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THE OIL ABUNDANCE IN ALGERIA: REMEDIAL MODELS AGAINST THE RESOURCE CURSE

A thesis submitted in fulfillment of the requirements for the degree of Doctor in Sciences in International Trade and Finance

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Abstract

The relationship between natural resource abundance and economic growth has stirred an endless string of research with the sole objective of attempting to understand the nature of the intertwining relationship between the two concepts and the extent of their impact on one another. At the core of the research lies the resource curse hypothesis which argues that abundant natural resources can hinder rather than boost economic growth in some countries. This study focuses on Algeria, a resource-rich country, and examines the short-term and long-term impact of natural resources abundance on its economic growth using an autoregressive distributed lag model (ARDL) and error correction model (ECM) for the period 1998-2019. The study analyses the impact on the three dimensions of economic growth; economic, social and political. The long and short-run estimation results portray the importance of total factor productivity (TFP), human capital and institutional quality for economic growth in the presence of natural resource rents and enforce the crucial role they play in achieving sustainable development in Algeria.

Keywords: Algeria, Economic Growth, Resource Curse, Natural Resources, Oil Rents, TFP, Human Capital, Institutional Quality, ARDL, ECM

المستخلص

أثارت العلاقة بين وفرة الموارد الطبيعية والنمو الاقتصادي سلسلة لا نهاية لها من الأبحاث بهدف وحيد هو محاولة فهم طبيعة العلاقة التي تربط بين المفهومين ومدى تأثيرهما على بعضهما البعض. تتمثل نظرية لعنة الموارد في حقيقة أن وفرة الموارد الموارد الطبيعية يمكن أن تعوق النمو الاقتصادي بدلاً من تعزيزه في بعض البلدان. تركز هذه الدراسة على الجزائر كبلد غني بالموارد الطبيعية، وتدرس التأثير قصير وطويل الأجل لوفرة الموارد الطبيعية على النمو الاقتصادي باستخدام نموذج الانحدار الذاتي للإبطاء الموزع ونموذج تصحيح الخطأ للفترة 1998-2019. تحلل الدراسة الأثر على الأبعاد الاقتصادية ، الاجتماعية والسياسية للنمو الاقتصادي. توضح نتائج التقدير طويلة وقصيرة المدى أهمية الانتاجية الكلية للعوامل (TFP)، رأس المال البشري والجودة المؤسسية للنمو الاقتصادي في ظل وجود ريع الموارد الطبيعية كما تبين الدور الحاسم الذي تلعبه في تحقيق التنمية المستدامة في الجزائر.

الكلمات المفتاحية: الجزائر ، النمو الاقتصادي ، لعنة الموارد ، الموارد الطبيعية ، عوائد النفط ، رأس المال البشري ، الجودة المؤسسية ، الانتاجية الكلية للعوامل، ARDL

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List of Abbreviations

GCC	Gulf Cooperation Council
OECD	Organisation For Economic Co-Operation and Development
WTO	World Trade Organization
UAE	United Arab Emirates
ARDL	Autoregressive Distributed Lag
VECM	Vector Error Correction Model
GDP	Gross Domestic Product
IMF	International Monetary Funds
OPEC	Organization Of the Petroleum Exporting Countries
TB/D	Thousand Barrels A Day
SONATRACH	Société nationale pour la recherche, la production, le transport, la transformation et la commercialisation. Des hydrocarbures
IQ	Institutional Quality
PGDP	GDP Per Capita
RR	Resource Rents
CUSUM	Cumulative Sum Control Chart
CRP	Control For Corruption
LO	Law And Order
TFP	Total Factor Productivity
ADF	Augmented Dickey–Fuller Test
PP	Phillips-Perron Test

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Chapter 1: Introduction

"Mankind did not weave the web of life." is a famous statement part of a letter written by Chief Seattle to explain that man is blessed with all the riches in the world, that have been granted to mankind to sustain the cycle of life. Natural wealth has been at the core of several branches of economic development theory especially after the natural resource booms since the mid-1960's where they garnered much interest. The main question sparking concern is whether to treat this natural wealth as a blessing or a curse.

In the very beginning, the nature of the role and the contribution of natural resources was never questioned as they were considered crucial factors of the production cycle. An assertion built mostly on common sense rather than anything else. In fact, the positive relationship between resource endowment and economic growth was taken for granted as it was believed that new sources would emerge once the ones that are being exploited become depleted. This was the fodder for early Resource-Based Development theories namely, the staple thesis and the vent-for-surplus theory (Barbier, 2005).

With the resource booms of the mid-1960's, a new issue arose. A wealth gap had been created between countries with the same endowments while some countries fared better even when they were relatively poor in natural resources. Naturally, the issue of scarcity was no longer on the forefront of the debate but abundance was. This gave birth to an intriguing question: why does natural resources abundance pose as a hindering threat to economic growth instead of boosting development? A question that has been at the heart of economic research of the current modern world. Richard Auty (1993)

coined the term paradox of plenty, also known as the resource curse, a hypothesis that explains the poor performance of some resource-endowed economies.

Ever since understanding the mechanisms of the natural resource abundance and economic growth has stirred an endless string of research varying in methods of analysis and for many years, the resource curse has been a chief interest for many scholars and economists resulting in a large body of literature that tried to dissect this phenomenon and investigate the existence of an effect on economic growth. Auty (1994) describes the phenomenon as a "strong recurrent tendency" since many countries seemed to be attained with the curse as the result of increasing resource rents while others were actually benefiting from the boom like Norway, Chile and United Arab Emirates who utilized their resources to overcome the curse through education development.

The empirical work done by various economist proves the existence of the natural resource curse. However, there was never a consensus reached on how it does affect the economy. This divided the economists into two groups: a group who claim that the resource curse has a direct impact on economic growth through economic channels that is the Dutch disease. Another group who argues that if it were for economic reasons then how can some resource-poor economies outperform resource-rich economies, hence they ascertain that the indirect effect of the curse on economic growth happens through institutional quality.

Th focus of this research project is on the Algerian economy as a resource-rich country that has proven a lack of immunity in the face of the resource curse. Being one of the resource-richest economies in the world made her vulnerable to the negative effects of the curse. Algeria relies primarily on the exploitation of the natural resources that the land has to offer, namely gas, aluminum, iron, diamonds, phosphate, gold, and most important of all is oil. The latter is considered an important real strategic

commodity that has an important role in building and establishing the foundations of the national economy. Natural resources in general contribute significant amounts of rents to economic growth. The highest amount reached 39.1% in 1979 (World Bank, 2022) and the amount fluctuated throughout the years with the oil prices changes. In recent years and due to several economic and political reasons the value of the contribution has declined to 16.3% in 2019 (World Bank, 2022).

In view of the importance of this commodity in economic development, Algeria decided on February 24, 1971 to nationalize this wealth (Himed & Belil, 2021), which was the monopoly of foreign and French companies in particular, and thus increased the percentage of its contribution to the Algerian economy significantly. This was achieved through the employment of financial revenues that this commodity generates from foreign currency in financing all infrastructure projects for the various major economic sectors in the country. However, it was clear that the revenues generated by oil exports were irregular and unstable, mainly because of the fluctuations of oil prices in the global oil market, which are controlled by external factors that no party can control or predict. This effected Algerian economy, either positively, in the event of an increase, or negatively in the event of a decrease. The instability is showcased through the macroeconomic indicators of the country after each crush and plumet of oil prices.

Accordingly, **the present dissertation examines the short-run and long-run impacts of oil rents on the Algerian economic growth via the proxy of per capita gross domestic product (PGDP), productivity, human capital, and institutional quality for the period of 1998-2019.** The analysis is conducted through employing an autoregressive distributed lag modelling and error correction model on the per capita

GDP as the dependent variable. The concern of the thesis has led to four questions pertinent to the topic at hand:

- What is the nature of the relationship between oil rents and per capita GDP?
- How does an increase in oil rents affect a resource-rich economy's total factor productivity?
- What impact oil rents have on human capital?
- How is institutional quality affected by oil rents?

The main objective of the thesis is to study the channels transmitting the resource curse while broadening the focus to include all three dimensions of economic growth, namely, the economic, social and political dimensions. For this reason, four models have been suggested to obtain a better understanding of the resource curse hypothesis and the way the phenomenon interferes with the mechanisms of the Algerian economic growth. The economic dimension is portrayed through the analysis of per capita GDP and total factor productivity. The social dimension is investigated through the analysis of human capital in Algeria represented in the third model whereas the fourth model covers the effects on a political level through the testing for the relationship of natural resource abundance and institutional quality.

To proceed with the research and to fulfill the aforementioned objectives, the models have been built on the main assumption that dependence on oil rents significantly affects the determinants of economic growth in Algeria. In addition, four hypotheses have been suggested for each model as follows:

- There exists a positive relationship between oil rents and per Capita GDP.
- Increase in oil rents affects positively TFP in the short and the long run.
- Oil rents have a positive impact on institutional quality in the short and long run.

- Oil rents encourage human capital development.

1.1 METHODOLOGY

To understand the mechanisms of the resource curse in the Algeria and its impact on the three dimensions of economic growth, the thesis will adopt an autoregressive distributed lag model. Several studies have recourse to this approach to estimate the long and short-run relationship between natural resources abundance and economic growth. Almosabbeh (2019) used the model to assess the nature of the relationship between human capital and total factor productivity with economic growth. Bouredja and Zerouat (2020) also used the approach while focusing on the examining the sources of slow economic growth in Algeria in the period from 1976 to 2016. The study concluded that for Algeria to achieve long-term economic growth, the government has to adopt a development strategy that includes human and physical capital accumulation. Chekouri et al. (2020) address the impact of natural resource abundance on financial development in Algeria for the period of 1984-2017 where the results showcase a negative relationship and ascertain the need for sound institutional quality. Another study that shed light on the financial sector using the ARDL model was conducted by Khendek et al. (2021). The study run the estimation using the GDP per capita (PGDP) as the dependent variable.

Similar to these studies, the present thesis plans to employ the ARDL approach using the GDP per capita as the dependent variable. It was customary for studies to use GDP as the dependent variable in their modelling (Agboola et al., 2021; Awosusi et al., 2022; Chekouri, Benbouziane, et al., 2017; Guan et al., 2021; Jović et al., 2016; Mohamed, 2020). However, GDP as a measure of economic growth has been criticized for its limitedness as it cannot be used to measure well-being of the individuals. Hence other measures were developed that proved to be more encompassing. GDP per capita

is often used in modelling to assess the material well-being (Acemoglu & Robinson, 2008; Aljarallah & Angus, 2020; Eregha & Mesagan, 2020; Khendek et al., 2021; Moiseev et al., 2020; Mustapha, 2014).

1.2 RESEARCH SIGNIFICANCE AND CONTRIBUTION

The extant literature has dealt with the topic of the resource curse in Algeria in different way. Some of the studies chose to focus on the analyzing the long-run and short-run effects of oil rents on economic growth (Benramdane, 2017; Chekouri et al., 2013; Djeflat & Lundvall, 2016; Elhannani et al., 2016; Fuinhas et al., 2015; Gasmi & Laourari, 2017; Hamdi & Sbia, 2013; Salim Badreddine & Maachi, 2019). Because economic growth is connected to total factor productivity, various studies have sought to study the effect of natural resource abundance on the latter (Almosabbeh, 2019; Attou & Ajri, 2015; Bouredja & Zerouat, 2020; Ghaddar, 2012; Taallah & Chine, 2020). Furthermore, recent literature trends have begun to emphasize the significance of institutional quality and its role in alleviating the consequences of the resource curse (Aimen, 2018; Akacem & Cachanosky, 2015; Belaid et al., 2021; Benghida, 2017; Bergougui et al., 2017; Chekouri et al., 2020).

Considering the different angles that has been dealt with the different studies, none of them have addressed the three dimensions of economic growth, namely economic, social and institutional and their relationship with natural resources abundance. Hence, this thesis brings a new perspective to the resource curse literature in Algeria. Furthermore, the literature on the resource curse in general mostly employs cross-sectional analysis. Therefore, since this thesis plans to use a time series analysis with Algeria as a study case, this could shed the light on the Algerian economy and provide a clearer diagnosis on the phenomenon of the resource curse. In addition, the

analysis of the Algerian economy could contribute in the study of other resource-rich countries where they share similar features.

1.3 THESIS OUTLINE

With the objective of answering the proposed research questions, the thesis structure stretches out over seven chapters. The first chapter represents an introduction to the topic at hand. A general overview of the resource curse theory is laid out in order to facilitate the understanding of the topic and explain the shift from the notion of natural resource abundance as assets for growth to natural wealth posing a threat to the economic stability of the country. The context of the study is built around the Algerian economy. Ever since its independence in 1962, the government has made countless efforts to promote economic growth and achieve development. However, the economic history of Algeria shows that the economic performance of the country is deeply affected by the global economic and financial crises which is mainly due to the fluctuation of the oil prices. Hence, the purpose of the study is to empirically assess the relationship between natural resources rents and economic growth and expose the three transmission channels that highlight the detrimental effects of the resource curse. The chapter also tackles the contribution of the thesis to the literature and its significance.

Chapter 2 involves the literature that is most pertinent to the topic at hand. The chapter is divided into three parts. The first deals with the recourse curse theory, how it evolved, the transmission channels explained by the literature, the impact the natural resources abundance on economic growth and the remedies that have been suggested by the literature to mitigate the detrimental effects of the resource curse. The second part tackles the mechanisms linking natural resources to economic growth which include total factor productivity, human capital and institutional quality, all factors that represents the three dimensions of economic growth. And the third part of the chapter

covers the literature that dealt with the resource curse mainly in Algeria which was related to three main areas. The first part deals with the long and short-run impact of oil rents on Algerian economic growth. Second, the relationship between natural resources and total factor productivity is covered and lastly, the quality of institutions in Algerian and its link to natural resource abundance.

The Algerian economy development is discussed in Chapter 3 chapter where a timeline is provided from the changes that occurred to the Algerian economy from the independence until 2019. The chapter describes the three main phases through which the Algerian economy has known major change and the reforms and adjustments that accompanied them. The first part in the chapter deals with the economy post-independence and the adoption of the socialite system. Then, the second part describes the country's transition towards a market economy, the factors that prompted the transition and the different structural adjustment programs that went with it. The last part involves the economic growth initiates in Algeria between 2000 and 2019.

In the fourth chapter (Chapter 4) a full description of the methodology and research design is provided. First, the data collection process is expressed with a description of each variable and the involved data. The second part justifies the model selected for the study and the methodology that will be followed to achieve the objective of the study and the last part addresses the estimation strategy that is pertinent to the chosen econometric model.

Chapter 5 represents the results. It starts with a description of the data. The second part entails explaining the necessary tests that guarantees the validity of the model and allow for the regression to be proceeded with. These tests include the unit root test and the stationarity tests. Lastly, the third part deals with the results obtained from running

the regression. The analysis branches out to include four regression models. Moreover, the estimation is run in short and long-run regressions.

Chapter 6 is devoted for analyzing the results obtained from the empirical regression using the ARDL model. The first section of the chapter encompasses a summary of the descriptive data. The second section presents the unit root and stationarity tests that are essential to confirm the validity of the model and the last section involves the results of the short and long-run regression related to the four presented models.

The last Chapter 7 discusses the key findings of the thesis and summarizes the impact of each of the three channels of the economic growth and their relationship to natural resource abundance. The chapter also deals with the research significance and contribution and the recommendation provided for future research.

Chapter 2: Literature Review

For many years, the resource curse has been a chief interest for many scholars and economists resulting in a large body of literature that tried to dissect this phenomenon and investigate the existence of an effect on economic growth. This resulted in the existence of two major waves, one that believed that natural endowments are factors of prosperity and progress and one that was adamant that natural resources are at the base of economic downfall. The ideas and theories pertaining to the abundance-scarcity spectrum has gone through a timeline. In this section, we divulge this time evolvement. This chapter begins with a historical background of the resource curse theory and a timeline for the evolvement of the study on the topic. The second section of the chapter deals with the mechanisms linking natural resources to economic growth. The last part presents the literature that tackles the resource curse in Algeria.

2.1 THE PARADOX OF PLENTY: THE RESOURCE CURSE EXPLAINED

Before the late 1980's, natural resource abundance was commonly believed to positively correlate with economic growth, with the focus being mainly on development, on the basis that production possibilities grow with an existing natural capital. However, there existed some of the radical theories, which advocated the idea that natural resources pose a threat to developing countries when depending on them because of the fluctuations of global economy (Singer and Prebish).

