

## The issue of Oil volatility and its Effect on Economic diversification in Recourse Rich countries

Farah ELIAS ELHANNANI<sup>1\*</sup>,

<sup>1</sup> Nour Bachir University center ElBayedh (Algeria), faraheliaselhannani@yahoo.fr,

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**Summary:** Oil-rich economies have historically struggled to operate well because of the issue of oil price volatility. Economic diversification is a concern in this situation. Countries with varied economies can lessen volatility and escape the oil curse. Countries with concentrated domestic and export industries are more prone to swings in their revenues and outputs. Algeria is the focus of our study. It is one of the most significant producers and exporters of oil. By creating management recommendations for Algeria's state and non-state actors, we want to demonstrate the influence of oil price volatility on Algeria's economic diversification. oil income fluctuations to diversify the economy.

The results showed a positive relationship between oil price volatility and economic diversification in Algeria. Accordingly, the research recommended the Algerian government pay more attention to the strategy applied in the long term and not focus on temporary decisions as an interaction with international fluctuations.

**Key words:** oil price volatility, Economic diversification, oil curse, domestic and export industries, revenues, oil income fluctuations

## I. Introduction

Many nations around the world specialize in the production and export of particular commodities, which results in significant windfalls in natural resource revenues. However, these nations face a challenge in managing these resource earnings due to two key issues: the volatility of commodity prices, particularly the price of oil, and their reliance on these commodities (lack of economic diversification).

The reality is that while some nations with abundant natural resources have managed their revenues and diversified their economies successfully (Indonesia, Chile, Norway, Malaysia, etc.), the majority of these nations have struggled to spur economic growth through their revenues; this is known as the "natural resource curse" phenomenon.

According to Aghion and Banarjee (2005), P.Collier and B.Goderis (2003), and F.Van Der Ploeg and Poelhekke (2008), countries relying on natural resources experience slow economic growth. According to Kaminsky, Reinhart, and Végh (2005), Havard Halland (2009), and Frenkel (2012), such volatility results in the so-called "procyclicality" of fiscal policy, which is contractionary in bad times (when resource receipts decrease) and expansionary in good times (during a boom).

Our study looks at the Algerian situation as one of the most significant oil producers and exporters, as discussed in the brief introduction about the resource curse, oil volatility, and economic diversification. It aims to respond to the following fundamental question: What impact does the fluctuation in the price of oil have on Algeria's economic diversification?

### Hypotheses the study:

- **Hypothesis 1:** The export concentration is impacted by RGDP
- **Hypothesis 2:** Oil price volatility has an impact on export concentration.
- **Hypothesis 3:** FDI has an impact on the concentration of exports.
- **Hypothesis 4:** The export concentration is impacted by GCF.
- **Hypothesis 5:** The export concentration is impacted by ICRG.
- **Hypothesis 6:** Openness has an impact on export concentration.
- **Hypothesis 7:** The export concentration is impacted by REER.

### Study Significance:

This research aims to create guidelines for Algerian state and non-state entities to follow to manage the volatility of oil earnings and diversify the economy. The study tries to achieve the following goals:

- 1- Providing an analytical framework for Algeria's economic diversification, which is lacking in the literature;
- 2- Using the portfolio theory and its equation on the national economy to measure the degree of economic diversification in Algeria, which is one of the thesis's added values;
- 3- Demonstrating the effect of oil price volatility on Algerian economic diversification, which is the second value added to this work because no study (to our knowledge) has dealt with this direct relationship using the oil volatility index.
- 4- Demonstrating the link between economic progress and diversification;
- 5- Evaluating the institutional structure of the Algerian economy and its contribution to the country's lack of economic diversification;
- 6- Empirically examine the relationship between the volatility of oil revenue and economic diversification while considering all the factors that influence this relationship.

**- Methodology of the study:**

In order to obtain the objectives of the study and answer the questions specified above, the thesis follows descriptive approaches. The descriptive approach is used to provide the theoretical aspect of the oil curse, manage oil rent fluctuations and economic diversification; It is also used to present and summarize a review of relevant literature and empirical evidence on the role of economic diversification in managing oil fluctuations and to evaluate some experiences of oil-rich countries that can deal with the problem of fluctuations and diversify their economies.

