests rejected some obvious econometric problems. The *Brush Godfrey* LM-test for serial correlation has proven that there is no evidence of serial correlation for the estimated model at the 5 per cent level of significance. Similarly, the homoscedasticity in the residuals is confirmed by performing the Heteroscedasticity-*brush-God-Frey* Test, that is the null hypothesis of no Heteroscedasticity is accepted since the corresponding p-value is greater than 5 per cent level of significance. As well as the null hypothesis of mis-specification cannot be rejected by the *Ramsey* test statistic since its p-value is greater than 5 per cent level of significance. Furthermore, the null hypothesis of normality cannot be rejected according to the *Jarque Bera* JB test since its p-value is greater than 5 per cent level of significance.

The findings of the study based on the long-run estimates show that the equilibrium real exchange rate LREER is highly elastic to changes in its fundamentals. They strongly support that an increase in the share of employment in the informal sector by 10 per cent produces an appreciation of the DZ real exchange rate by 3.1 per cent, but this finding is not sufficient to confirm the resource movement effect, in particular under considerable rates of unemployment.

Similarly, the terms of trade are significant in explaining the DZ real exchange rate movement. A 10 per cent improvement in ToT leads to about 2.2 per cent appreciation in the real exchange rate.

It is also suggested based on the model that technological progress may have been the dominant source of persistent real exchange rate shocks. An improvement in productivity as a proxy of technological progress by 10 per cent leads to appreciating the DZ real exchange rate in the long-run by 10.45 per cent, thus confirming the *Balassa Samuelson effect*.

As it is found that the capital flows coefficient is significant and correctly signed. A 10 per cent increase in capital flows leads to about 8.5 per cent appreciation in the DZ real exchange rate.

Finally, the coefficient of government spending has the correct sign and statistically significant. A 10 per cent increase in this variable will lead the DZ real exchange rate to appreciate by 8.9 per cent, which indicates that the proportion of government spending on NT is greater than of T.

By contrast, Oil rent is highly significant with an unexpected negative sign, indicating that a 10 per cent improvement in oil rent leads to depreciate the DZ real exchange rate by almost 2.2 per cent. In fact, the existence of such a relationship between the oil rent does not meet the necessary condition for the presence of the DD traditional form, the channel through which the excessive oil revenues affect the local producers.

Likewise, the trade openness explains significantly with a negative sign, the variation in the long-run real exchange rate. A 10 per cent increase in trade openness contributes to depreciating Algeria's real exchange rate by 1.79 per cent.

Accordingly, we could not detect the major symptoms of the Dutch disease, i.e. the appreciation of REER due to high oil revenues, that is, the spending effect is not confirmed in Algeria over the period of 1990-2016 due to the state control of the exchange rate, similarly to the resource movement effect that is difficult to prove by the existence of unemployment and thus, the result is insufficient for such a purpose. Indeed, Algeria's real exchange rate has experienced a falling trend over the studied period due to the monetary authorities' intervening, thus, it has not been affected by the DD that assumes its appreciation.

In the short-run, the ECM sheds more light on the speed of adjustment from the short-run to the long-run equilibrium. The ECT revealed that about 184 per cent of disequilibrium errors are corrected within a year with a speed of adjustment of 54 per cent i.e. Six and a half months. Moreover, based on the ECM estimates, all variables are significant in explaining the DZ equilibrium real exchange rate's movement. Technological progress, government spending and capital flows are found to be major determinants with a significant positive impact on the real exchange rate in both long and short-runs.

The stability of our model estimates in both long and short-runs has also been proven by plotting the CUSUM and the CUSUMSQ of recursive residuals.

Lastly, drawing on its major findings related to the estimated RER misalignment index, this study highlights that the DZ currency was found to be overvalued in 1990, 1993 and during the period 1997-2002 with an average of about 5.35 per cent, 2.13 per cent and 1.01 per cent respectively, given that the highest level of overvaluation occurred in 1990, while it has been undervalued during the periods:1991-92, 1995-96, 2003-07, 2009, 2011 and 2015-16 reaching its highest value in 1991-92, with an average of about -3.11 per cent. However, it has been in full conformity with the equilibrium level in both 1994 and 2010.