In later years, the minority viewed that the natural resource abundance can cause a potentially detrimental effect on economic growth evolved and spread around. However, not until 1993 that the concept of "resource curse" came to exist. Richard Auty coined the term in his book *Sustaining Development in Mineral Economies: The Resource Curse Thesis*. Other studies emerged later, to confirm the negative association of abundance and economic development, Auty (1993), Sachs and Warner (1995, 1997).

2.1.1 Natural Resources Assets for Growth

Before the late 1980's, it was commonly believed that natural resource abundance had a positive impact on a given state's economic growth and development mainly, because natural capital expands the production possibilities of an economy. As to what development theorist Walter Rostow (1961) would state, "The natural resource endowments would help developing countries to make transition from underdeveloped to developed as this natural resource abundance will act as the industrial "take-off", just as it had done for countries like Australia, USA and Britain." (Roy et al., 2013, p. 148).

Some of the radical economists like Singer and Prebisch (1950) argued that dependency on natural resources put developing countries on a serious disadvantage because of the global economy and the nature of the international commodity markets. However, as it was a minority view, this was unheeded and the natural resource abundance continued to be considered as a blessing for developing countries (Roy et al., 2013)

In order to support the then apparent idea that, natural resources are tools to help countries grow, many authors reviewed the historic evidence to back up their belief that natural resources play a positive role in economic growth (Karabegović, 2009), starting with Mikesell in his "Explaining the Resource Curse" in 1997 where he states that in fact

if not for the contribution of natural resources there would mostly be no development. Halvor Mehlum, Karl Moene and Ragnar Torvik state Australia, Canada, the United States, New Zealand, Island and the Scandinavian nations as examples of positive economic development simulated by the abundance of natural resources (Mehlum et al., 2006). In addition, there were authors like Kronenberg who emphasized the importance of certain natural resources during periods of time like the role of iron and coal as the primary sources of energy during the industrial revolution and the nineteenth century (Kronenberg, 2002).

2.1.2 The Resource Curse Theory

After the 1980's, the notion that natural resource abundance has a negative and potentially detrimental effect on economic development has been around for some time but not until 1993 that the term "resource curse" has been coined by Richard Auty in his book "Sustaining Development in Mineral Economies: The Resource Curse Thesis". The opening sentence in that book was:

> However, a growing body of evidence suggests that a favorable natural resource endowment may be less beneficial to countries at low-and mid-income levels of development than the conventional wisdom might suppose. Two important pieces of evidence are the developing countries' post-war industrialization efforts and the performance of the mineral-rich developing countries since 1960s. The new evidence suggests that not only many resource-rich developing countries fail to benefit from a favorable endowment; they may actually perform worse than less well-endowed

> countries. This counter-intuitive outcome is the basis of the resource curse thesis. (Auty, 1993, p. 1)

Ever since, there has been ample flux of works dissecting the resource curse, the first of which were Sachs and Warner (1995) who, in a series of papers, have produced the most persuasive recent empirical evidence connecting economic growth and relative abundance of natural resources (Behbudi et al., 2010). Following works, in the subsequent years seemed to find a consensus with the findings of Sachs and Warner (Gylfason, 2011; Ross, 2001; Sala-i-Martin & Subramanian, 2003; Smith, 2004).

The study of the natural resource curse in the past 15 years was initiated by Barro's work, facilitated by the 1990's availability of new cross-country data from Penn World Table and World Bank (Behbudi et al., 2010). Sachs and Warner (1995) were the pioneers to publish findings confirming the resource curse's existence (Karabegović, 2009). Their study aimed to examine if natural resources influenced economic growth and how the curse may occur (Sachs & Warner, 1995). The main findings of their first work concluded, using cross-section regression, that first, there exists a "negative relation between natural resource intensity and subsequent growth". Second, economies experiencing temporary resource boom, would experience a decreasing rate of growth for several periods after the boom. Another important point was the focus of the literature on the subject spurred by the need to clarify the reason why would natural resources abundance have a negative impact despite being necessary assets of economic growth (Gylfason & Zoega, 2006; J. Sachs & Warner, 1995). Eventually, theories could distinguish between two kinds of impacts: a direct one caused by economic channels and an indirect one that resulted from political and institutional channels.

2.1.3 Economic Channels

The Dutch disease is the most prominent channel for the curse. Named after the Netherlands experience during the 1960s and the 1970s, it occurs when a country experiences a resource boom that provides a false sense of security and weakens the investment and growth-promoting plans. This phenomenon was handled in the works of, first Cordon and Neary (1982), then came Sachs and Warner with both works (1999; 1995) and Gylfason (2001). When he explained the effect that had the appreciation of the exchange rate on the non-hydrocarbon traded sector and how the increase in the currency value would lessen the competitiveness of the nation's manufacturing sector (Gylfason & Zoega, 2006). Auty further explained that the Dutch disease entailed two effects: the resource movement effect and the spending effect (1993).

2.1.4 Resource Dependency Versus Resource Abundance

A criticism of the resource curse thesis, according to Brunnschweiler and Bulte (2008), is that it fails to differentiate between natural resource dependence and natural resource abundance. Resource dependence refers to a state's economic reliance on resource export revenues, which can be measured through ratios such as resource export revenue to GDP or oil revenue to total government revenue. On the other hand, resource abundance refers to a state's endowment of natural resources, measured by natural resource capital per capita. This abundance may not have a negative impact on economic performance, as seen in resource-abundant economies like Australia, Canada, Norway, Botswana, and the US (Torvik, 2009).

In contrast, Resource-dependent states experience the negative effects of the resource curse because the discovery of new resources in many of these states took place

during early stages of their economic development. Natural resource extraction and export shouldn't be considered as true economic activities, but rather a shift in assets through the exchange of resources for foreign currency. Although this exchange involves labor, capital, and technology, finite resources like oil eventually run out. A growth in GDP, driven by increased oil exports or prices, does not indicate true positive economic growth. A state is considered resource dependent if its economy relies heavily on revenue from natural resource exports.

According to Auty, "the mineral economies are defined as those developing countries which generate at least 8 percent of their GDP and 40 percent of their export earnings from the mineral sector" (2003, p. 2). Yet, the IMF has a higher standard, stating that a state is considered resource-dependent if resource exports make up 60-95% of its total exports. Karl (2004) states that the literature offers a different measure, suggesting that a state is resource-dependent if its export revenues represent over 25% of government revenues. Other factors in the literature, such as limited growth in non-oil sectors and high levels of government involvement in the economy, can also indicate a state's vulnerability to the resource curse.

2.1.5 Political and Institutional Channels

Natural resource abundance has been found to have an effect on the quality of a nation's institutions and governance. Ross in his work "*Does Oil Hinder Democracy*" in 2001, explains that people are less likely to ask their governments for better accountability and representation if they are lightly taxed as the country obtains great revenues from natural resources (Ross, 2001). Furthermore, there might be an increase in spending in the form of social programs to relieve pressure for political reform (Karabegović ,2009). Ross

concludes his work by stating that indeed, oil does impede democracy and that these anti-democratic effects of oil are not restricted to the Middle East countries as stated by another research. Barro (1999), Aslaksen (2010), and Tsui (2011) support these results, however, they reached their findings through the use of different measures, samples, and/or econometric techniques (Busse & Gröning, 2013). Ross examined empirically the causal channels through which natural resources could have a negative impact on government and they are the rentier effect, the suppression effect and the delayed modernization effect. Another effect discussed by both Mehlum et al. and Gylfason & Zoega in 2006 that in extreme cases struggle over the resources could ignite civil wars that will destroy physical and institutional infrastructure. Kronenberg adds another argument that due to the nature of the resources and the need for permit or state authorities' concessions for their extractions, this would spark close ties between the companies' requesting permits and the authorized state agencies granting those permits (Karabegović, 2009). Moreover, in a low level of transparency and weak rule of law, those ties could turn into incentives bribes and abuse of power leading to what economists call rent-seeking which is defined as the allocation of effort and resource in order to maintain wealth through political redistribution.

In addition to the economic explanation of the curse, the literature also now includes studies on the correlation between natural resource abundance and regime type, likelihood of conflict, and institutional quality. These other sub-literatures have transformed the resource curse into "a multi-dimensional phenomenon involving not simply poor economic performance but also civil war and authoritarianism" (Rosser, 2006, p. 8).

2.1.6 Natural Resources' Direct Impact on Economic Growth

The literature reviewed in this section has tested for the possibility that resource curse have a direct impact on economic growth. Starting with Sala-i-Martin's "I Just Run Two *Million Regressions*" in 1997. His omnibus study's main goal was to test every variable that was of importance for economic growth. The results showed that natural resources and institutions were among the top 20 variables that strongly correlated with growth. More specifically, he found that non-mining natural resources have a negative impact whereas measures of institutional quality have a significant positive impact (Sala-I-Martin, 1997).

Several other studies continued the research, using cross-country data for 77 countries from 1965 to 1990, Sachs and Warner in (1997) tested for the determinants of growth. The paper found evidence for a negative relation between natural resource intensity and subsequent growth. However, the authors would not conclude that countries should implement a non-resource-based as a sole strategy for growth (Sachs and Warner, 1997). Another follow-up study in 2001, Sachs and Warner tested for other independent variables that were overlooked before and still they found that the natural resources had a negative significant impact on growth and they attributed it to the Dutch disease and higher incentives of rent-seeking (Karabegović, 2009).

In 2005, Ding and Field had a new take on the natural resource abundance and its effect on growth. They distinguished between resource- dependent and resource-abundance, taking the example of the United States who has an abundance of natural resources yet was not dependent on them. While, Tanzania and Burundi are strongly reliant on natural resources even though they do not have an abundance of resources.

Several other authors breached out to test more variables such as Lederman and Maloney, 2003, where they investigated the impact of trade structure, natural resources, export concentration and intra-industry trade on economic growth. The authors concluded that "export concentration per se, not natural resource endowment, has a negative impact on growth Lederman and Maloney, on the other hand" (as cited in Karabegović, 2009).

Arezki's paper criticized existing empirical results on the negative impact of natural resource dependence on the rate of economic growth after controlling for institutional quality, openness, and initial income. And he found the "high correlation (in absolute terms) between institutional quality and resource abundance suggests that resource abundance affects income per capita directly (affecting directly a nation's incentives to improve economic performance)" (Arezki & Ploeg, 2007, pp. 23–24). Even after all this extensive research and testing, it seems that it is not possible to reach a definite conclusion about the direct impact of natural resources on growth (Karabegović, 2009).

2.1.7 Natural Resources' Indirect Impact on Economic Growth

Economic institutions are important for economic growth since they represent the link between the economic inputs such as human, physical and natural resources and the transformation process that results economic outputs like economic growth. Once their importance has been established, it is quintessential now to know their influence on economic growth whether is it positive or negative, direct or indirect.

This section previews the works that tried to find evidence of the impact that natural resources had on economic growth through political and institutional channels. The following works emphasized the importance of the institutional quality for economic

Growth. The basic argument they explored is that the decay of political system engenders corruption and even civil wars, hence, affecting negatively the quality of institutions.

There exist plenty of works of literature on economic growth that talked about the importance of institutional quality. Engerman and Sokoloff (2004; 2000), and Acemoglu et al. (2008; 2014), Indicates that institutions are crucial factors for long-term growth. The results provide fresh perspectives on how resource availability and political institutions interplay to shape different countries' paths of development. In 2005, the International Monetary Fund's report, "World Economic Outlook: Building Institutions" started using the index published in the Fraser Institute's Freedom of the World as the key measure of the quality of institutions. Ever since, more than 200 academic articles have used the index in their quest of finding the relationship between economic institutions and economic prosperity (Karabegović, 2009). The index includes a list of qualities, which are essential for economic institutions to have in order to nurture economic freedom.[1] It is worth mentioning that, some of the research, like Easton and Walker (1997), De Haan and Sturn (2000), Dawson (1998) and Gwartney et al. (2006) focused on economic freedom. What they found shows that economic freedom directly increases economic growth by increasing the efficiency at which inputs are transformed into outputs; it has an indirect effect by encouraging and attracting investment. The result that has been reached using the economic freedom index is as follow: Institutions are an important determinant of economic growth. Furthermore, it is through the institutions that natural resources exert indirect influence on the economy.

[1] The list includes: personal choice, voluntary exchange, freedom to compete, and security of private property

Barro (1999) explored the adverse impact of natural resources, economic development and other factors on democracy (Karabegović, 2009). Same as did Ross (2001) when he formulated four questions on impact of oil on democracy. “Does oil have an impact on democracy? If yes, is the impact present in certain region only? Do other types of natural resources have the same impact on democracy? Through what channels do oil and natural resources in general affect democracy”. Ross considers three possible channels through which oil can impede democracy that he confirms to be all three true. We will talk about these channels later in the next chapter. He also found out that not all natural resources have the same effect on democracy, in addition to the fact that it is not limited to the Middle-East region.

2.1.8 Remedies to the Resource Curse

According to Booz et al., the most common definition of economic diversification is “an economy made up of several strong and balanced sectors with low correlation and interdependence among each other.” (Haddad et al., 2011). As a key element of economic development, diversification has been the focus of an extensive body of literature. In its most basic sense, economic diversification engenders shifting from depending on one commodity or agriculture production to higher production sectors. According to an At Glance report by the OECD and WTO, economic diversification has two dimensions, trade diversification and domestic production diversification which are intertwined and have a close connection with each other. Accordingly, on the one hand, domestic production diversification is defined as the “shift of domestic output across sectors, industries and firms” (OECD & World Trade Organization, 2019, p. 142). It entails the employment of resources in higher productivity sectors to ensure a structural transformation and a

calculated distribution of output aiming at increased levels of productivity. On the other hand, trade diversification involves exploring new markets or the export of new products. Moreover, the report explains trade diversification further by providing three ways by which trade diversification occurs. First, it takes place through the export (or import) of new products that might include goods or services. Second, through exploring new markets with existing products and last, upgrading the quality of exported (or imported) products (OECD & World Trade Organization, 2019).

Diversification has been the key to achieve the governments growth agendas. Hence, the resource curse literature has claimed that it poses as a quintessential strategy for addressing the resource curse. Ahmadov (2014), for instance, ascertains the importance of diversification for the resource-rich developing countries. The study focuses on export diversification factors, namely, geographic factors, trade openness and political institutions while establishing a significant correlation between diversification and sound political systems. Haouas and Hashmati's (2014) research sheds the light on the phenomenon in GCC economies, mainly the United Arab Emirates. Ben Mim and Ben Ali (2020) conducted an empirical study in GCC countries where the results reveal that diversification of the production structure strengthens the mechanisms of investment in human and physical capital which, in the long term, attenuates the over-reliance on natural resources rents.

Several resource rich countries would have recourse to Sovereign Wealth Funds to mitigate the detrimental effects of the resource curse. These funds use budget surpluses and can act as a safeguard during the times when oil prices are low. The Sovereign Wealth Funds are created to accumulate and manage wisely the state's wealth generated from oil exports (Alhinai, 2017). One of the first countries in the GCC region to employ such

strategy is Kuwait when they established the Kuwait Investment Authority (KIA) in 1953, followed by Abu Dhabi in 1976 creating the Abu Dhabi Investment Authority (ADIA) and the Algerian government with the State General Reserve Fund (SRGF) in 1980 (Al Suwaidi & Caruana, 2008). The main roles of the SRGF consisted of, first, to use budget surpluses in investments for future generations and second, to provide a financial safety net for the government during low oil price periods.

Commodity funds are used by many natural resource producers to invest savings for the benefit of future generations. These savings are frequently saved in worldwide portfolios. The Persian Gulf is home to the world's oldest and largest commodities funds, which are owned by Kuwait and the United Arab Emirates. Some of Asia's most successful non-commodity exporters have also formed similar funds. When China joined the club in 2007, they were given a new name, Sovereign Wealth Funds, as well as a new logo. Hence, the use of funds as remedial mechanisms against the curse has had a big share of the literature where the conducted research affirms the importance of these funds in providing a sound management system for the resource rents and improves the quality of political institutions when used effectively (Amar et al., 2018; Dymitrowska, 2020; Frynas, 2017; Ouoba, 2016; Palley, 2004; Tsani, 2013; Weinthal & Luong, 2006).