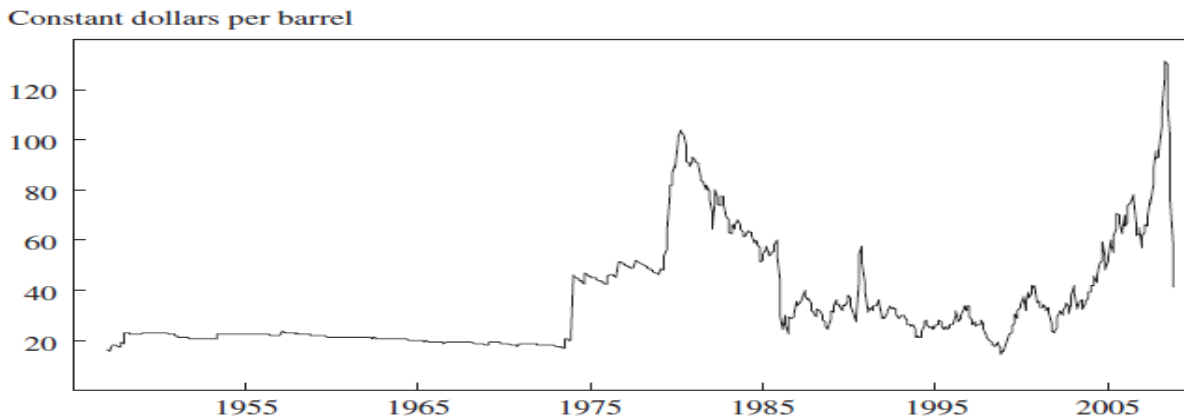
**II. The theoretical and conceptual framework**

Many nations specialize in producing and exporting particular commodities, which results in significant windfalls in natural resource revenues. However, these nations have difficulty managing these resource earnings due to two key issues: the volatility of commodity prices (oil in particular), and their reliance on these products (lack of economic diversification), leading to their experience of the "natural resource curse."

**1. Oil price volatility issue:**

Particular focus has been placed on the behavior of oil prices in recent economic studies, particularly in light of the two shocks that occurred in the 1970s and 1980s. As can be seen in the image, oil prices have been quite volatile since the mid-1980s.

**Figure (01): Real crude oil prices, from January 1947 to December 2008**



Sources: Energy Information Administration (EIA) data; Bureau of Labor Statistics data.  
a. Monthly average price of West Texas Intermediate crude in dollars of November 2008.

This extreme volatility in oil markets is the result of several factors, including geopolitics, speculation, and supply and demand shocks. Both importers and exporters of this commodity face difficulties as a result of the volatility, or uncertainty, in the price of oil. We note that one of the pathways of the resource curse that we emphasize in our analysis is the impact of volatility on oil exporters.

### 1.1. The causes of oil volatility:

#### Oil supply and demand (basic market principles):

- **On the demand side:**

Income, not price elasticity, is the primary driver of short-term price movements on the demand side of the oil market (Hamilton 2009a).

**Price elasticity:** is a measure of how much the amount demanded changes concerning the price change, expressed as a percentage (Hamilton J., 2009, p2). According to estimates from literature surveys made by Dahl (1993) and Cooper (2003), the price elasticity of demand for crude oil has historically been low (-0.1). Such an estimate attests to the existence of other price-related variables that influence oil demand.

**Income elasticity:** The income elasticity states that as a country's GDP increases, so does its oil consumption. Additionally, a lot of research on income elasticity came to a figure that was close to unity. For instance, (Gately and Huntington) found that for the 25 OECD nations from 1971–1997, the average income elasticity was 0.55, compared to 1.17 for the remaining 11 countries, which were characterized by a high-income increase during that time.

- **The supply side:**

**The function of OPEC:** Twelve of the largest oil-producing nations are members of the cartel known as the Organization of Petroleum Exporting Countries (OPEC). About 40% of the world's liquids are produced there, with Saudi Arabia alone accounting for 25%.