In fact, the value of the local currency DZ has been greatly influenced by the decisions taken by the State following its intervention in order to achieve the economic efficiency and to better prevent shocks or absorb their impact particularly due to the high oil revenues. Indeed, the 1990s were periods of profound economic reforms reflecting, in general, the macroeconomic policies and in particular, its monetary policy through which Algeria managed to bring the real appreciation down and make the real exchange rate closer to its equilibrium level. Indeed, it succeeded in reducing the degree of real exchange rate misalignment over the covered period 1990-2016. This, in turn, helped Algeria to prevent the occurrence of the Dutch Disease phenomenon by intervening when necessary.

Research Recommendations & Outlook:

In fact, getting such results despite the obvious difficulties and challenges we faced through the preparation of this thesis, in particular, the limited availability of data specific to Algeria, does not mean it leaves much to be desired. In contrast, it has some imperfections, thereby ensuring that there would be further studies to complement aspects of the subject not addressed in this work, including:

- Using current data in assessing the Dutch disease impact on the equilibrium real exchange rate's performance in Algeria to show the importance of inflation effect in such a relationship;

- Introducing other variables that were not taken into consideration in our study due to the lack of data, such as remittances, foreign aid and institutional quality ;

- Trying to perform the used econometric model to study the same relationship but in a larger sample of resource-rich countries, such as OPEC members.

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- The Statistics Portal: https://www.statista.com/

- The World Bank: www.worldbank.org/

Annexes

Annexe n° A-02: Share of employment by sector

	Employment in agriculture	Employment in industry	Employment in services
1991	22,45	26,19	51,36
1992	22,42	26,12	51,47
1993	22,64	26,39	50,98
1994	22,51	26,72	50,77
1995	22,49	26,46	51,05
1996	23,03	24,89	52,08
1997	22,47	24,68	52,85
1998	22,15	25,58	52,27
1999	22,17	25,24	52,59
2000	21,93	24,48	53,59
2001	21,72	25,01	53,28
2002	21,23	25,46	53,31
2003	21,72	24,68	53,60
2004	21,34	26,78	51,88
2005	19,96	29,83	50,21
2006	19,93	31,82	48,25
2007	19,12	34,14	46,74
2008	18,22	36,02	45,76
2009	17,47	38,87	43,66
2010	16,53	39,43	44,04
2011	15,77	39,10	45,13
2012	14,69	40,75	44,56
2013	12,48	41,47	46,05
2014	13,57	47,02	39,42
2015	13,07	47,60	39,33
2016	12,73	47,09	40,17

Source: The web site of Jobs Data: http://datatopics.worldbank.org/jobs/country/algeria

Annexe n° A-01: Share of different sectors in GDP %

	Hydrocarbon	Agriculture	Industry	Construction &Public Works	Services
1990	24,5	12,3	13,1	12,1	38,01
1992	25	12	11	10	21
1994	24	10	10	10	24
1995	27,6	10,7	10,6	11,6	30,04
1996	31	11	7	8	22
1998	25	11	8	9	25
2000	41,9	9	7,5	8,7	32,9
2001	33,9	10,97	8,39	8,53	38,21
2002	35,6	10,1	8,1	9,9	36,2
2003	28,5	10,6	7,3	9,2	34,3
2004	40,7	10,2	6,8	8,9	33,5
2005	47,4	8,2	5,9	8	30,4
2006	48,4	8	5,6	8,4	29,6
2007	46,3	8	5,4	9,3	30,9
2008	47,9	7	5	9,2	30,9
2009	33,5	10	6,2	11,8	38,5
2010	37	9	5,5	11,1	37,4
2011	38	8,6	4,9	9,8	38,4
2012	34,4	8,8	4,5	9,3	43
2013	33	9,8	4,6	9,8	42,8
2014	39	9,7	4,1	8,9	38,3
2015	26.18	11.17	9.95	10.12	27.01
2016	36.59	9.20	5.99	9.39	35.69