In the many attempts to explain the resource curse, many has examined this phenomenon through the lens of political economy. Several studies argue that institutions are the fundamental cause of economic growth and, therefore, are at the heart of the differences that attain the development levels for each economy. In addition, the differences in institutions across countries may help explain differences in human capital, physical capital and technology across countries all of which contribute in the promoting economic

growth and sustainability (Acemoglu & Robinson, 2008; Baliamoune-Lutz & Ndikumana, 2007; Mehlum et al., 2006; Robinson et al., 2006; Torvik, 2009). The approaches in dealing with the correlation between resource rents, economic growth and institutional quality varied in terms of the sample of the study and the methods employed. Bakwena et al. (2009), for example, stress the importance of role of institutions as a remedy for alleviating the curse. The study runs a mixture of cross-country and dynamic panel regressions where the results showcase how governance influences the impact of natural resource abundance on economic growth. Ahrend (2005) bases his study on the case of Russia and explores the political aspect of economics to canvas for a solution to mitigate the effects of the resource curse as did many other studies (Adams et al., 2019; Akacem & Cachanosky, 2015; Baliamoune-Lutz & Ndikumana, 2007; Nwokoye et al., 2019; Sala-i-Martin & Subramanian, 2003). In the same regard, and with the application of ARDL bounds testing approach to cointegration, vector error correction model (VECM), Granger causality test and cointegrating regression on the Nigerian economy from 1996 to 2019, Fagbemi and Kotey (2022) dissect the channel of institutional quality confirming the correlation between poor governance and resource rents.

Other studies attest that the method of measuring natural resource abundance Empirical also plays a role in inducing a resource curse which evidence was found by Arezki and Ploeg (2007). While others adopted new emerging approaches such as transparency which has been adopted as an attempt to reverse the detrimental effects of the resource curse (Cater, 2014) and exchange rate as a remedial mechanism. Using a panel data model, Zhan et al., for instance, explore different exchange rate regimes and how it

effects the outcome on natural resource abundance. They conclude that despite the positive effects on economic growth, the resource curse is highly expected in free-float economies.

The literature so far has been very important in the way that it is helping with pointing out that there is no evidence that says resources-rich nations have no power over their destiny. It is suggesting that with good institutions and an effective trade policy they may be able to turn the curse into a blessing.

2.2 MECHANISMS LINKING NATURAL RESOURCES TO ECONOMIC GROWTH

The effect of natural resources on economic growth has been a widely discussed topic by the literature in general. Countries experience growth in different manners and at different paces therefore it is natural that natural resources abundance impacts economic growth via different channels and mechanisms.

Studies an advocate of the positive impact resource endowment has on the long-term economic growth (Alexeev & Conrad, 2009). Mideksa investigated the impact of natural resources abundance on per capita GDP in the Norwegian economy by constructing a synthetic economy. The estimation was conducted through a sensitivity test, a robustness test, a dose-response, and other falsification tests. The results reached at the end of the study suggest that since its discovery in 1971, oil abundance only started to have an impact in 1974 where the amount of the extracted oil started to get greater and the use of oil rents was regulated by the Norwegian government (2013). Using a panel fixed-effect estimation, Smith assesses the impact and finds that it significantly varies between countries (Smith, 2015).

Aljarallah chooses Saudi Arabia as a case of study by running an estimation of the short run and long run impacts of natural resources rents on GDP per capita and total factor productivity. The research is conducted through the application of the cointegration and error correction approach based on the Autoregressive Distributed Lags (ARDL) model. The research finds that for the long-term, natural resources are seen as a positive for the Kingdom. An improvement in human capital significantly boosts per capita GDP and total factor productivity. Consequently, Aljarallah proposes two options. First, it is crucial to invest in human capital to achieve sustainability in the long run and, second, the government needs to decrease the reliance on natural resources rents to avoid the trap of the resource curse (2021).

2.2.1 Natural Resources and Human Capital

Extensive research has been considering human capital as one of the most important factors of economic growth. However, this has not always been the case and the importance of human capital was overlooked by the classical and neoclassical theories (Abbas & Mujahid-Mukhtar, 2000; Pelinescu, 2015). The classical theory did not account for the positive effects education has on the potential growth of productivity and neither does the dynamic economic growth model developed by Thomas Malthus. The disregard continued with the emergence of Robert Solow's model for economic growth. Starting from the 1960's and onward, the term human capital gained popularity in the modern neoclassical literature when Jacob Mincer and Gary Becker spiked the interest in the concept with their separate research in 1958 and 1964 respectively (Zhu, 2012). Taking on different approached and starting off from different angles, the literature branched out to elaborate more on the reciprocal relationship between economic growth and human capital and most of them have

employed education as a proxy for human capital (Barro, 1996; Fernandez & Mauro, 2000). The new growth theory comes to correct the previous theories' shortcomings by emphasizing the importance of human capital and innovation. The Grossman-Helpman model show that a balanced growth requires a production function with human capital as a parameter in it (Grossman et al., 2020).

In the same regard, human capital accumulation has been linked to natural resources abundance and examined as a potential solution to mitigate the resource curse. Alexis Manning(2004) regresses natural resources abundance against economic growth with the most recent data on the same 80 countries Auty (1997) analyzed in his study (2004). The results of study showed a negative relationship between human capital and natural resource abundance however they were not conclusive due to lack of robustness. Suslova and Volchkova (2012) follow Manning's line of research in examining human capital as a transmitting channel for the resource curse. Conducting a cross country analysis, their study confirms that natural resource abundance impedes the growth of high-skill intensive industries in resource-rich countries. Literature of the last decade witnessed a shift from analysing empirical relationships to suggesting human capital as a remedy to the resource curse (Coulibaly & Asirvatham, 2021; Kufenko, 2015; Rahim et al., 2021; Shao & Yang, 2014).

2.2.2 Natural Resources and Institutional Quality

Several studies tackled the importance of institutional quality for resource-rich countries. A sound institutional quality plays a major role in enhancing the drivers of economic growth this is why Some economists consider it as a factor of production (Kansheba & Marobhe, 2022). Furthermore, it was steering the economic growth literature towards technology as

one of the drivers of production that shed light on the connection between institutions and economic performance and then a link to natural resources has been established.

Different studies adopted different approaches in investigating the relationship between natural resources abundance and institutional quality. Triggered by the question of why does natural resources endowment benefit some countries and ail others, the earliest studies focused on the fact that resources abundance impeded economic growth (Auty, 1993; Mehlum et al., 2006; Ross, 2001) while most recent studies preferred to shed light on the long-run positive effects on natural resources abundance (Acemoglu & Robinson, 2008; Al-Kasim et al., 2013; Arezki & Ploeg, 2007; Ayad & Bensaci, 2019; Belarbi et al., 2021; Bergougui et al., 2017; Boschini et al., 2013; Costa & Santos, 2013; Mohtadi, 2022; Saeed, 2022).

The research did not stop at the effect of institutional quality and instead of analyzing said effect the following study examines the role the latter plays in affecting development. Lashitew and Werker employ a 3SLS instrumental variable setup to evaluate the impact of reliance on resource rents on the development of the country and the quality of its institutions. The study distinguishes between resource abundance and resource dependence and clarifies the different effects each has on economic growth and development (Lashitew & Werker, 2020).

Other studies suggested that the resource curse can be reversed if institutional quality is improved. Like Boschini et al., who conducted simple regression (Mehlum et al., 2006), a pooled OLS and IV regressions to investigate the possibility of having recourse to institutions as a remedy to the resource curse (2013). Kansheba and Marobhe, as well, stress the importance of directing governmental efforts towards enhancing the quality of institutions in order to achieve economic, social and environmental sustainability (2022).

Furthermore, some attempts have been made to explains the mechanisms through which institutions operates to reduce the symptoms of the resource curse (Saeed, 2022; Vijge et al., 2019; Weinthal & Luong, 2006) explaining how sound institutions will play an active role in preventing conspicuous exploitation of resources rents, limit rent seeking activities and curb the spread of corruption.

2.3 THE MANIFESTATION OF THE RESOURCE CURSE IN ALGERIA

In this section, the focus is on tracing back the natural resources literature that focused on Algeria as a case of study. The approaches and methodologies adopted foe each study differed according to the different objectives. The literature started by assessing the long and short run impact of oil rents on economic growth. The economic growth was linked to total factor productivity, hence, some studies attempted to investigate the impact of natural resources abundance on the latter. Furthermore, most recent trends in literature have started emphasizing the importance of institutional quality and its role in mitigating the effects of the resource curse.

2.3.1 Long and Short-Run Impact of Oil Rents on Economic growth

'Are natural resources a "curse" a blessing?' asks Van Der Ploeg in his paper. To find the answer he conducts an empirical study to dissect the experiences of resource-rich countries among of which is Algeria and testing different hypotheses pertaining to the impact natural resources endowment might inflict to an economy (2011). The paper concentrate on past research shedding light on the practices and experiences and the main hypotheses on the subject while backing the notions with theories accompanied with cross-

country, panel-data and quasi-experimental evidence. The economist concludes his paper with some suggestion as to how to better manage natural resources.

Following up, another paper that includes Algeria among the sample of the study. Robinson et al. tackle the topic at hand from a political angle arguing that political incentives that are related to natural resources are the deciding factor (2006). In addition, the institutions play a major role in managing natural resources in an optimal manner. Countries will fully benefit from resource endowment only when their institutions are accountable and promote competence.

Offering a diagnostic of the Dutch disease in Algeria for the period between 1963 and 2008, Chekouri et al. (2013) investigate the economic ailment and its impact on the Algerian economy. Their research exposes the manifestation of the Dutch disease through several symptoms such as: a deceleration of manufacturing growth, a poor performance of the agricultural sector with a revival of the employment sector. The main reason for the attainment of the Algerian economy is the dependence on the oil rents which crowded out all of the production efforts towards the hydrocarbon sector. In the same context, Hamdi and Sbia (2013) find a bidirectional causal relationship between the natural resources and economic growth in both the short run and long run through adopting a multivariate cointegration approach based on the advances in time series econometrics including cointegration test and Vector Error Correction Models (VECM).

There exists a distinction between a semi-rentier economy and a rentier economy. With the objective of understanding the nature of the relationship between energy and economic growth, this paper employs an ARDL cointegration model on two countries, Egypt and Algeria who possess different rentierism characteristics (Fuinhas et al., 2015). The obtained results indicate that when the government is dependent upon the rents of a

specific energy source the relationship yields negative and the natural resource is no longer a driver for economic growth.

Elhannani (2016), shifts the attention towards financial development explaining that a weak financial infrastructure will make the economy more vulnerable in face of the volatility of oil prices. The paper seeks to dissect the link to economic growth hand the possibility of finding a remedy to the oil curse in the midst of a sound financial system.

Djeflat and Lundvall (2016) choose not to participate in the ongoing resource curse debate but to focus on offering a brief discussion on the implications of industrial and innovation policies. Their research sheds light on Algerian oil company Sonatrach and the role it plays in enhancing knowledge transfer and capacity building. They conclude the study by showcasing the government's failed attempt at diversification which they attribute to the inability to "upgrade the knowledge base" (Djeflat & Lundvall, 2016, p. 16).

Gasmi and Laourari (2017) focus on examining the existence of the resource curse via the channel of the Dutch disease. However, their focus has been on the spending effect. Using an ARDL model spanning over the period between 1960 and 1916, they reach inconclusive results that could not confirm nor refute the hypothesis that the Dutch disease manifested through the spending effect. Salim Badreddine and Maachi (2019) seem to have reached the same results where they could not confirm the Dutch disease in spite of the existence of some of its symptoms. whereas, Using a VAR model, Benramdane (2017) reaches the conclusion that the resource curse is a product of the volatility of the oil rents rather than the abundance of natural resources.

Following the same reasoning, Chekouri et al. (2017) conduct a cointegration VAR with exogenous (VARX) model concluding that on the one hand, there exist a strong and positive link between oil rents and the long-run economic growth. On the other hand, a

negative correlation links volatility of oil rents and economic growth. In addition, a positive spike in oil revenues will in turn affect real output and causes the appreciation of the real exchange rate (2017).

2.3.1 Natural Resources and Total Factor Productivity

Growth of total factor productivity (TFP) can be used as a measure of an increase in the welfare of people. The literature elaborates on the nature of TFP by referring to Solow's growth model (1956) and explains that this growth is usually measured by the Solow residual which is why it is called the "indicator of economists' ignorance (Fukao et al., 2021, p. 1).

Extant literature has dealt with the impact TFP has on economic fluctuations, economic growth and the existing differences in per capita GDP between countries. According to Baier, the growth in TFP is directly responsible for small part of growth of output per worker (Baier et al., 2002). Agnani and Iza find that the nature of the relationship depends on the performance of the Venezuelan economy showing a high positive correlation during economic booms and a negative correlation when the oil rents are lower (2011). Different studies examined the relationship between TFP and economic growth in Algeria (Almosabbeh, 2019; Attou & Ajri, 2015; Bouredja & Zerouat, 2020; Ghaddar, 2012; Taallah & Chine, 2020).

2.3.2 Institutional Quality and the Resource Curse

In attempt to dispel the myth of the resource curse, Akacem and Cachanosky study the case of Algerian economy. Their motivation has been to understand why the country did not fare well after the independence in spite of the natural resources' endowment. They

compare the country's economic progress to that of Norway and show how institutional quality offers a solution to the curse (2015). Quality of institutions have started to gain intrigue among the literature on natural resources and economic growth nexus. Benghida (2017) exposes the main factors leading to the resource curse among of which she sates: the volatility of oil prices, fiscality system, the amount of the production, and the institutional framework which is the most important one especially after the sharp plunge of the oil prices in 2014. That famous crash taught resource-rich governments to seek to enhance their political and economic institutions to escape the trap of the resource curse.

More studies honed in on the importance of institutional quality. Bergougui et al. (2017) employ a panel data analysis on several Arab resource-endowed countries among of which is Algeria. Their objective is to examine the impact of oil abundance on GDP per capita in the period between 1996 and 2015. The results indicate a strong causal relationship between a good institutional quality and economic development aligning with the conclusions reached by the literature so far.

Similarly, Using the resource governance index (GIR) method to assess the main four key components of resource governance, Aimen's study concluded that the hurried or anachronistic decisions made by the Algerian government did not serve well the purpose of natural resources governance. Also, territorial governance is found to be the key to reduce governance issues, namely mismanagement, corruption and economic instability (2018).

In another paper, Chekouri et al. (2020) focus on the resource abundance and its influence on the development of the financial sector for the period of 1984-2017 using an ARDL model. The study's results maintain the reached conclusion of the existence of a significant negative impact of oil rents on financial development while a positive and

significant impact exists between institutional quality and financial development. In other words, when the government improves the quality of its institutional framework, it consequently leads to a better financial development.

Another measure of institutional quality is the nature of politics in a country. In a study to assess the existence of the resource curse in the Mena region, Belaid et al. distinguish between democratic and non-democratic countries. The research is conducted through a panel Vector Auto-Regressive (PVAR) model and it concludes that oil rents engender a growth in economic development be it in a democratic or a non-democratic country what really marks the difference is the fact that the country is ruled by a military chief of state. According to Belaid et al. (2021), having military high executives will hinder the economic growth of the country because it inflicts the quality of the institutions.

The chapter has been tailored to fit the chronological progression of the resource curse theory. It follows the development of the literature on the topic starting with explaining the curse theory and presenting the economic channels through which the curse occurs in an economy and the impact (direct and indirect) natural resource dependence have on economic growth. A section has been devoted to talking about the literature that dealt with the mechanisms linking natural resource to economic growth through the three dimensions; social, economic and political. And finally, the last section tackled the literature that focused on Algeria as a case of study.

Chapter 3: The Algerian Economic Development

This chapter discusses the main stages that the national economy goes through from independence to 2019, and sets out the main economic and social indicators that accompany each stage, as well as the main factors that ensued such reforms. The sections of the chapter follow the progress of the transitions that the economy underwent going from a centrally planned approach, resorting to medium-term development plan, followed by several corrective measures to correct deficiencies affecting all sectors of the economy. Later, a radical change occurred turning the Algerian economy towards market economy after the collapse of the socialist system during the economic crisis.

3.1 THE ALGERIAN ECONOMY UNDER THE SOCIALITE SYSTEM

After gaining its independence and during the period 1962-1966, the Algerian government focused on determining the political and economic directions and the methods of their application and this crystallized in the Tripoli Program (Bengharbi, 2021). The first objective had been to regain possession over national wealth, wholesale trade and all financial institutions. In addition, socialism had been adopted as the only approach towards achieving development. However, and due to the political and financial frailness of the newly established government, the program was not executed until after 1966.