OPEC normally aims to stabilize the price of oil, but the short term presents a difficult task due to exogenous uncertainties and low data quality (Lynch M, 2003, p2) The policies of OPEC may increase volatility rather than eliminate unfavorable variations. Many analysts, including Lynch (2003), Hamilton (2008), and Fattouh (2007), asserted that OPEC is helpless since its quota choices are now made independently and in response to each member's political interests.

- **Changes in behavior:**

**The role of speculators:** From an economic standpoint, a speculator is somebody who purchases crude oil for use in the future rather than for immediate consumption (Kilian and Murphy 2011). In fact, speculators are frequently charged with contributing to changes in the price of oil. In uncertain times, they try to make money and look for arbitrage chances (Lynch M, 2003, p19).

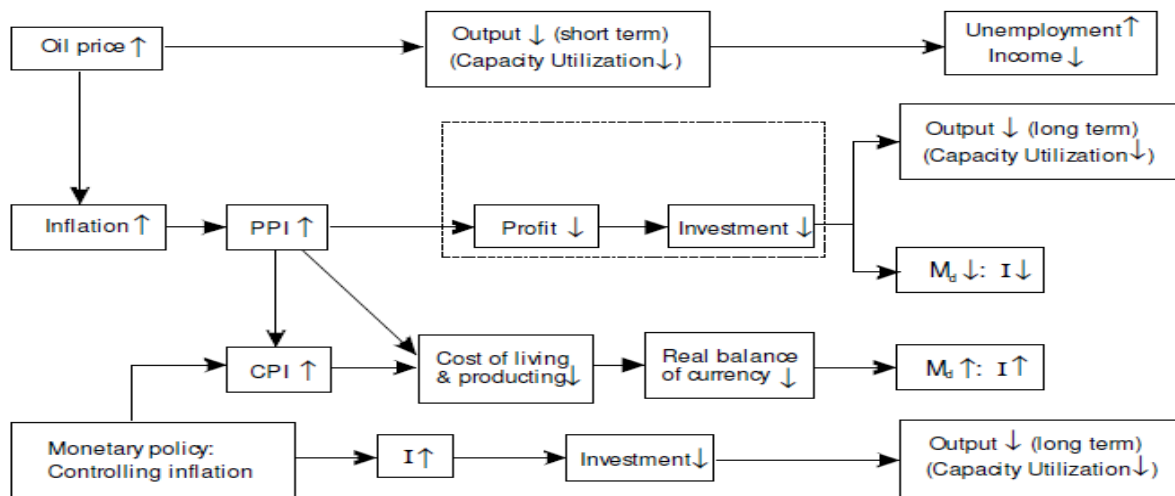
**Geopolitical events:** Events that have the potential to obstruct the flow of oil and petroleum products to market, such as geopolitical and weather-related occurrences, can have an impact on the prices of both crude oil and petroleum products. These kinds of occurrences may result in actual disruptions or breed concern over future supply or demand, which can increase price volatility. The low responsiveness or "inelasticity" of both supply and demand to price fluctuations in the short run is intrinsically linked to the volatility of oil prices. In the near future, the capacity for oil production and the machinery that relies primarily on petroleum products for energy are both fairly fixed (Muzima J.D. and Mandy F. 2015).

**1.2. The effects of oil price volatility:**

**Macroeconomic volatility:** Macroeconomic indicators for oil exporters, including production growth, fiscal balance, exchange rates, inflation, and external debt, can be seriously hampered by the volatility of oil prices. Due to these countries' reliance on oil exports, there is a transfer of volatility from the oil price to these variables through the volatility of the terms of trade.

Chuku, Effiong, and Ndifreke (2010) talked about the transmission routes by which changes in the oil price could impact macroeconomic indicators. These channels are summarized in the diagram below.

**Figure(02): Transmission channels of oil-price shocks:**



*Source:* Chuku, Effiong and Ndifreke (2010).

**Volatility and growth:** The instability of production growth brought on by changes in oil prices has a detrimental effect on economic growth. The groundbreaking research of Ramey and Ramey (1995) provided proof in this regard by examining a sample of 92 nations that economies with highly volatile GDP grow at a slower rate.

## 2. Theoretical foundations of economic diversification

Economic growth and progress depend on economic diversification. Economic history has demonstrated that diverse economies outperform countries that heavily rely on income from a single sector (such as agriculture, mining, or hydrocarbons) over the long term.