Source: Data from different reports of the ONS

Annexe n° A-03: Recursive Coefficients
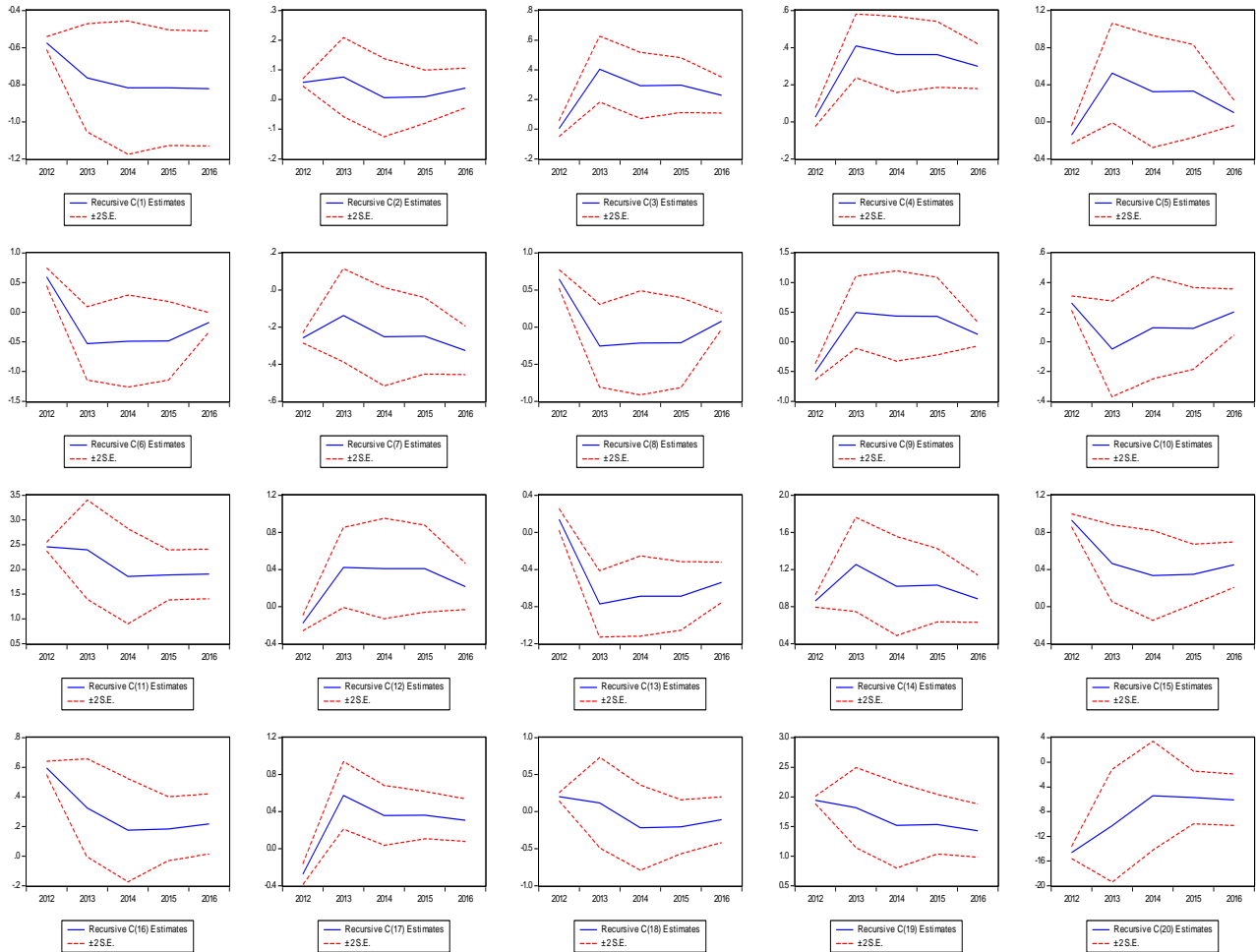
Source: Author's own calculations using Eviews.

Annexe A-04: The optimum lag selection

VAR Lag Order Selection Criteria
Endogenous variables : LREER
Exogenous variables : C   .
Sample: 1990 2016
Included observations : 21

Lag	LogL	LR	FPE	AIC	SC	HQ
0	19.32353	NA	0.010225	-1.745098	-1.695359	-1.734304
1	35.31885	28.94390*	0.002453*	-3.173223*	-3.073745*	-3.151634*
2	35.33385	0.025718	0.002698	-3.079414	-2.930197	-3.047030
3	36.73958	2.275942	0.002603	-3.118055	-2.919098	-3.074876
4	37.30468	0.861101	0.002725	-3.076636	-2.827940	-3.022662
5	37.83628	0.759430	0.002870	-3.032026	-2.733591	-2.967258
6	38.17680	0.454030	0.003087	-2.969219	-2.621045	-2.893656

* indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion

Source: Author's own calculations using Eviews.