Because capitalism was highly associated to colonialism, the Algerian government rejected its doctrine and as a result the socialist system was chosen. Several other factors helped tipping the scale towards socialism. On the one hand, Algeria had been at the

receiving end of material aid and sympathy of socialist states. On the other hand, the inability of the national private sector of achieving development and the fear for the national market in face of foreign competition had been ones of the major concerns of the government. Therefore, the Algerian economic development has witness three major phases (Adamson, 2005; Boukaroun, 1991; Laframboise et al., 1998; Sali, 2016).

3.1.1 Stage One: Nationalization and the Establishment of the Algerian Economy 1962-1966

Independent Algeria faced very difficult circumstances, especially the smuggling of money abroad, emptying the state treasury and the central bank, deserting 900 thousand hectares of the best agricultural lands in the event of a vacancy to create deficit, and emptying the administration of administrative documents to paralyze the administrative system. Hence, it was adamant that the government steps in with some political measures including (Sali, 2016):

- Nationalization of all the lands of the long-lived and all vacant properties, and the application of the self-management system in accordance with the regulations of the decrees of March and October 1963 and December 1968.
- Nationalization of all mines in May 1966 and the entire network of foreign oil derivatives distribution in 1968.
- The nationalization of the Bank of Algeria, which turned into the Central Bank of Algeria, the abolition of the French currency and its replacement by the Algerian dinar in January 1963, and then the expansion of nationalization to all foreign banks in 1966.

- Planning the national economy: The Tripoli Program in 1962 emphasized the importance of planning and organizing the economy (Bengharbi, 2021).

The post-independence economy was afflicted on different levels. Colonialism had left the government with a complete absence of basic industries, mostly. The agricultural sector, occupying an area of about 30 million hectares of the most fertile lands in the country was owned by the Europeans (Sali, 2016). The infrastructure left by the French was all concentrated in the north leaving the rest of Algeria heavily underdeveloped. In addition, nearly a million European executives left Algeria before the declaration of independence, which left a large void in professional personnel and workers. On a financial level, the existence of a banking sector consisting only of branches of foreign banks stationed mainly in the north of the country, especially at the level of major ports had posed another problem for the newly established government. Furthermore, a significant lack of capital was witnessed when the Europeans transferred their savings and capital when they left. In 1962, for instance, the transfer of about 750 million francs was recorded (Sali, 2016). This resulted in diminishing funds which in turn affected the banks' ability to grant loans and therefore, a lack of investment entailed.

Faced with this difficult situation, the Algerian leaders at the time had no choice but to keep the devices inherited from the colonial era, such as managers, laws, decrees, and practices that existed before independence, in addition to continuing to implement the projects programmed within the framework of the Constantine Project (1959-1964), which was considered an absolute necessity (Boukaroun, 1991).

Reference to the economic measures to be taken was made to the development strategy in the Tripoli Conference of 1962 and during the Algiers Pact of 1964, where those

gathered in the Tripoli Conference believed that the tasks of development on the economic, social and cultural levels require the unification and mobilization of all energies, and the monopoly of the state on all basic activities. The political authority is the authority responsible for achieving political, economic and social development. And, in order to achieve the economic and social tasks of the popular democratic revolution, attention must be paid to the economy, society, and the international sphere in order to liberate Algeria from its colonial restrictions and the remnants of feudalism. Therefore, the roles of the government were constricted to the following:

- Strengthening socialist experiments that are on the way to completion, such as unifying the mode of production.
- The state's intervention in the private sector in order to activate nationalizations, in addition to determining the relations that the state should establish for foreign capital.
- Preparing for the adoption of self-management based on the cooperative system in the agricultural sector. As for the industrial sector, this organization is done first through the transformation of the private industrial sector (nationalization) and the establishment of public industry.

3.1.2 Stage Two: Central Economic Planning 1967-1979.

The aforementioned period was a waiting period, as the development strategy was limited to setting the annual equipment budget of the Finance Law, hence, efforts to achieve investment remained within the framework of the urgent plans that followed independence, which were very simple, and during which there was no clarity of the development model

that will be implemented (Laframboise et al., 1998). The Algerian economy was characterized in the period from 1967 to 1979 by a unified central system in all economic sectors through its reliance on central planning in achieving economic development. The objective was focused on carrying out medium-term development plans, which made it a stage of plans, as it was characterized by increased state intervention in all aspects of economic life to ensure the organization of economic and social life.

The process of real planning for development in Algeria began with the first tripartite plan for the year 1967-1969, which aimed to bring about harmony and adaptation between the social, economic and administrative structures of the country by preparing the material and human means to accomplish the future plans, where preference was given to the basic structures of industries and hydrocarbons including the establishment of heavy industries and focusing on the fuel sector at the expense of the rest of the other economic sectors, with the almost total neglect of the private sector, whose contributions decreased e in investment from 45% in 1967 to 5.04% in 1978 (Sali, 2016).

During this period, Algeria witnessed three development plans: the tripartite plan (1967-1979), the first four-year plan (1970-1973), and the second four-year plan (1974-1977). This was followed by a complementary phase (1978-1979) during which the rest of the projects were completed.

3.1.2.1 The Three-Year Plan 1967-1969

This plan is considered as a first start for the coming development plans that Algeria has known, and it relied on industrialization as a necessary basis for development, since planning at this stage was characterized by two characteristics: the orientation towards

medium-term plans and the increasing volume of actual investments in various sectors as an attempt to advance them in view of the widening period of implementation of the plan and the increase in the material capabilities of society. The interest was in developing the industrial sector to cope with various sectors such as agriculture and services. An amount of 11.081 billion DZD has been allocated as an investment in this plan, but what has been employed during this stage amounted to only 9.124 billion DZD, with an implementation rate of 82% (Sali, 2016).

The largest share of investments in the industrial sector was the share of the fuel sector at a rate of 41%, with an amount of investments amounting to 2.205 billion DZD (Sali, 2016), which is the direction that the Algerian economy followed to collect revenues. Which is still the main resource to this day, followed by the iron and steel sector and the manufacturing industries sector, with close rates of 22% and 20%, respectively, of the total investments allocated to the industrial sector, which are percentages that remain high compared to the remaining other sectors that have lower percentages. It reaches 10%, and this is what Algeria has focused on in the field of industrialization, relying on the establishment of basic industries, including the iron and steel industry, whose returns are achieved in the long term (Boukaroun, 1991).

3.1.2.2 The First Quadrilateral Plan 1970-1973

With the beginning of the year 1970 and the end of the experimental phase of the planning system, which was represented in the three-year plan for development, where the priorities for economic and social development were identified and the foundations for the state's policy towards it were laid by supporting the socialist economy, the second phase of the medium-term plans was entered, according to specific priorities. The state worked on its

development and support in order to achieve real independence in its various aspects by relying on the means of planning and distributing investments to various sectors (Adamson, 2005).

The state has relied on the socialist management of economic public enterprises, which was defined by the legal text of Ordinance No. 71/74 of November 1971 (Sali, 2016), which confirms the state's control over aspects of economic life, through the state's representation of public institutions of a national form, as well as various public institutions of a local and regional nature and various national offices. The state has adopted this pattern of management to improve the social conditions of the people by focusing on creating job positions, eliminating unemployment, achieving cooperation between individuals and promoting productive relations. These public institutions have worked on subordination in Implementation of general economic policy.

The plan was built on different objectives. First, the government aimed to build a socialite state while destroying all social and economic remnants of the colonizer. Increasing the volume of investment in different sectors was another important objective. Also, reducing unemployment rates through the process of industrialization. Hence, the allocated finances for this plan had been larger than that of the previous one where they reached 27.740 billion DZD distributed over various sectors with industry taking the biggest share. The largest percentage of investments in the industrial sector remained in the share of fuels, at an estimated rate of 36%, but with an amount of money estimated to be double compared to what was allocated to this sector in the three-year plan (1967-1969) (Sali, 2016).

3.1.2.3 The Second Quadruple Plan 1974-1977

This plan is the third development plan prepared by Algeria since independence, and it is considered as a blueprint for economic and social development in light of the long-term prospects and the lessons learned from the implementation of the first quadruple plan, as the state relied in its economic orientations and policy to achieve development on the productive sector, with priority given to the industrial sector followed by the industrial sector. The volume of investments allocated for this scheme was estimated at more than 110 billion DZD, an increase of 12 times over the three-year scheme and an increase of four times over the four-year scheme. The first, as it was expected to achieve a tangible increase in the gross national product by no less than 46% during this plan, which means an annual increase in development estimated at 10% (Sali, 2016).

This plan has prioritized strengthening the infrastructure and improving the social and economic conditions. This was possible due to the positive results achieved through the previous two plans. The most important directions and objectives of this plan are summarized as follows (Sali, 2016):

- Strengthening economic independence and building a socialist economy by increasing production and expanding development throughout the national territory within the framework of the overall development plan.
- Raising the gross domestic product by the end of the projected four-year period by at least 46%, i.e., an increase of 10% annually.

- Strengthening the planning system in order to be able to increase the production capacities; improve the management organization of the production bases and set a price system and a national wage schedule.

This plan also witnessed the continuation of the development of the agricultural sector and the support of the agricultural revolution by trying to address the imbalances that the sector experienced, by setting up an organizational structure for the agricultural revolution to meet the emerging needs.

The largest percentage of private investments in the industrial sector belongs to the hydrocarbons branch, with an estimated rate of 40.63%, which is a significant percentage given that the largest share of the total investments in the plan was allocated to the industrial sector as the main financer of development, and to continue on the same approach adopted in the previous plans (Sali, 2016).

During the period of the second quadruple plan, the National Charter was issued in 1976, whereby the development strategy was based on the industrial sector, in addition to addressing the agricultural sector, which had previously been reformed in the Charter of the Agricultural Revolution of 1971, as it was mentioned in the National Charter of 1976 to talk about Industry that relies on advanced technology, which is one of the most important conditions necessary to ensure industrial independence.

Furthermore, the charter allotted great importance for the development of the private sector, while it worked to remove some of the ambiguity that was in previous charters, by giving a vision of private ownership in Algeria, where it deliberately divided it into two types, namely, independent and non-independent. The non-independent private ownership included everything related to individual and family use, as well as the use of means of

production and services that play a beneficial role in the development of the economy, which makes it remain pertaining to a group of socially beneficial activities such as traditional industries, retail trade, and small ownership of the farmer or livestock breeder.

3.1.2.4 The Complementary Stage 1978-1979

This stage is considered as the transitional stage through which the remainder of the second quadruple plan was completed. It was characterized by investment programs characterized by some characteristics, namely (Sali, 2016):

• The large volume of investments remaining to be completed from the second quarter plan, estimated at 190.07 billion DZD.

• establishment of new investment programs to meet the new requirements of development.

• Most of the programs were re-evaluated due to changes in prices resulting from the international crisis. The total amount of registered and revalued investments during the year 1978 amounted to 52.65 billion DA, while in 1979 its financial achievements amounted to 53.32 billion DA out of the total financial license estimated at 64.77 billion DA (Sali,2016).

3.1.3 The Third Stage: The Decentralized Economic Planning 1980-1989

The eighties witnessed several transformations in several areas for the Algerian state, including the economic reforms that had been launched during the end of the sixties of the last century through the development plans that were previously mentioned, which necessitated the elimination of the shortcomings recorded during the implementation of these plans in order to be avoided by future programs and reforms through the evaluation of all existing means of production, giving priority to self-capabilities, and obliging those

in charge to apply laws to ensure control over the completion of projects. Therefore, it was necessary to change the approved management plan, which was based on centralized management and planning to a policy of decentralization of development plans in order to facilitate the process of monitoring its projects and avoid delays in completion with the objective of reducing dependence on foreign forces, achieve economic integration, control decision-making and lead investments (Laframboise et al., 1998).

In terms of development planning, this stage was defined by two five-year plans: the first five-year plan (1980-1984) and the second five-year plan (1985-1989), in addition to the organic and financial restructuring of the public corporation, and the issuance of the third investment law in 1982, which came in accordance to the global economic situation and the country's economic and social environment to right the imbalances resulting from the seventies, where the focus was on re-evaluation of the economy through the implementation of a number of reforms in order to get out of the difficult situation that the national economy knew.

Algeria has reconsidered investment methods that gave priority to the industrial and hydrocarbon sectors at the expense of other economic activities, especially since the signs of an economic and social crisis were emerging, which had a role in accelerating the adoption of various measures in order to reform the status quo, and to reconsider development strategy and the coming economic directions.

3.1.3.1 The First Five-Year Plan 1980-1984

The first five-year plan, which was at the beginning of the eighties, set goals which sought to bring about changes and reforms in the national economy, with a focus and attention to

the social aspect, in an attempt to rectify the delay recorded in the fields of agriculture, housing, irrigation, and economic and social structures. In this regard, the objective involved the need for a rapid answer for basic needs accompanied with the shift from investment to expansion of consumption to achieve a better life standard. Also, the need to reduce dependence on foreign countries in relation to technology, finance and supply. In addition, the government attempted to mitigate the dependence on hydrocarbons revenues which resulted in a turn towards diversification of exports (Sali, 2016).

The first five-year plan focused on improving the performance of the agricultural sector and modernizing work methods to increase production and land reclamation. The plan deliberately reduced industrial investments in arable areas in order to preserve fertile lands. In addition, this plan sought to support the industries that enhanced the means of agricultural production, such as agricultural equipment and irrigation equipment, to raise the rate of productivity and develop the economic and social infrastructure (highways, training, housing, education, etc.) and try to satisfy the consumer needs of families such as foodstuffs, pharmacies and household equipment. Within the framework of this plan, Algeria carried out several economic reforms, including the restructuring of public institutions in order to enable the public sector to overcome its problems that impede its production and reach a self-financial balance for institutions. The plan also called for the need to control the deadlines and costs of completing investment projects, and the introduction of production plans at the level of public institutions in order to improve the use of the national productive system. This plan also was concerned with satisfying the primary needs of the population in terms of employment, education, housing and health, and cared about improving their living standards and adopting a demographic policy that is

in line with the requirements of society. Moreover, new measures were taken during this period that allow the participation of foreign capital in achieving the development strategy within the framework of various companies. Investment, in this plan, obtained what amounted to 550.50 billion DZD where the largest part was allotted to the industrial sector, especially the hydrocarbons sector with 78 billion DZD (Sali, 2016).

The real beginning of the reforms that the state intended to carry out was associated with the first five-year plan, which carried a new vision of how to develop and reform the national economy, especially with regard to public institutions. Considering negative results achieved by national companies under the centralized management system that was adopted, it made the decision makers realize that it was impossible to operate large-sized national institutions which called for the need for allowing the private sector and foreign investment to compete with the public sector.

3.1.3.2 The Second Five-Year Plan 1985-1989

This plan is considered an extension of the previous one, and it is also an important stage in the economic and social development stages in the country. Its objectives included orienting the national market and giving it importance as a base for economic development in the medium term. Second, giving importance to self-financing of investments by institutions to reduce their dependence on state loans to finance their investments. In addition, reducing inflation was one of the most important objectives and encouraging savings by curbing family consumption, which has developed very quickly in recent years more than production, plus creating one million new jobs. Third, it was essential to reduce the costs and deadlines for completing projects in all sectors.

With regard to investments during this stage, the second five-year plan has allocated 550 billion DZD as investments, which will allow for greater efficiency of the production system in general and the realization of investments in particular (Adamson, 2005). The investment program approved with a tight flow of investments in its various stages, in order to make the necessary adjustments within the framework of the annual plans according to the development of international economic conditions and the real expansion of external resources and the development that will take place in the field of productivity and effectiveness of the production system so that 55% of the expenditures will be allocated to finish the programs being implemented until 1984 (Sali, 2016) .

During this period, Algeria witnessed several tremors that affected the good course of what was planned, as oil prices witnessed a significant drop in their value by a rate ranging between 60 to 70%, which constituted a painful and violent blow to the economy, which became helpless due to the shrinking of its revenues from foreign currency and thus the difficulty of financing the development programs that were under control, and it can be seen with regard to the direction of investments that they went to industries other than hydrocarbons (Sali, 2016).

The second five-year plan (1985-1989) is considered ambitious in its objectives and investment programs due to its interest in organizing, managing, and addressing the imbalance between demand and supply in consumer products, regional balance - regional development - and integration between economic sectors, giving it priority to organizing the national economy, developing the agricultural and irrigation sector, and reducing dependence Abroad, while strengthening the policy of decentralization and directing investments to develop the economic and social infrastructure, especially in the regions of

the high plateaus and the south. Despite the financial funds allocated to this program, it was unable to achieve its goals, as its actual investments amounted to about 370.5 billion DZD, and this is due to financial resources. Whereas, starting in 1986, it was no longer possible to continue financing development projects of the previous size.