### 2.1. definition and patterns of economic diversification

According to the application field, diversification is characterized by a variety of approaches. Diversification can be defined as producing a range of economics. It can also apply to the diversification of export markets or the diversification of income sources away from domestic economic activity. (ZenF. 2012)

Economic (product) diversification and export diversification are the two types of economic diversification that can be distinguished in this context.

Furthermore, diversification is the process by which the economy creates a range of goods and services. This kind of diversification may also be referred to as domestic. Diversification of exports or trade refers to purposeful actions taken to alter the proportions of commodities in the export portfolio or enter new geographic markets (Akram Esanov 2011).

### Determinants of economic diversification

In economic theory, there is no exact definition of the elements affecting economic diversification or specialization in any country. But the empirical literature sought to identify the main institutional, geographic, economic, and demographic drivers of economic diversity. (Sturm et al,2009) suggested three ways that rent-seeking may have an impact on diversification. The first is political: innovations are unlikely to be implemented when the ruling elites do not value them and innovators do not belong to them. Second, seeking rent increases a new product's fixed costs. Third, since innovations are lengthy endeavors, they require more steps and hence more rent-seeking. Therefore, we can summarize the determinants as follows:

- **The income (level of development)**
- **Institutions and governance**
- **Human capital**
- **Private sector**

### **3. Oil volatility and Economic Diversification in Algeria**

One of the oil-rich nations that could be impacted by the alleged "natural resource curse" is Algeria. It is one of the largest producers and exporters of hydrocarbon products (oil and gas); 98% of its total exports come from this industry. Algeria is thus up against the same problem as the other oil-rich nations. Algeria is attempting to diversify its economy by putting several projects under various domestic and international conditions.

#### **3.1. Evolution of the oil sector**

Algeria has been one of the most significant producers and exporters of oil and gas. Following the discovery of two enormous oil and gas resources at Hassi Messaoud and Hassi R'mel in the northern Sahara region in 1958, these two industries began to take off.

From its independence until the late 1980s, Algeria operated under a managed and socialist economic structure. As a result, the 1963 creation of the national and state-owned oil firm SONATRACH limited its responsibilities to hydrocarbon products. After this industry was nationalized in 1971, SONATRACH acquired a monopoly-like position in oil production.

Under the economic reforms that began in the 1980s, the hydrocarbon law of 1986 permitted foreign corporations to participate in oil exploration with a maximum partner share of 49%.

The law of 2005 and its revisions offered more open possibilities; the 1991 law's amendments also increased the opportunities for international engagement (Ndjambou,2013).

Establishing two independent regulatory bodies (ALNAFT and ARH) to assure regulation of the liberalized hydrocarbon industry; establishing competition in the free market; separating state operations from SONATRACH; and establishing transparency in contract awards.

Since 2000, Sonatrach has made investments in methane tankers, natural gas liquefaction plants, gas pipelines, and compression stations; field exploration, development, and exploitation; and transportation infrastructure for hydrocarbons.

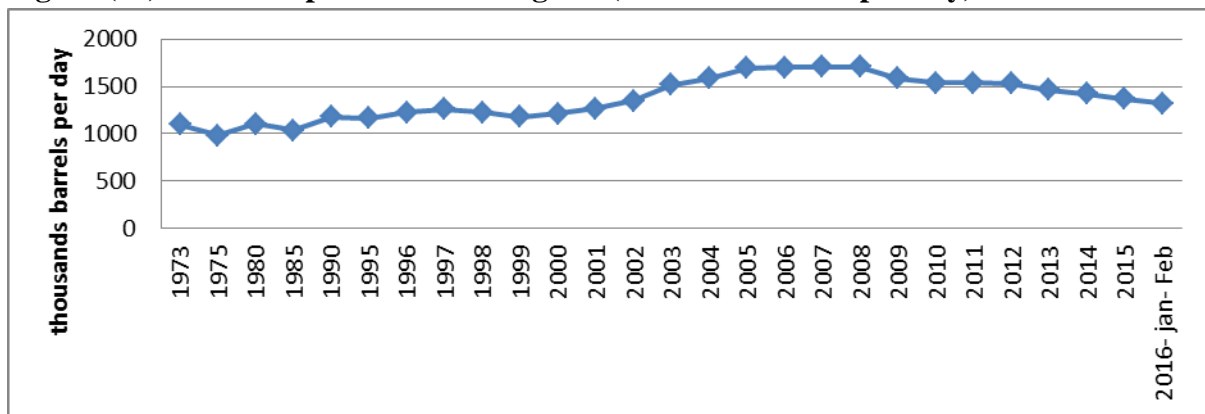
The growth of competencies, globalization, petro-chemistry development, and diversification of Sonatrach activities have all seen several projects established since 2000. Additionally, the primary production target set for 1999–2007 was surpassed.