Annexe A-05: The long-run cointegration

ARDL Cointegrating And Long-run Form

Original dep. variable: LREER

Selected Model: ARDL(1, 2, 2, 2, 0, 1, 2, 2)

Sample: 1990 2016

Included observations: 25

Cointegrating Form

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LEMP)	0.036834	0.017807	2.068538	0.0934
D(LEMP(-1))	-0.302822	0.023023	-13.153057	0.0000
D(LOILRENT)	0.093787	0.022077	4.248095	0.0081
D(LOILRENT(-1))	0.327929	0.028406	11.544245	0.0001
D(LTOT)	0.076200	0.023610	3.227510	0.0233
D(LTOT(-1))	-0.201444	0.027643	-7.287378	0.0008
D(LPROD)	1.892220	0.079440	23.819454	0.0000
D(LOPEN_1)	0.221635	0.047176	4.698008	0.0053
D(LCF)	0.873096	0.041768	20.903299	0.0000
D(LCF(-1))	-0.226866	0.040454	-5.607952	0.0025
D(LGS)	0.299417	0.064074	4.672977	0.0055
D(LGS(-1))	-1.456235	0.102631	-14.189040	0.0000
C	-6.153223	0.269934	-22.795270	0.0000
CointEq(-1)	-1.838447	0.080499	-22.838129	0.0000

Cointeq = LREER - (0.3103*LEMP -0.2192*LOILRENT + 0.2220*LTOT +

1.0456*LPROD -0.1796*LOPEN_1 + 0.8496*LCF + 0.8911*LGS)

Long-run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEMP	0.310280	0.056401	5.501337	0.0027
LOILRENT	-0.219171	0.063869	-3.431576	0.0186
LTOT	0.221987	0.054551	4.069374	0.0096
LPROD	1.045554	0.120416	8.682867	0.0003
LOPEN_1	-0.179579	0.067223	-2.671402	0.0443
LCF	0.849618	0.141085	6.022029	0.0018
LGS	0.891052	0.127694	6.978047	0.0009

Source: Author's own calculations using Eviews.

Annexe n° A-06: Calculations of misalignment

	LREER A1	PEER Eilibi	Misalignment	Mean	Std.Dev.	Min	Max
1990	5,38	5,11	5,35	-	-	-	5,35
1991	4,86	5,06	-3,82	-3,11	1,00	-5,12	-1,10
1992	4,89	5,01	-2,40				
1993	5,07	4,96	2,13	-	-	-	2.13
1994	4,92	4,92	0,00	-	-	-	0.00
1995	4,75	4,89	-2,85	-1,54	1,44	-4,41	1,34
1996	4,77	4,85	-1,75				
1997	4,85	4,82	0,43	1,01	0,67	-0,32	2,35
1998	4,89	4,80	2,00				
1999	4,82	4,77	0,92				
2000	4,77	4,75	0,46				
2001	4,80	4,72	1,67				
2002	4,72	4,69	0,62				
2003	4,62	4,67	-1,08	-0,89	0,23	-1,34	-0,44
2004	4,63	4,65	-0,54				
2005	4,58	4,63	-1,09				
2006	4,58	4,62	-0,82				
2007	4,57	4,61	-0,92				
2008	4,61	4,61	0,13	-	-	-	0,13
2009	4,60	4,60	-0,10	-	-	-	-0,10
2010	4,61	4,61	0,00	-	-	-	0,00
2011	4,60	4,61	-0,17	-	-	-	-0,17
2012	4,65	4,61	0,92	0,79	0,22	0,34	1,47
2013	4,64	4,61	0,53				
2014	4,66	4,62	0,91				
2015	4,62	4,62	-0,08	-0,28	0,29	-0,86	0,29
2016	4,60	4,62	-0,49				

Source: Author's own calculations