The large deficit that affected the state treasury led to the issuance of a cash block for free in order to finance the budget deficit, which confirmed the weakness of the banking system and its inability to carry out its tasks of collecting savings, controlling the exchange rate and the import system, which led to the emergence and expansion of a parallel market for hard currency, In addition to the large deficit that the country witnessed in the balance of payments as a result of the increase in external debt, and in the face of these conditions, the state had to find solutions to eliminate this crisis and mitigate its severity, as it began to engage in a reform program aimed at restoring the consideration of the institution as an economic factor that enjoys complete independence, and to put in place mechanisms Legislative legislation that enables the state to devote its role as a public authority and a strategic regulator, and therefore it was necessary for Algeria to move from a centrally planned economy to a market economy, which became inevitable.

3.2 THE ALGERIAN ECONOMY SINCE THE TRANSITION TO A MARKET ECONOMY.

After the independence, Algeria adopted the socialist approach in order to protect the national economy and gradually liberate it from dependence on the one hand, and to support the achievement of economic independence on the other hand. Thanks to planning, Algeria was able to establish an industrial base that helped it move from a traditional economy to a

modern one. These results indicate a significant decline in the growth of the Algerian economy due to the economic crisis and the sharp drop in oil prices in 1986, hence the downside of overreliance on the oil revenues, which makes Algeria, essentially, a rentier economy that depends on external factors in the reproduction of its economic system (Sali, 2016).

The poor situation in which the Algerian economy was found prompted the authorities to adopt a series of legislation and laws since 1988 to accelerate the process of educational reform and get out of the critical situation that the level of economic performance reached, which accelerated the pace of reforms with the aim of entering into a market economy that is supposed to be established at the beginning 1991.

3.2.1 The Factors Prompting The Transition of the Algerian Economy towards a Market Economy

The transition toward a market economy was an inevitable choice for the Algerian economy. The choice was prompted by different external and internal reasons.

3.2.1.1 The Internal Reasons

There are several internal factors related to the national economy that were behind the shift to a new economic orientation. The first was present in the high rate of inflation which reached 30 and unemployment also rose to 25%. In addition, the state budget witnessed a permanent imbalance that was a result of the imbalances known in the public sector institutions. The absorption of approximately 4/5 of the export revenues by a productive system that operates at only 50% of the gross domestic product (GDP). These elements represent some of the obstacles that prevented the launch of the national economy

in appropriate circumstances and conditions. They also give an idea of the conditions that must be applied in order for the national economy to return to balance and to provide firm and continuous bases for the expected economic launch.

3.2.1.2 The External Reasons

The international environment in which Algeria lived at the time was one of the most important influences that prompted it to change towards a new economic system, in addition to the collapse of the Soviet Union, which was the leader of the communist camp. This led the world to walk forcefully under a unipolar pole in the leadership of The United States of America as the most powerful economic and military power capable in the world. The international economic institutions, namely the International Monetary Fund (IMF), the World Bank and the World Trade Organization (WTO) sought to impose financial restrictions on Algeria, especially after the oil crisis that it suffered during the eighties, so that the revenues of the trade balance collapsed from hydrocarbon exports, which constituted the main source of about 97% of foreign currency, that is, revenues decreased from more than 63 billion DZD in 1985 to less than 36 billion DZD in 1986, and it has become necessary, then, to apply the principle of self-reliance by assigning the task to the private sector, which would guarantee a more effective and efficient economy. Economic freedom is also considered among the pillars of the market economy, which can be explained by the individual's freedom of will to practice economic activities without the intervention of the state, whether in terms of production, investing money in projects or expanding them. Another one of the important pillars of market economy is the freedom of prices where the market is organized by the laws of supply and demand.

3.2.2 The Process of the Transition towards Market Economy

Transitioning from socialism to a market economy is a process that requires taking several measures within a program called the transitional phase which consists of building market economy mechanisms (Sali, 2016). The program focused on several key principles which involved:

- Economic freedom and the decline of the role of the state.
- Institutional reforms.
- Openness to the outside world.
- Restructuring the public sector and privatization.
- Reforming the financial and monetary system.
- Promotion and encouragement of the private sector.
- Liberalizing prices and establishing a labor market.

3.2.3 The Development of the Algerian Economy during the Nineties.

To consolidate the transition of the Algerian economy from an administrative economy to an economy driven by market rules, three successive set of economic reforms were initiated. The first set was in 1988, the second in 1991, and the third in 1994. These allowed for the launch of the reforms even before the execution of the legal framework and even before signing the contracts with the IMF. The government started to devaluate the dinar in an undisclosed manner where the official value of the dinar declined between 1987 and 1991.

The oil shock in 1986 was sufficient to highlight all the weaknesses in the central planned system, and when the revenues of Algerian exports of hydrocarbons decreased to 50%, the authorities started implementing many measures to achieve economic stability and structural reforms, as they adopted a corrective program in order to gradually decentralize the process. Decision-making and the development of market mechanisms on the one hand, and on the other hand, correcting imbalances from the state's finances resulting from the previous period in light of the central economy ((Laframboise et al., 1998). The second set of reforms began in April 1991 with the signing of the agreement with the International Monetary Fund, which stipulated, in return for the granted loans, measures to deepen the economic reforms that had been initiated including decrees organizing investments and expanding the legal forms of companies while reviewing the commercial law. Inflation rate was among the concerns of the second set of reforms where the government took measures to reduce the high rate.

In order to face the dangers resulting from the deterioration of the economic, social and financial situation, a four-year economic and financial program was prepared starting from 1994 to restore internal and external financial balances and to create the necessary conditions for solid and sustainable economic growth. This was represented in the third set of economic reforms. Another crush of oil prices in 1993 engendered more economic troubles for the government. The price of the barrel fell from $20 in 1993 to $14.2 in 1994. In addition, it was accompanied with accumulating external debts, all factors that gave birth to the financial and economic crisis. In order to relieve its pressure, the authorities, in agreement with the International Monetary Fund, agreed to an economic stability program 1994-1995 and concluded a "Stand-by" compliance agreement with it in April 1994, in the

form of a structural adjustment program to be implemented through an economic stability program that lasts for one year. This would be followed by a three-year structural adjustment program, during which the focus will be on restoring internal and external balances with the help of successive loans from the International Monetary Fund and the World Bank. Several measures have been taken in this regard (Sali, 2016):

- Adjusting the general agreement and tightening monetary policy to contain aggregate demand and achieve internal and external balance with the passage of time.
- Reducing the immediate pressures resulting from the high burden of external debt by rescheduling more than $17 billion over the four years of the program.
- Adjusting relative prices, liberalizing foreign trade, and reducing customs duties from 60% to less than 50%, and from 50% to 45%. Furthermore, the government devaluated the currency by 17.40% in April 1994, and then adjusted the value of the convertible dinar into foreign currencies, as the exchange rate of 01 dollars became equal to 36 dinars.
- Removing interest rate caps on loans from commercial loans to the public.
- Reducing the budget deficit to 3.3% of the gross domestic product.
- Stabilizing the mass of public sector workers' wages, controlling government transfers, abandoning the treasury from public sector investments, and opening the way for bank financing.
- The use of mechanisms that allow the transition to a market economy and the initiation of structural reforms for institutions and exempting them from paying debts to the treasury.

- Reforming the social security network and introducing some amendments to it in 1992 to counter the negative social effects

Algeria obtained a loan of 1037 million dollars, equivalent to 731.5 DTS. This loan was divided into two parts, the first part, which amounted to 389 DTS, was received immediately after the conclusion of the agreement, and the rest was agreed to be received during the year in the form of payments.

Among the results reached after applying the procedures that have been discussed, we mention the following:

- Liberated prices amounted to 85%, while transportation and postal rates were raised by 20% to 30%.
- Curbing the inflation rate to 29.05%.
- Reducing the budget deficit in 1994 to 5.7% of the gross domestic product.
- The stock of foreign currencies increased by 1.5 billion dollars at the end of 1994, and thus the total stock reached 2.6 billion dollars.
- Reducing the value of the dinar from 23.4 DZD per dollar to 35.1 DZD per dollar (Sali, 2016).

This agreement with the International Monetary Fund gave a positive indication to the creditors, as it was agreed to reschedule the debts signed in 1994, and the repayment period was set at 16 years within the framework of the Paris Club, which enabled Algeria after that to conclude 17 bilateral agreements. In general, the economic stability program, which was implemented under the technical and financial supervision of state institutions, means creating the conditions for initiating another series of structural reforms related to

the performance and effectiveness of the productive apparatus, as well as the continuation of international financial institutions to support the structural adjustment program financially and technically in a way that allows the concerned country to benefit from technical assistance. As well as the facilities for drawing on the resources of the Fund and the Bank through the signed facility agreement.

3.2.4 Structural Adjustment Program May 1995 - May 1998

After the end of the economic stabilization program, the Algerian authorities sent a letter of intent on March 30, 1995 to the Director General of the International Monetary Fund for the purpose of supporting the development policies that Algeria intends to implement, asking him for a financial contribution from the Fund. The Algerian authorities concluded an agreement in May 1995 with the Fund International Monetary Fund within the framework of the structural adjustment program for a period of 03 years within the scope of the expanded mechanism of the loan.

According to this agreement, an amount of money estimated at 1.169 million DTS units was obtained, equivalent to 127.9% of Algeria's share in the fund, and according to the fund's board of directors' approval of Algeria's request, it will ask the member states of the Paris Club and the London Club to reschedule. Its receivables related to the external debt service, which are due to be paid during the term of the agreement, and on this basis, Algeria concluded in July 1995 an additional agreement to reschedule the debts payment between 06/01/1995 and 05/31/1998, in addition to the interest payment between 01/01 06/1995 and 31/05/1996, and these amounts are scheduled to be paid in 25 semi-annual instalments that are gradually increasing starting from 30/11/1999 and continuing until the year 2011 (Sali, 2016).

This program was the embodiment of the measures taken to revive the national economy and the transition to a market economy. The objectives of these reforms have focused on achieving economic stability and maintaining the level of permanent employment, in addition to continuing the process of deepening structural reforms of industrial enterprises and starting the privatization of part of public enterprises and continuing to liberalize the economy (Boukaroun, 1991). And work to ensure the necessary protection for the groups affected by these reforms. During this period, several measures were taken, including:

- Dissolution, reorganization and even financial cleansing of public institutions, and then privatization of some of them.
- Establishing an export insurance company in order to diversify and upgrade it.
- Establishing private banks with local or mixed capital, or branches of foreign banks.
- Establishing the Stock Exchange of Transferable Values to support the privatization of public institutions.

And through the policy adopted by the Algerian government starting in the year 1995, which led to the emergence of successive surpluses in relation to the budget, where an annual rate was estimated at 4%, with an expectation of an average growth rate equal to 5% in the period 1997-2000, as the expectations proved to achieve a surplus in the trade balance since 1998, and this is due to the measures that were taken in this regard, as the revenues witnessed a remarkable improvement between 1995 and 1997, and this was due to the improvement in oil prices, in addition to the application of value-added tax on petroleum products. As for non-oil revenues, they remained almost stable. Furthermore, with regard

to expenditures, they witnessed a noticeable decrease due to the austerity policy pursued by the state at the time, in addition to the abolition of subsidies on prices and the freezing of the employment process.

Algeria has completed the various stages of implementing its agreement with the International Monetary Fund during the year 1998 (Laframboise et al., 1998), and it was found through the evaluation process carried out by the country that a number of positive results were recorded at the level of macroeconomic balances, including:

• The decline in the inflation rate to 06% in 1997 after it was 39% in 1994. This decline continued in the following years to reach 02% in 1999 and 2000.

• Increasing the exchange reserve from 1.5 billion dollars in 1993 to 2.1 billion dollars in 1995, then 08 billion dollars by the end of 1997, which is equivalent to nine months of imports.

• A decline in the foreign debt service ratio from 83% in 1993 to 30% in 1997, then to 28% in 2000.

• The return of the gross domestic product, which declined by 02% in 1993, to an increase, as it recorded a growth rate estimated at 04% in the years 1995 and 1996, and more than 4.2% in the following years until the year 2000.

In addition to these positive results, the economy has become more and more organized according to the rules of the market economy, and prices have become determined according to the laws of supply and demand, and price control and generalized subsidization of commodities have been abandoned, and the state has abandoned production and commercial activities through the issuance of the Commercial Capital Management

Law For the state, and thus the separation between the state as a public power and the state as a shareholder was established, and this meant applying the same law to public economic institutions as it is applied to private sector institutions. The public economy, and the encouragements granted to the private sector increased through the issuance of the investment law and its advantages, as well as the privatization law and the competition law (Boukaroun, 1991).

3.3 ECONOMIC GROWTH INITIATIVES IN ALGERIA 2000-2019

After the structural adjustment programs implemented by Algeria during the nineties, specifically after 1998, the Algerian economy witnessed remarkable growth in various sectors, due to the efforts made by the state in order to achieve growth and advance development, and to improve the security situation that would help enhance investments. It also witnessed relative success in controlling financial and monetary balances on a macroeconomic level, which prompted the Vice-President of the World Bank at the end of March of 2001 to acknowledge that the Algerian economy carries positive indicators, including an increase in real GDP rate from 4.5% in the two years 1998 and 1999 to 6.2% in 2000, also, studies indicated an increase in the value of total exports to 10.8% in mid-2000, to drop to 9.4% in 2001.

The Algerian state has prepared an ambitious program for the advancement of the national economy based on the amendments that take place from time to time in economic legislation in line with international and national developments, the most important of which are those reforms that affected the investment law and the privatization law amended in August 2001 by order 01-03 and 01-04 respectively. As the investment law focused on

providing an appropriate climate with more effective mechanisms for developing investment and raising the competitive capabilities of national institutions, and it did not distinguish between the public sector and the private sector, in addition to distinguishing it from the previous investment law with those previously mentioned characteristics, it provided many incentives for investors with the aim of motivating and attracting foreign investment to Algeria.

3.3.1 The Development Programs 2001-2014

Algeria has sought, through the efforts that have been made, to raise the rate of economic growth by increasing the volume of government investment spending (Sali, 2016), as these policies have been embodied through the implementation of three development programs represented as follows:

- The Economic Recovery Support Program: It was implemented in the period 2001-2004, and a total amount of 525 billion DZD was allocated for it, which is equivalent to 07 billion US dollars.
- The Complementary Program to Support Economic Growth: This program was implemented during the period 2005-2009 and a financial amount of US$ 150 billion was allocated for it, which is a significant amount compared to the previous program.
- The five-year program 2010-2014: which is considered one of the largest development programs applied in Algeria since independence, given the amount of money allocated to it, which amounted to 286 billion US dollars.

3.3.1.1 Economic Recovery Program (2001-2004):

The economic recovery support scheme that was approved in April 2001 consists of financial allocations distributed over the length of the program's period in varying proportions, with a total value of about 525 billion DZD, which is equivalent to 07 billion US dollars. 129 billion DZD has been allocated for local development and 90 billion for human development, which makes it a huge program compared to the exchange reserves recorded before its approval in 2000, which was estimated at 11.9 billion dollars (Sali, 2016).

This plan came within the framework of the fiscal policy that Algeria began to pursue in the form of an expansion of public spending accompanied with an improvement in its financial position in order to revitalize the national economy.

3.3.1.2 The Reasons for Implementing the Economic Recovery Policy

Several reasons have had led the government to pursue the implementation of the economic recovery policy.

- **Weak economic growth rate**: The economic crisis that Algeria witnessed starting in 1986 affected the economic growth rates, which were as the average GDP growth rate during the period 1987-1994 was 0.5%, which prompted the government to apply Reform policy with the help of the International Monetary Fund.
- **Recording an average negative growth rate in the agriculture and agriculture sectors**: it was estimated at -1.15% and -1.57%, respectively and this negatively affected the rate of utilization of production capacities in this sector.

- **High unemployment rates**: which coincided with the economic crisis that Algeria experienced in 1986, as the rate increased from 9.7% in 1985 to 21.4% in 1987, an increase of 11.7 percentage points. Then, this percentage witnessed a slight decline in 1989, when the unemployment rate reached 18.1%, and starting in 1990, the unemployment rate witnessed a steady development until it reached its highest rate since independence, which was estimated at 29.8% in 2000.