1. SONATRACH, which serves as both a producer and a regulator of the hydrocarbon sector and is rated 11th among all global oil firms, continues to dominate the hydrocarbon industry despite these legal reforms (Kabbashi S.M, 2012, p. 735.)

Regarding production, the growth of the hydrocarbon industry following Algeria's independence was centered on the production of crude oil. Oil exports and production sharply decreased at the start of the 1980s as a result of OPEC's efforts to keep the price of oil stable. In fact, the percentage of crude oil exported fell from 80% to 30% between 1980 and 1982.

Algeria has recently been taking initiatives to maintain and increase its oil production capability by creating new oil fields to make up for the deterioration in existing fields. As a result of the rise in worldwide demand, oil output surged significantly in the first five years of the last decade, rising from about 1.2 million barrels per day in 2000 to 1.7 million barrels per day in 2006 as the figure (3-1) shows. However, this production has known a decrease after 2012.

**Figure (03): crude oil production in Algeria (thousand barrels per day)**



Source: Energy Information administration; [www.eia.gov](http://www.eia.gov)

### 3.2. Evolution of the institutional framework in Algeria

As the Algerian government's economic objectives and programs to diversify the economy have taken different steps, the institutional framework of these programs has also altered in response to Algeria's political and economic realities. The tables below illustrate the various adjustments and developments that the institutional structure has undergone since 1970.

**Table (01): The economic system**

Institutional organization	1970-1986	1986-1999	2000-2008	2009-2010
<b>Market freedom</b>	Strictly regulated by the state	Progressive openness under the IMF programs	Rationalization and transparency	Openness and regulation of some product and services
<b>Markets regulation</b>	Controlled market	Almost inexistent	Very weak regulation and	Reaffirmed regulation but



		regulation	without efficiency	inefficiency of the institutions of control
<b>Business area</b>	Strictly regulated by the state	Weak supervision	Measures of freedom and flexibility	Strengthened supervision
<b>Enterprise freedom</b>	Limited and largely regulated	Limited and largely regulated	Enhancement of the enterprise freedom	Promotion of the enterprise freedom
<b>External trade</b>	Strictly controlled by the state	Progressive then sudden openness	Freedom and joining to free exchange zones	Limitation of imports and regulation of the adherence in the free exchange zones
<b>Banking system nationalization</b>	Banks; financial funds charged by: - distribution of planned investments; financing the operations of national societies (S.N.)	Organized Public commercial banks	Enhanced public banks and attempts of bank privatization  Foreign bank facility	Putting the privatization projects away and tightening the foreign bank facility authorization
<b>Financial market</b>	Inexistent	Inexistent  Creation of Algiers stock market and introduction of four public enterprises' securities	Bonds operations  Withdrawal of the stock market securities  Attempts to create a financial market in the external bank of Algeria BEA	Creation of national fund of investment (FNI)  Promotion of the decentralized public investment funds

Source: Temmar H. (2015), “The Algerian economy: 1970-2014”, Tome IV “The public economic governance”, University Publications office, Algeria, P104.

We can distinguish two institutional and governance models from the table above: the first is centralized planned management of a state's closed economy, and the second is a hybrid model of the market, free enterprise, and openness to global markets, but this does not exclude the role of the state in the economy (Temmar H.2015, Tome IV, P95).