3.3.1.3 The Objectives of the Economic Recovery Support Policy:

The Economic Recovery Support Scheme aims to achieve three final main objectives which consisted of reducing poverty and improving the standard of living, creating jobs and reducing unemployment and supporting regional balance and revitalizing rural spaces. Furthermore, achieving these main goals is through intermediate goals that are considered as channels that enable reaching the aforementioned goals (Sali, 2016), which are:

- Activating aggregate demand, and in this is a shift of economic policy in the neoclassical nature that brought the programs of the International Monetary Fund to the Keynesian thought that focuses on stimulating aggregate demand through fiscal policy to stimulate the economy, especially through public spending that increases its effectiveness in raising economic growth rates and creating jobs.
- Supporting agricultural investments and small and medium enterprises, based on their being establishments that directly produce added value and jobs.
- Preparing and completing basic structures that allow the revival of economic activity and cover the basic needs of the population, which will positively affect the development of human resources.

3.3.1.4 The Content of the Economic Recovery Support Plan:

The economic recovery support plan extending over the period 2001-2004 is mainly centered around strengthening activities related to agricultural production and fishing, construction and public works, supporting reforms in various sectors as well as those related to local and human development. The largest amount of the total amount allocated for this scheme has been allocated to strengthening public administration and improve the quality of life with a total amount of 210.5 billion DZD, which represents 38.22% of the total amount allocated for the scheme, and this means paying attention to the administrative aspect and supporting the social aspect. This step was necessary because of the crises left by the previous programs, as the regional structural system received an amount of 142.9 billion DZD, while the revitalization of the mountainous rural areas that suffered from m²flight during the security crisis years, in addition to the highlands and oases, where An amount of 67.6 billion DA has been allocated, and great importance has been given to local development, support for productive activities and the development of human resources, as an amount of 129 billion DA, 74.5 billion DA and 90.28 billion DA has been allocated to them, respectively (Sali, 2016).

The local and human development sector also gained a significant percentage, amounting to 38.9 of the total amount allocated for the plan over four years, which is an indication of the pursuit of regional balance between the regions of the country and the improvement of the citizen's living framework, and the support of human resources will lead to an increase in human development rates And thus reducing the poverty rate in society, and compared to the four years, during the following two years it gained significant shares compared to the last two years.

In general, it can be said that the year 2001 has acquired, in total, the largest amount of money compared to other years of the economic recovery support scheme, as its share was estimated at 205.4 billion DZD, so that this amount began to decrease from year to year, which indicates the government's determination to implement the contents of this program in the least possible time for the purpose of improving social and economic conditions.

3.3.2 Supplementary Program to Support Economic Growth 2005-2009

This program came within the framework of continuing the pace of programs and projects that were initiated and implemented within the framework of the economic recovery support plan 2001-2004, which was characterized by an intensive recovery of economic development and an improvement in the security situation, in addition to an improvement in the financial situation after the rise recorded in the price of Algerian oil, which reached in 2004, the value amounted to 38.5 dollars per barrel, which resulted in the accumulation of exchange reserves, which reached a financial amount of 43.1 billion DA in the same year, with a continuous growth of an average of 3.8% throughout the years of the program, in addition to a decline in the unemployment rate from 29% to 24%, as well as the completion of thousands of basic facilities (Sali, 2016).

3.3.2.1 Objectives of the Supplementary Program to Support Economic Growth

The supplementary program to support economic growth came to achieve a number of objectives, including:

- **Modernization and expansion of public services:** As what Algeria went through during the nineties, whether it was the political crisis or the economic crisis, negatively

affected the type and size of public services in a way that made modernizing and expanding them an urgent necessity in order to improve the living framework on the one hand, and as a complement to the activity of the private sector in the path to prosperity of the national economy on the other hand.

- **Improving the standard of living of individuals:** by improving the aspects affecting the lifestyle of individuals, whether it is the health, security or educational aspect.
- **Developing human resources and infrastructure:** This is due to the role played by both human resources and infrastructure in developing economic activity, as human resources are considered one of the most important economic resources at the present time, and infrastructure has an important role in developing productive activity, especially in supporting The productivity of the private sector by facilitating the process of transportation and the transfer of goods, services and production factors.

3.3.2.2 Content of the Supplementary Program to Support Economic Growth

The supplementary program to support economic growth is an important program in view of the amount of money allocated to it, which is the largest ever compared to previous programs, as it was estimated at 4202.7 billion Algerian dinars. High plateaus with a value of 668 billion DZD, in addition to the remaining resources from the economic recovery support scheme estimated at 1071 billion DZD, additional funds estimated at 1191 billion DZD and transfers to treasury accounts worth 1140 billion DZD (Adel et al., 2016).

The local and human development sector has benefited from the largest share in this program with a financial amount of 1908.5 billion DZD, which represents 45.5% of the total amount. It was set as a goal to complete one million housing units to reach 1.65 million

housing units, an increase of 65% was recorded for the benefit of the decisions of the President of the Republic, and the number of completed housing units during the period 2005-2009 reached 326,912 housing, an estimated rate of 91.2% of what was planned. In the program, bringing the number of housing units completed on 12/31/2010 to 1.048 million units, 42% of which fall within the framework of rural housing and 58% of which fall under urban housing (Adel et al., 2016).

With regard to the infrastructure program, which receives an estimated rate of 40.5%, which is equivalent to 1703.1 billion DZD of the total amount, as this amount covers more than 18 thousand completion operations that have witnessed remarkable progress, and during this program, 67 369 km of the road network were restored and developed in addition to building 1,250 technical facilities.

With regard to economic development support programs, the agriculture and rural development sector received the lion's share of the amount of money allocated to economic development support programs at an amount estimated at 300 billion DZD, in order to push the agricultural sector in order to improve national production and contribute to the development of local products to reduce the import bill of foodstuffs in particular.

With regard to public service development programs, the percentage allocated to them was estimated at 4.8% of the total amount allocated to the five-year program, equivalent to 203.9 billion DZD, which was directed to both the Ministry of Interior and the Justice Ministry, as those responsible for public services to a greater degree, with an amount of 99 billion DZD. Finance and trade sector at 67 billion DZD.

As for the program for the development of modern technology for information and communication, an amount of 50 billion dinars has been allocated for it out of the total amount allocated for the five-year program (2005-2009).

In general, the Algerian state was able to get out of the circle of economic stagnation since 2002, based on an increase in public expenditures, especially in the field of equipment, in addition to reducing the phenomenon of unemployment through the employment policies that the state pursued depending on different formulas and programs.

3.3.3 Program for Consolidating Economic Growth during the Five-Year period 2010-2014

It is also called the second five-year plan, and it was an attempt to reach the sustainability of national food security through a strategy that is considered the focus of this policy. It was adopted to continue the process of economic and social development that was initiated in the aforementioned programs, where a very large amount of money was allocated which amounted to 21 214 billion DZD Which is equivalent to 286 billion DZD. It included the programs being implemented, for which an amount of 9,680 billion DZD had been allocated to support them, which is equivalent to 130 billion dollars, and the development of a new program during the next five years with a financial amount of 11,534 DZD, which is equivalent to 155 billion dollars (Adel et al., 2016; Meres, 2015). Among the most important objectives that the program was seeking to achieve are:

- Improving the average growth rate of agricultural production from 06% during the period (2000-2008) to 8.33% during the years of implementation of this program.
- Increasing national production and improving its various types.

- Supporting sustainable development and regional balances and improving the living conditions of the population in rural areas, in addition to protecting more than 8.2 million hectares of soil.
- The sustainable management of industrial machinery and the improvement of agricultural-industrial integration.
- Creating 750,000 permanent jobs.

3.3.3.1 Measures Taken to Control Government Spending Within the Five-Year Program 2010-2014

A number of arrangements had been put in place in order to rationalize government spending and to strengthen the fight against acts of infringement of public property. Therefore, among the objectives for which this program was established are as follows (Adel et al., 2016):

- **Containing the cost of the five-year program within the specified amounts:** so that no approved program can be implemented unless its studies are completed and the real estate base is not available for its completion.
- **Accelerating the mobilization of real estate funds required for the implementation of public equipment programs:** this is done while preserving good agricultural lands, and a committee has been formed to decide on the deduction of the necessary real estate after conducting a field investigation.
- **Ensuring the acceleration of conducting transactions, as well as respecting procedures in the field of public expenditures:** the Transactions Committee has been

activated by branching into more than one branch, and the role of financial controllers has been strengthened in the field of pre and post control.

- **Enhancing study and achievement tools:** by encouraging investment in these two fields.
- **Preventing and suppressing acts of prejudice to public funds:** This is done by expanding the supervision of the General Inspectorate of Finance and the Court of Auditors to public institutions in order to strengthen anti-corruption measures.

3.3.4 Growth Consolidation Program 2015-2019

This program is considered a continuation of the previous development programs, as this program covers public investment operations registered during the period 2015-2019, as a fund was established to manage registered public investment operations under the title of the Economic Growth Consolidation Program 2015-2019, which allocated the amount of 6.4079 billion DZD 2015, and an amount of 2.1894 billion DZD in 2016, in which the basic economic and administrative facilities got the largest share (Kadari, 2022) . This program aimed to achieve the following objectives (Ben Mohamed, 2020):

- Preserving social gains by giving priority to improving the living conditions of the population in the sectors of housing, education, training, and public health, and connecting homes to water, electricity, and gas networks...etc.; rationalizing social transfers and supporting the disadvantaged working classes.
- Paying more attention to economic diversification and achieving export growth outside the hydrocarbon sector; Paying attention to agricultural and rural development, due to its contribution to food security and diversification.

- Job creation; continue the effort to combat unemployment and encourage productive investment that creates wealth and job positions.
- Paying special attention to the training and quality of human resources by encouraging and promoting the training of qualified personnel and manpower.

Through the five-year growth program 2015-2019 (Hedi Mohamed, 2019), the government aims to achieve an annual growth rate of 7% in order to reduce unemployment and improve the living conditions of citizens. However, the period witnessed a decline in oil prices during the year 2014 and the continuation of its downward trend during the subsequent years led to a decrease in the state's domestic and foreign revenues. Therefore, the internal public debt continued to rise, and the gradual resort to external debt increased as well in the medium and long term in the event of the continuation of the crisis, and the withdrawal from the revenue control fund, whose revenues began to decrease, also increased (Ben Mohamed, 2020). All factors that were bound to inevitably affect the financing of public development and investment programs in the five-year plan 2015-2019. Accordingly, the implementation of this program came in very difficult financial conditions that the country is going through and the government had to cease the program in 2016 (Bouketir & Mecheri, 2019). This led to the freezing of all operations that have not been launched and that are not necessities except for those operations of utmost importance. The government has decided to close all privatization funds that were established for the purpose of managing and guiding public investment projects, and to make them within one fund, which guarantees the government abandoning the multiplicity of funds, in the context of its policies. As a result, a rationalization of public spending was adopted by the government as a strategy due to the decline in state revenues.

In general, we can say that the sectoral distribution of the aforementioned programs reflects the state's desire to target the most important sectors that directly affect economic growth rates and employment levels in order to improve its economic situation, in addition to supporting social development. In addition, Algeria allocated huge sums of money for these development programs, through which it aimed at advancing the national economy to improve the livelihood of individuals, reduce poverty and unemployment, and support economic development. These development programs were able to achieve positive results in various economic and social fields, but they lacked effectiveness due to their excessive reliance on hydrocarbon revenues that are subject to shocks from time to time, which negatively affected the achievement of their objectives. Hence, it was inevitable for the Algerian government to perform deep economic reforms that would create wealth outside the hydrocarbon sector.

Chapter 4: Methodology and Research Design

With the objective of exploring the relationship between natural resources abundance and economic growth, the study will adopt an autoregressive distributed lag (ARDL) approach which will be theoretically explored in the chapter. First, there will be a short historical overview of the cointegration approach and the model specification will be provided along with the explanation of the econometric methodology. Furthermore, a full data description will be included in addition to its source. The aim of the study is to investigate the impact of natural resource abundance on the determinants of economic growth. Because of the nature of the investigation, a quantitative approach is conducted to answer the research question in means of an econometric model of cointegration. The model employs GDP per capita as the dependent variable and natural resource rents as the independent variable. To assure the validity of the model, other variables are used to overcome the issue of structural breaks in the ARDL model. The basic equation for the model was adopted from Aljarallah & Angus (2020) with adaption to fit the Algerian case of study.

4.1 DATA COLLECTION AND ANALYSIS

With the objective of assessing the short run and the long run relationship between economic growth and natural resources rents, the model utilizes a set of secondary data including controlling variables for institutional quality (IQ) such as Control for Corruption (CRP) and law and order (LO), education (Edu) as a proxy for human capital, Total Factor Productivity (TFP) in addition to oil rents (Oil).

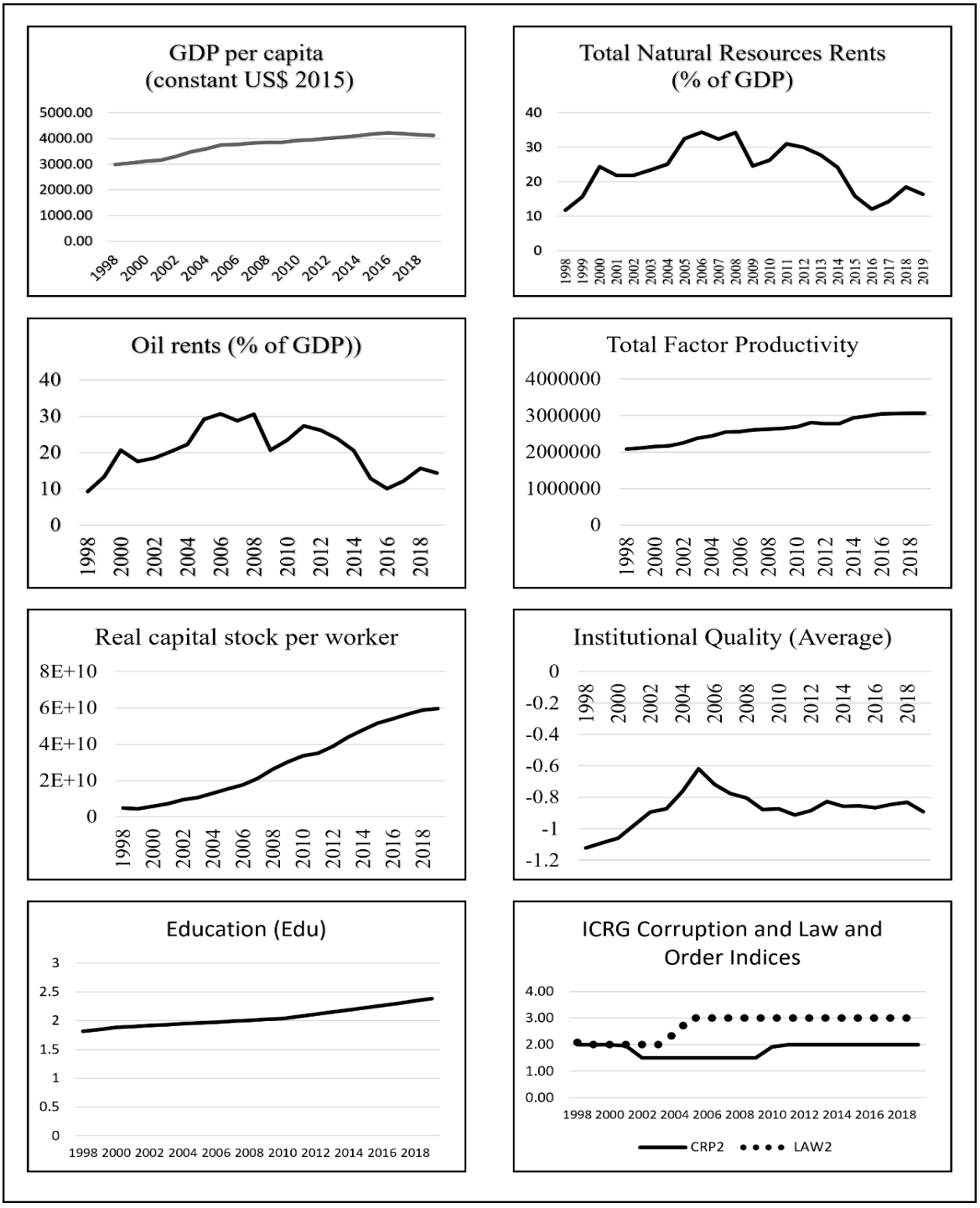
- **GDP per capita (PGDP; Constant US$2015):**

In general, the gross domestic product is a financial metric that is employed as a measure of production. In other words, it is used to assess the flow of money through the country's economy through measuring the market value of all final goods and services that were produced during a certain period of time (Leamer, 2009; OECD, 2008; Resche, 2013). Many studies use this measure in their modelling (Agboola et al., 2021; Awosusi et al., 2022; Chekouri, Benbouziane, et al., 2017; Guan et al., 2021; Jović et al., 2016; Mohamed, 2020). However, GDP as a measure of economic growth has been criticized for its limitedness as it cannot be used to measure well-being of the individuals. Hence other measures were developed that proved to be more encompassing. GDP per capita (PGDP) is often used in modelling to assess the material well-being (Acemoglu & Robinson, 2008; Aljarallah & Angus, 2020; Eregha & Mesagan, 2020; Moiseev et al., 2020; Mustapha, 2014). The GDP per capita is a calculated through dividing the GDP at current prices by the population.

The present study will use GDP per capita (PGDP) as the dependent variable. The data for GDP per capita (constant US$ 2015) in Algeria is collected from the World Bank database (*GDP per Capita (Constant 2015 US$) - Algeria | Data*, n.d.). The period spans from 1998 to 2019 after adjustment. The data is represented in a graph (see **Figure 1**) that illustrates the changes taking place over the above stated period of time. The trend of GDP per capita (PGDP) shows constant growth with a slight fluctuation between 2005 and 2010 where the year 2009 witnessed a dip from $3856.41 in 2008 to $3851.21. The small decline was accompanied with a slower annual growth rate of 1.6% which dropped from the 2.4% achieved in the previous year (*GDP Growth (Annual %) - Algeria | Data*, n.d.). This could

be explained by the Great Recession of 2009 when a crisis threatened the global financial system and engendered economic turmoil for the whole world.

Figure 1. *Description of variables (1998-2019)*



Source: Constructed using collected data

The recovering oil and gas sector later induced a steady growth in the trend as shown in **Figure 1** where it reached its highest in 2016 with the amount of $4224.04 GDP per capita. The deceleration continued for five consecutive years as a response to the political turmoil and transition that was later met with the double shock of the Corona Virus Pandemic and the crashing oil prices in 2019 where GDP per capita crashed to its lowest point in the past decade reaching $3834.40.

- **Natural Resources Rents (% of GDP)**

Considered as the dependent variable for this study, the OECD defines natural resources as natural assets that are found in nature which can be used for economic production or consumption (OECD, 2011). Algeria is rich in minerals and other natural resources such as oil and gas which are considered as the backbone of the economy. In addition to iron, phosphate, uranium, lead and many other instances that compose its natural wealth. According to the World Bank data, the indicator for natural resources rents (% of GDP) is obtained through the summation of oil rents, natural gas rents, coal rents, mineral rents and forest rents. Therefore, if Algeria is taken as an example, natural resources composition breakdown for the year of 2019 will be calculated as shown in equation (1):

$$Total\ resource\ rents = Oil\ rents + Natural\ gas\ rents + coal\ rents + mineral\ rents + forest\ rents \quad (1)$$

When replacing the variables from equation 1 with their values (% of GDP) from World Bank data, the equation becomes:

$$Total\ resource\ rents = Oil\ rents\ (14.30777865) + \quad (2)$$
$$Natural\ gas\ rents(1.88968048) + coal\ rents\ (0) + mineral\ rents(0) +$$
$$forest\ rents\ (0)$$

Equation *2* illustrates the composition of natural resources rents where oil rents make for the majority of the rents of natural resources with a small contribution of natural gas rents. This explains why the trends of natural resources rents and that of oil rents look almost identical (see **Figure 1**).

For the selected period of the study, the natural resources rents trend shows major fluctuations which is mainly due to the fluctuating oil prices in the global markets. Starting from a low value of 9.2% in 1998, the trend shows an unsteady growth until it hits a high of 30.7% in 2006 which could be explained by the rising world demand (Dept, 2006). The Great Recession took a toll on oil and energy movements around the world and the recovery was deemed fragile at best with a growth trend below average which is why the trend at hand shows a decline between the years 2011 and 2016 where it hit a low of 10% succeeded by a small upward progress up to 2018 that was stomped by outspread of the Covid pandemic and the crashing oil prices.

- **Real capital stock per worker (K)**

The capital stock, employed as an independent variable in this model, is a measure used to account for the physical capital that exists in an economy. The data calculation involves, first, the estimation of a base period capital stock or initial capital stock. This step requires using the perpetual inventory method (Aljarallah & Angus, 2020; Berlemann &

Wesselhöft, 2014). The approach was designed by Harberger in 1978 and is built on the assumption that the rate of growth of the output is steady and similar to the growth rate of the capital stock. Hence, the initial stock can be written as follows

$$K_0 = \frac{GFK_0}{\delta + g_{GFK}} \qquad (3)$$

Where K_0 represents the capital stock, GFK_0 denotes the level of gross fixed capital formation, δ the rate of depreciation that is assumed to be at 5% by the literature and g_{GFK} represents the growth rate of output. Where both gross fixed capital formation (constant US$ 2015) and the growth rate of output (annual %) are obtained from world bank data (*GDP Growth (Annual %) - Algeria | Data*, n.d.; *Gross Fixed Capital Formation (Constant 2015 US$) - Algeria | Data*, n.d.).

Once the initial stock is obtained, the estimation can proceed into the next step which involves calculating the data for the selected period of the study using equation 9 as such:

$$K_t = K_{t-1} - \delta K_{t-1} + GFK_t = (1-\delta)K_{t-1} + GFK_t \qquad (4)$$

Where :

$\boldsymbol{K_t}$: Capital stock of the current year.

K_{t-1} : Capital stock of the previous year

δ: the rate of depreciation that is assumed to be at 5%

The results of the calculations are represented by the real capital stock per worker in **Figure 1** which shows a steadily growing trend

- **Total Factor Productivity**

It is used to calculate the efficiency of production. In other words and according to Comin, total factor productivity (TFP) is "the portion of output not explained by the amount of inputs used in production" (Comin, 2010). The Penn World Table (PWT) offers TFP data for 182 countries. However, data for the Algerian economy is absent. Hence, TFP is to be calculated assuming that production takes the form of a Cobb-Douglas production function as such:

$$Y = A \times K^{\alpha} \times L^{\beta} \qquad 5$$

Where:

Y: denotes total of physical output

A: Total factor productivity or the Hicksian neutral efficiency level (Beveren, 2007).

K and L: inputs of capital and labor, respectively

α, β: are measures of the elasticities of both capital and labor, respectively.

Physical output was represented by GDP (constant US$ 2015), active population data designated labor and capital stock represented capital. The latter was obtained from the previous calculation whereas, the two other parameters were obtained from world bank data. The trend illustrated in the graph representing TFP in **Figure 1**, shows a constant growth with slight dips in the years 2010 and 2013 which were soon recovered from.

- **Education**

To assess the relationship between human capital, TFP, economic growth and education, human capital index is used as a proxy for education since it is considered as an

important component of economic growth because higher education rates are the higher number of skilled workers is and that will enhance production output leading to a better economic development. The data is available in the Penn World Table (PWT) v10.0. the World Bank also offers data for the index however, the PWT v10.0 is more encompassing in terms of available data for the Algerian economy. The data is represented in the education graph in **Figure 1** and it shows a trend with values varying from 1.5 to 2.5.

- **Institutional quality**

Different proxies have been used to assess the impact of institutional quality on economic growth or to investigate the relationship between natural resources and institutional quality. Some studies, use the World Governance Index (WGI) provided by the World Bank (Fagbemi & Kotey, 2022). Others employ the ICRG components of governance indicators (Aljarallah & Angus, 2020; Busse & Gröning, 2013; Chekouri, Benbouziane, et al., 2017).

For the current model, different methods were empirically tested. The ICRG corruption and Law and Order variables were deemed unhelpful for the model since they resulted in spurious correlation. Therefore, the World Bank WGI was used. The WGI are a research data set initiated by Daniel Kaufmann and Aart Kraay in 1999. The world Bank defines this research tool as a data set that provides information related to the quality of governance. The index is composed of six dimensions, voice and accountability (VA), political stability and absence of violence (PV), government effectiveness (GE), regulatory quality (RQ), rule of law (RL), and control of corruption (CC). to assess the relationship between institutional quality and natural resource, an average of the six dimensions was used (Matallah & Matallah, 2016).

4.1.1.1 Methodology and Model Specification

In a Contribution to the Theory of Economic Growth, Robert Solow (1956) builds a model based on the Keynesian Harold-Domar model which is considered as the first growth model of neoclassical nature. The objective of the model is offering a simplified yet powerful framework that helps answering the questions pertaining to the drivers of economic growth to succeed in distributing the output between the production factors and technological change (Aljarallah & Angus, 2020). Accordingly, the model presented in this work will follow in the steps of the Solow Growth model to measure the impact of natural resources (oil rents specifically) on economic growth. According to Aljarallah and Angus (2020), Solow employs this specific production function with Hicks-neutral technology with the objective of raising the capital and labor marginal productivity at the same amounts thus, no change will affect the balance:

$$Y(t) = A(t) \times F[K(t), L(t)] \qquad (6)$$

The component of the expression can be explained as follows: *Y(t)* represents the level of aggregate output or the rate of production of the whole output, *K(t)* stands for the level of capital stock, the economy's labor force is designated *L(t)* and the level of technology is represented by *A(t).* since the model utilizes per capita output, hence the Cobb-Douglas function is employed as such:

$$Y_t = AK_T^{\alpha} L_t^{\beta}, \qquad (7)$$

The elasticities α and β represent the respective shares of input out of output. In other words, they represent the share of contribution of capital and labor. The function of

production is built on the assumption that it allows for a constant return to scale. Thus, by dividing equation (6)(7) by L_t on both sides the function for per capita output is obtained:

$$\frac{Y_t}{L_t} = AK_T^{\alpha} L_t^{\beta} \frac{1}{L_t} \ . \qquad (8)$$

The next step consists of multiplying and dividing equation (8) by L_t^{α} *and* L_t^{β} which results in the following expression:

$$\frac{Y_t}{L_t} = A\left(\frac{K_t^{\alpha}}{L_t^{\alpha}}\right) L_t^{\alpha} \left(\frac{L_t^{\beta}}{L_t^{\beta}}\right) L_t^{\beta} \frac{1}{L_t}, \qquad (9)$$

Where $Y_t/L_t = y_t$, $K_t^{\alpha} / L_t^{\alpha} = k_t^{\alpha}$, $L_t^{\beta} / L_t^{\beta} = 1$.

Hence, by rearranging equation (9), the expression can be reduced as such:

$$y_t = A\, k_t^{\alpha} L_t^{\alpha} L_t^{\beta} \frac{1}{L_t} \qquad (10)$$

When the condition of $\alpha+\beta = 1$ is imposed in equation (10) the resulting expression is as follows:

$$y_t = Ak_t^{\alpha} , \qquad (11)$$

In the new formula, y_t denotes the output per capita and k_t denotes the physical capital stock per worker. Further, the natural logarithm of both sides of equation (11) is taken such that:

$$ln(y_t) = ln(A) + \alpha\, ln(k_t) \qquad (12)$$

In this expression, *A* denotes the Solow residual or what is called TFP. This component is used to explain the unexplained part of the output which can manifest in any economic or economic variable that represents the output.

In addition to the traditional approaches mentioned above, Aljarallah and Angus (2020) introduce new variables to the growth function which are: resource rents (RR), education (Edu) which is employed as a proxy for social development, and institutional quality presented by law and order (LO) and corruption (CRP) which stand in place of *A* which all are placed in equation (12) resulting in the following equation:

$$\boldsymbol{ln(y_t) = \alpha\, ln(k_t) + \theta_1 RR_t + \theta_2 LO_t + \theta_3 CRP_t + \theta_4 Edu_t.} \qquad \boldsymbol{(13)}$$

Many studies have tested for the negative effects the resource rents had on economic growth, enabling the resource curse theory. In addition, the study will investigate the claim through the employment of TFP. Therefore, the equation can translate TFP from equation (13) as such:

$$\boldsymbol{ln\, A = lny_t - \alpha ln(k_t)}, \qquad \textbf{(14)}$$

$$\boldsymbol{In\, A = TFP}. \qquad \textbf{(15)}$$

As mentioned above the main determinants that represent TFP are Oil, LO, CRP, and Edu. Hence, the new equation of TFP becomes:

$$\boldsymbol{TFP = f(RR, LO, CRP, Edu)} \qquad \textbf{(16)}$$

Or it can be written differently such as:

$$\boldsymbol{TFP = \theta_1 RR_t + \theta_2 LO_t + \theta_3 CRP_t + \theta_4 Edu_t}. \qquad \textbf{(17)}$$

Aljarallah and Angus (2020) take a further step to investigate inclusivity and exclusivity of the resource rent growth therefore they test the impact of resource rents on social development and institutional quality (IQ). Consequently, this study will use the same method, however, since the focus of the study at hand is on oil rents and their impact, the variable resource rents (RR) will be replaced with oil rents (Oil) giving the following expressions:

$$Edu_t = \theta_1 Oil_t + \theta_2 LO_t + \theta_3 CRP_t + \theta_4 PGDP_t \qquad \textbf{(18)}$$

And the one for institutional quality is denoted in equation (24)

$$IQ_t = \theta_1 Oil_t + \theta_2 Edu_t + \theta_3 PGDP_t. \quad \textbf{(19)}$$

4.2 ECONOMETRIC METHODOLOGY AND ESTIMATION STRATEGY

To explain the impact of oil abundance on economic growth empirically, the equations (13), (17), (18) and (19) need to be written, respectively, as follows:

$$ln(y_t) = \alpha_0 + \alpha ln(k_t) + \theta_1 Oil + \theta_2 LO + \theta_3 CRP + \theta_4 Edu + \mu_t, \quad \textbf{(20)}$$

$$TFP_t = \alpha_0 + \theta_1 Oil_t + \theta_2 LO_t + \theta_3 CRP_t + \theta_4 Edu_t + \mu_t, \quad (21)$$

$$Edu_t = \alpha_0 + \theta_1 Oil_t + \theta_2 LO_t + \theta_3 CRP_t + \theta_4 PGDP_t + \mu_t, \quad (22)$$

$$IQ = \alpha_0 + \theta_1 Oil_t + \theta_2 Edu + \theta_4 PGDP_t + \mu_t. \quad (23)$$

3.1.2.1 Autoregressive Distributed Lag Model

With the objective of conducting an empirical investigation into the short and long run impacts of resources rents on economic growth, the study employs the autoregressive distributed lag (ARDL) model designed by Pesaran (Pesaran, 1999; Pesaran et al., 2001).