According to the table, 1986 is the year to quit the centralized planned paradigm. The first step, which lasted from 1970 to 1986, was the execution of a state development strategy based on centrally planned management, a unique party's institutional framework, active voluntarism, and administrative supervision of the national economy

Due to the liberation of colonial life, the Algerian state had an optimistic aspiration for rapid economic development throughout this period, which was defined from a solely political perspective. The nationalization of mineral and hydrocarbon wealth, banks and insurance businesses, and external commerce occurred throughout the industrialization and agricultural revolutions; these sectors were rigorously regulated by the state and viewed as strategic areas associated with sovereignty. The financial market was non-existent since it is a component of capitalism, which was incompatible with the economic and political beliefs and purposes of the time.

The years 1986–1999 saw the establishment of a multiparty institutional framework and an economic model based on independent businesses and openness. However, these economic and institutional reforms did not provide a framework for the expansion and diversification of the national economy; social and political turmoil, as well as ineffective management, hampered the development route.

The third phase, from 2000 to 2008, was characterized by a reconciliation between the community and the political authorities, synchronized with a global economic strategy marked by social stabilization, economic recovery, and integration of the national economy into international and regional markets (Temmar H.2015, Tome IV, P98).

The fourth step, 2008–2014, is defined by the return of the state to the economy to maintain an independent Algeria. Assuring free enterprise, governance recognizes a shift toward governmental involvement.

Algeria has an ambiguous and perplexing institutional framework (Temmar H.2015, Tome IV, P101). On the one hand, assured and improved free enterprise; on the other hand, the market remains the institution of value generation. As a result, while the institutional foundation of businesses and the market remain the same, the economy is still dominated by state management.

### **Table (02): The production recovery**

	1970-1986	1986-1999	2000-2008	2009-2010
<b>Investments</b>	Centralized under the public spending plans	Centralization then freedom for enterprises to mobilize investments  Policies to attract FDI	Enhancing the freedom of investment and introduction of rationalization and supervision measures	Return to the direct investment by the creation of public investments fund (FNI)
<b>FDI (foreign direct investment)</b>	Non-hydrocarbon FDI inexistent  Controlled by the plans' objectives	Attractive investments code  Installation of enterprises in the hydrocarbons sector	Active policies to attract FDI  Installation of medium and international enterprises	Framing the foreign direct investment
<b>Public enterprise</b>	Economy (production and services) organized in the vertical enterprises (S.N.)	Empowerment of the public enterprises in the participation funds and holdings framework  Consolidation of public enterprises: bank-Enterprise device	Enhancing the autonomy of enterprises: SGP (société de gestion de participation)  Implementation of an extensive program of privatization	Stopping the privatization and enhancement of public enterprise
<b>Private enterprise</b>	Repressed	Promotion of the private enterprise	Active promotion of the private sector  Establishment and measures to enhance the small and medium	Measures to promote investment in favor of the private enterprise

			enterprise (SME)	
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*Source: Temmar H. (2015), "The Algerian economy: 1970-2014", Tome IV "The public economic governance", University Publications office, Algeria, P105.*

**Table (3-4): Institutional framework for 2000-2014**

<b>Institutional organization</b>	<b>2000-2008</b>	<b>2009-2014</b>
<b>Market freedom</b>	Freedom Transparency	Freedom Regulation of some consumer products
<b>Enterprise freedom</b>	Enhancement of the enterprise freedom Privatization	Promotion of the enterprise freedom: fiscal and financial measures Suspension of privatizations
<b>Business area</b>	Measures of rationalization Attempts to enhance efficiency of agencies	Enhanced administrative framing
<b>Market regulation</b>	Very weak and inefficient regulation	Assured but inefficient regulation of institutions
<b>External trade</b>	Freedom and adhesion to the free exchange zones Readjustment of customs tariffs	Relative limitation of imports Reassessment of the adhesions to the free exchange zones
<b>Banking nationalization system</b>	Enhanced public banks Attempt of the bank privatization Freedom of foreign bank facility	Putting away the privatization projects Tightening the authorization of foreign bank facility Enhancing the public banks
<b>Financial market</b>	Bonds operations Withdrawal of bank securities	Creation of FNI Promotion of regional public investment funds

	Creation of business bank branch at the external bank of Algeria	
<b>Investments</b>	Enhancement of investment freedom	Promotion of national investment
<b>Foreign direct investment</b>	Rationalization of FDI attractiveness device  Introduction of rationalization and supervision of FDI measures	Framing the foreign direct investment

*Source: Temmar H. (2015), "The Algerian economy: 1970-2014", Tome IV "The public economic governance", University Publications office, Algeria, P105.*

### III. Coclusion

This research sought to develop guidelines for the Algerian state and non-state actors in managing the fluctuations of oil revenues rather than diversifying the economy and avoiding the so-called "oil curse." For this reason, the study dealt with this issue theoretically.

Accordingly, the three concepts in the first axis are "oil volatility; "the curse of natural resources; and "economic diversification." Large fluctuations in world oil prices present a challenge to oil exporters who act as a channel for the curse of resources by hampering economic growth and development in these countries; a thesis The curse of natural resources is conditional and not a fate that can emerge through various economic and political channels in which the Dutch disease, cyclical financial fluctuations, volatility, and weak institutions are the most important. Economic diversification is a difficult target for resource-rich countries where a diversified resource-rich economy needs a set of strategies and policies to be implemented: sound financial and industrial policies with a strong foundation for human capital and a good business environment.

Concerning the Algerian economy, which is the case study for this thesis, he described the third axis and analyzed the economic diversification in Algeria, and found that the hydrocarbon sector has an important role in the Algerian economy through the large revenues it generates. It contributed 98% of the total exports in the last two decades and averaged about 30% of the total GDP. This contribution changed during the independence period, with the highest percentage in the decade 2000–2010. In recent years, the share of hydrocarbons in GDP has decreased by about 5% due to fluctuations in world oil prices and economic policies and programs applied concerning other economic sectors in the context of economic diversification. Despite the efforts made by the Algerian government to diversify the economy and the institutional framework that has been put in place to succeed in these programs, the indicators of Algerian governance are still very weak according to many international institutions. According to Transparency International, Algeria ranked 106th in the world, according to Transparency International, which represents this factor as the main impediment to investment. Thus, the findings of this study were as follow:

- the solutions and the decisions taken during times of high volatility are temporary because of the weak base and environment of this diversification and this is confirmed by the effect of the other economic and institutional determinants of economic diversification.
- The level of foreign investment had no effect on export concentration and no role in economic diversification in Algeria
- The institutional quality and governance have not played any role on export diversification in Algeria; and this is an important impediment for the economic diversification and development.
- The trade openness has negative and significant relationship with export diversification in Algeria and this is referred to the specialization of the Algerian export in the hydrocarbon sector (95%)
- The real exchange rate has led to more export concentration in Algeria showing the Dutch Disease effect, an appreciation in the real exchange rate has led to the shrinkage of the non-hydrocarbon sectors which has been really noticed during the period of 1980s, but this effect is not really touched during the recent years due to the devaluation of the nominal exchange rate of the Algerian dinar.
- **Recommendations**

In light of the foregoing conclusions, we provide the following advice:

Algeria should pay more attention to the service sectors, particularly the tourist industry, as they contribute very little, if anything, to the total value added (0.01%), if at all. Given that Algeria meets all the requirements to be a highly touristic nation, this sector is crucial for economic diversification and improving macroeconomic factors.

Algeria should review its domestic investment policy, which is carried out through the implementation of development programs. In this regard, we can suggest that the best way to strengthen the role of domestic investment is a partnership between the private and public sectors, in which the latter plays the role of a supervisor while keeping the private sector's innovation.

To boost non-hydrocarbon exports, the foreign trade policy should be linked to domestic investment one.

By enhancing the standard of budget management, Algeria should implement more sensible fiscal policies to achieve strong economic diversification and performance. By paying off all of the external debts accrued in the 1980s and 1990s, the oil stabilization fund has helped to build up significant reserves and a stable financial external position. However, this fund won't make a contribution to the development of the next generation because it prioritizes stabilization above permanent income and doesn't direct its accumulation toward any worthwhile endeavors. Therefore, rather than focusing just on funding the budget deficit, we advise the Algerian government to use this fund as one of the instruments to increase domestic investment by investing in worthwhile initiatives.

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