Theoretically, there exist different techniques to examine the long run relationship in non-stationary series including the Granger (1981), Engel and Granger (1987), the Johansen and Juselius (1990) and the autoregressive lag ARDL cointegration model (Nkoro & Uko, 2016). According to Pesaran et al (2001), ARDL model allows for the integration of variables at order zero I(0), one I(1) or fractionally integrated (Kriskkumar et al., 2022). Hence, for the case of this study, ARDL is the most appropriate model because it allows for the manipulation of variables that are of different orders integration (Aljarallah & Angus, 2020). Accordingly, the ARDL model formulas can be obtainable by rearranging equations (20) through (23) as such:

$$\begin{aligned} \Delta PGDP_i = \alpha_0 + \sum_{i=1}^{t} \delta_i \Delta PGDP_{t-i} + \sum_{i=1}^{t} \vartheta_i \Delta k_{t-ii} + \sum_{i=1}^{t} \rho_i \Delta Oil_{t-1} \\ + \sum_{i=1}^{t} \emptyset_i \Delta Edu_{t-i} + \sum_{i=1}^{t} \omega_i \Delta Crp_{t-i} + \sum_{i=1}^{t} \varphi_i \Delta LO_{t-1} \\ + \lambda_1 PGDP_{t-1} + \lambda_2 k_{t-1} + \lambda_3 Oil_{t-1} + \lambda_4 Edu_{t-1} \\ + \lambda_5 CRP_{t-1} + \lambda_6 LO_{t-1} + \mu_t, \end{aligned} \tag{24}$$

$$\begin{aligned} \Delta TFP_i = \alpha_0 + \sum_{i=1}^{t} \delta_i \Delta TFP_{t-i} + \sum_{i=1}^{t} \rho_i \Delta Oil_{t-1} + \sum_{i=1}^{t} \emptyset_i \Delta Edu_{t-i} \\ + \sum_{i=1}^{t} \omega_i \Delta Crp_{t-i} + \sum_{i=1}^{t} \varphi_i \Delta LO_{t-1} \\ + \lambda_1 TFP_{t-1} + \lambda_2 Oil_{t-1} + \lambda_3 CRP_{t-1} \\ + \lambda_4 LO_{t-1} + \lambda_5 Edu_{t-1} + \mu_t, \end{aligned} \tag{25}$$

$$\Delta Edu_i = \alpha_0 + \sum_{i=1}^{t} \delta_i \Delta Edu_{t-i} + \sum_{i=1}^{t} \rho_i \Delta Oil_{t-1} + \sum_{i=1}^{t} \emptyset_i \Delta PGDP_{t-i} + \sum_{i=1}^{t} \omega_i \Delta Crp_{t-i} + \sum_{i=1}^{t} \varphi_i \Delta LO_{t-1} + \lambda_1 Edu_{t-1} + \lambda_2 Oil_{t-1} + \lambda_3 CRP_{t-1} + \lambda_4 LO_{t-1} + \lambda_5 PGDP_{t-1} + \mu_t, \quad (26)$$

$$\Delta IQ_i = \alpha_0 + \sum_{i=1}^{t} \delta_i \Delta IQ_{t-i} + \sum_{i=1}^{t} \rho_i \Delta Oil_{t-1} + \sum_{i=1}^{t} \emptyset_i \Delta PGDP_{t-i} + \sum_{i=1}^{t} \emptyset_i \Delta Edu_{t-i} + \lambda_1 IQ_{t-1} + \lambda_2 Oil_{t-1} + \lambda_3 Edu_{t-1} + \lambda_4 PGDP_{t-1} + \mu_t, \quad (27)$$

Where Δ denotes the operator at first difference level and α_0 is the drift component. The different expressions above are helpful with providing short- and long run estimate within a single-equation framework (Kriskkumar et al., 2022). For the parameters employed in the short run analysis they are designated by the coefficient of the respective first differenced such as: δ_i, ρ_i, $\emptyset_i$, ω_i and φ_i. As for analyzing the long run estimates, $\lambda_1, \lambda_2, \lambda_3, \lambda_4 and\ \lambda_5$are used after normalizing their coefficients. To assure the existence of a cointegration between the long run estimates different tests are to be run.

The first test consists of applying stationarity tests to preserve the accuracy of the estimation at different time points. For this study, two of the unit root tests are applied. First, the Augmented Dickey Fuller (ADF) to examine the non-stationary characteristics of the variables (Mukhtarov et al., 2019), and the Phillips-Perron (PP) tests which is used to

correct the issues concerning autocorrelation and heteroscedasticity. And the hypothesis of the cointegration test is presented in the following equation:

$$H_0 = \lambda_1 = \lambda_2 = \lambda_3 = \lambda_4 = \lambda_5 = \lambda_6 = 0(Absence\ of\ cointegration)$$
$$H_1 = \lambda_1 \neq \lambda_2 \neq \lambda_3 \neq \lambda_4 \neq \lambda_5 \neq \lambda_6 \neq 0(Presence\ of\ cointegration).$$

To test for the hypothesis that all model parameters are zero, the F-test is applied. In regression analysis, F-tests are used to compare between statistical models to decide which model is the best fit (Kissell & Poserina, 2017). It was coined after Ronal A. Fisher and it measures the ratio of variances. The F-statistic denotes:

$$F = \frac{Explained\ variance}{Unexplained\ variance}$$

The calculated value of F is compared with the lower and upper bounds pertaining to the critical values. The null hypothesis is rejected when the F-statistic is greater than upper value. Hence proving the existence of cointegration and a long run relationship between the dependent and independent variables. In case of opposite results where the value of the F-statistic is lower than the upper value, the null hypothesis stating that there exist no cointegration between the variables is rejected.

Once the hypotheses tested, the study moves to the selection of the most fitting lag length for the ARDL model through the application of the Akaike information criterion (AIC). This AIC is the most used model selection tool and its calculation depends on the number of independent variables that are involved in building the model in addition to the maximum number of likelihoods estimate of the model. In other words, the degree to which

the model can reproduce data. Therefore, the most fitting model is the one achieving the biggest amount of variation while involving the fewest number of independent variables(Aljarallah & Angus, 2020; Bevans, 2020; Cavanaugh & Neath, 2019; Sakamoto et al., 1986). To estimate the chosen models, the study conducts cointegration and error correction analysis. The ARDL framework is the most appropriate since it allows for analyzing cointegration relationship in a small sample (Aljarallah & Angus, 2020; Nkoro & Uko, 2016; Pesaran, 1999; Pesaran et al., 2001). In this case, the values of the long run parameters can be deduced through the normalization of the long run equation and running an estimation of the error correction model on a short run level.

The study assumes a steady-state condition (Aljarallah & Angus, 2020), hence the long run assumptions are $\Delta PGDP_i = 0,\ \Delta TFP_i = 0, \Delta Edu_i = 0,$ and $\Delta IQ_i = 0.$
The assumptions if rearranged give:

$$\Delta PGDP = PGDP_t - PGDP_{t-1} = 0 \Rightarrow PGDP_t = PGDP_{t-1},$$
$$\Delta TFP = TFP_t - TFP_{t-1} = 0 \Rightarrow TFP_t = TFP_{t-1},$$
$$\Delta Edu = Edu_t - Edu_{t-1} = 0 \Rightarrow Edu_t = Edu_{t-1},$$
$$\Delta IQ = IQ_t - IQ_{t-1} = 0 \Rightarrow IQ_t = IQ_{t-1}.$$

When dividing the above expressions by λ_1, equations from (24) to (27) can be transformed into equation of the long run analysis as such:

$$\frac{\lambda_1}{\lambda_1}PGDP_t = \frac{\lambda_2}{\lambda_1}k_{t-1} + \frac{\lambda_3}{\lambda_1}Oil_{t-1} + \frac{\lambda_4}{\lambda_1}Edu_{t-1} + \frac{\lambda_5}{\lambda_1}CRP_{t-1} + \frac{\lambda_6}{\lambda_1}LO_{t-1}, \quad (28)$$

$$\frac{\lambda_1}{\lambda_1}TFP_t = \frac{\lambda_2}{\lambda_1}Oil_{t-1} + \frac{\lambda_3}{\lambda_1}CRP_{t-1} + \frac{\lambda_4}{\lambda_1}LO_{t-1} + \frac{\lambda_5}{\lambda_1}Edu_{t-1}, \quad (29)$$

$$\frac{\lambda_1}{\lambda_1}Edu_t = \frac{\lambda_2}{\lambda_1}Oil_{t-1} + \frac{\lambda_3}{\lambda_1}CRP_{t-1} + \frac{\lambda_4}{\lambda_1}LO_{t-1} + \frac{\lambda_5}{\lambda_1}PGDP_{t-1}, \quad (30)$$

$$\frac{\lambda_1}{\lambda_1}IQ_t = \frac{\lambda_2}{\lambda_1}Oil_{t-1} + \frac{\lambda_3}{\lambda_1}Edu_{t-1} + \frac{\lambda_4}{\lambda_1}PGDP_{t-1}. \quad (31)$$

The next step involves the reparameterization to achieve the following equations:

$$PGDP_t = \psi_0 + \psi_1 k_{t-1} + \psi_2 Oil_{t-1} + \psi_3 Edu_{t-1} + \psi_4 CRP_{t-1} + \psi_5 LO_{t-1}, \quad (32)$$

$$TF_t = \psi_0 + \psi_1 Oil_{t-1} + \psi_2 CRP_{t-1} + \psi_3 LO_{t-1} + \psi_4 Edu_{t-1}, \quad (33)$$

$$Edu_t = \psi_0 + \psi_1 Oil_{t-1} + \psi_2 CRP_{t-1} + \psi_3 LO_{t-1} + \psi_4 PGDP_{t-1}, \quad (34)$$

$$IQ_t = \psi_o + \psi_1 Oil_{t-1} + \psi_2 Edu_{t-1} + \psi_3 PGDP_{t-1}. \quad (35)$$

Where $\psi_1, \psi_2, \psi_3, \psi_4, and\ \psi_5$ are parameters for the long run estimation which values are to be used to determine the long run relationship between the variables in the model (Aljarallah & Angus, 2020). Whereas the short run analysis necessitates the employment of the error correction model.

3.1.2.2 Error Correction Model

When the variables of a model accomplish a long run cointegration, the analysis have recourse to an error correction model (ECM) to be able to model the dynamics between the variables in the short run as well. There are two types of ECM that can be implemented, the two-steps ECM by Engle and Granger (1987) and the one-step ECM which is the one to be used for this study as such:

$$\Delta PGDP_i = \alpha_0 + \sum_{i=1}^{t} \delta_i \Delta PGDP_{t-i} + \sum_{i=1}^{t} \vartheta_i \Delta k_{t-ii} + \sum_{i=1}^{t} \rho_i \Delta Oil_{t-1} + \sum_{i=1}^{t} \emptyset_i \Delta Edu_{t-i} + \sum_{i=1}^{t} \omega_i \Delta Crp_{t-i} + \sum_{i=1}^{t} \varphi_i \Delta LO_{t-1} + \gamma ECM_{t-1}, \quad (36)$$

$$\Delta TFP_i = \alpha_0 + \sum_{i=1}^{t} \delta_i \Delta TFP_{t-i} + \sum_{i=1}^{t} \rho_i \Delta Oil_{t-1} + \sum_{i=1}^{t} \emptyset_i \Delta Edu_{t-i} + \sum_{i=1}^{t} \omega_i \Delta Crp_{t-i} + \sum_{i=1}^{t} \varphi_i \Delta LO_{t-1} + \gamma ECM_{t-1}, \quad (37)$$

$$\Delta Edu_i = \alpha_0 + \sum_{i=1}^{t} \delta_i \Delta Edu_{t-i} + \sum_{i=1}^{t} \rho_i \Delta Oil_{t-1} + \sum_{i=1}^{t} \emptyset_i \Delta PGDP_{t-i} + \sum_{i=1}^{t} \omega_i \Delta Crp_{t-i} + \sum_{i=1}^{t} \varphi_i \Delta LO_{t-1} + \gamma ECM_{t-1}, \quad (38)$$

$$\Delta IQ_i = \alpha_0 + \sum_{i=1}^{t} \delta_i \Delta IQ_{t-i} + \sum_{i=1}^{t} \rho_i \Delta Oil_{t-1} + \sum_{i=1}^{t} \emptyset_i \Delta PGDP_{t-i} + \sum_{i=1}^{t} \emptyset_i \Delta Edu_{t-i} + \gamma ECM_{t-1}. \quad (39)$$

To conclude the chapter, the model has explored the relationship between natural resources rents and economic growth through an ARDL model. A theoretical exploration of the model was dealt with first in the chapter. Additionally, a full description of the used data was provided.

Chapter 5: Results

Chapter 5 encompasses the results section of the research project. the chapter ensues a discussion of the main findings and analysis of the econometric model. The first part of the chapter provides a summary of the data of the variables involved in the empirical investigation. Second, a description of the unit root and stationarity tests will be provided to ensure the validity of the model and the last part will tackle the short and long-term regression results for the different models.

5.1 DESCRIPTIVE DATA

The descriptive data of the variables under study were obtained using EViews 10 and are summarized in **Table *1***.

Table 1: Summary of Descriptive Data

	PGDP	TFP	EDU	IQ	CRP	LAW	K	OIL	RR
Mean	3684.0315	2577678.0	2.0337127	-0.894432	1.8906250	2.7291667	27023288412	19.959225	23.13427
Median	3839.6811	2618447.7	2.0000357	-0.873508	2.0000000	3.0000000	23754016911	20.34641	23.78295
Maximum	4224.0373	3065669.2	2.3839655	-0.619145	3.0000000	3.0000000	59636910074	30.658685	34.40823
Minimum	2884.1202	2049673.7	1.7472061	-1.122729	1.5000000	2.0000000	868257894.6	9.2142127	11.69502
Std. Dev.	456.55654	353864.3	0.178842	0.130308	0.3594423	0.4383833	20280609324	6.494998	7.006957
Skewness	-0.559869	-0.122711	0.4107150	-0.88146	1.0814630	-1.0019460	0.290239000	0.125261	0.049341
Kurtosis	1.850934	1.712546	2.2030700	2.388616	5.0024920	2.0740470	1.631490000	1.940146	1.905582
Jaque-Bera	2.574166	1.717769	1.309846	3.479467	8.688223	4.872971	2.209775	1.186072	1.207488
Probability	0.276075	0.423634	0.519482	0.175567	0.012983	0.087468	0.331248	0.552647	0.546761
Sum	88416.75	61864272	48.7641	2.22E-16	45.375000	65.50000	6.49E+11	479.0214	555.2225
Sum SQ. Dev.	4794209	2.88E+12	0.740695	23.00003	2.971571	4.420139	9.46E+21	970.25500	1129.241
Observation	24	24	24	24	24	24	24	24	24

Source: Calculated using EViews 10

The statistics included in ***Table 1*** show that the number of observations is 24. The study the period under observation between 1998 and 2019. The results show PGDP with a mean of 3684.03 and a median of 3839.68. Skewness measures symmetry or more specifically, the lack of symmetry. Therefore, based on the result obtained above some of the variables are left skewed while others are right skewed. Kurtosis measure whether the data is peaked or flat as compared to a normal distribution. The statistics of the variables are leptokurtic (higher peak or long-tailed) when the statistical distribution has a kurtosis higher than three while platykurtic (short-tailed or fat) happens when the distribution has a negative kurtosis. As observed in ***Table 1***, only Control for corruption (CRP) is leptokurtic while none of the others is platykurtic but instead are lighter tails. These measurements of skewness and kurtosis combined to determine whether the variables follow a normal distribution. The Jarque-Bera is used to test for normality which implies that residuals are normally disturbed. As all the variables Jarque-Bera (Probability value) is greater than 0.05. Therefore, it is stated that the all the variables included the model are normally distributed.

5.2 UNIT ROOT AND STATIONARITY TESTS

As mentioned in the previous chapter, it is necessary to determine the order of the integration of the variables, where I(0), I(1) or fractionally integrated are accepted but not an order of I(2). Therefore, the first the step the analysis goes through is to test the stationarity of the variables. The study employs two-unit root tests including ADF and PP. the extended results of the tests are tabulated in Appendix 1. While testing for the stationarity of the series at hand, the results of both ADF and PP tests showed the order of integration of the variables varying between I(0) or I(1) (as shown in Table 2) for the ADF test and the same results for the PP test. The stationarity of the series, as a perquisite, is

achieved because and according to Pesaran, the order of integration could vary between I(0), I(1) or fractional integration(Pesaran, 1999; Pesaran et al., 2001). Hence, the study can proceed with the application of the ARDL model.

Table 2. Unit Root Tests Results ADF and PP: Null Hypothesis: the variable has a unit root

	Tests	
	Augmented Dickey-Fuller Test	Phillips-Perron Test
Variables	With constant and trend	
	Level	
GDP PER CAPITA	0.4660*	0.0383*
TFP	-2.1861**	-2.1861**
Education	0.2098*	-0.1897*
Institutional quality	-0.9274*	-1.1245*
Corruption	4.127***	-4.1334***
Law and order	-3.8179**	-2.5582**
Capital stock	-1.7938*	-2.6222**
Oil rents	-1.4364*	-1.4672*
Resource rents	-1.4087*	-1.4317*
	First Difference	
Δ GDP PER CAPITA	-2.9815***	-4.0043**
Δ TFP	-4.4803***	-4.5603***
Δ Education	-3.6445**	-3.6021***
Δ Institutional quality	-3.3890*	-3.2654**
Δ Corruption	-3.8167**	-3.8272**
Δ Law and order	-4.5590***	-3.5335**
Δ Capital stock	-3.8690**	-3.9358**
Δ Oil rents	-3.3697*	-4.5329***
Δ Resource rents	-3.8935**	-4.3535***

Notes: (*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product; TFP = total factor productivity. Lag length based on SIC. Probability based on MacKinnon (1996), one sided p-value.

For hypothesis testing, it is usual practice to use only one threshold of significance, such as 5%. It establishes a defined criterion for rejecting or failing to reject the null hypothesis. In some cases, however, it may be necessary to have recourse to alternative levels of significance in order to assess the strength of evidence against the null hypothesis. Multiple significance thresholds, such as 10%, 5%, and 1%, provide a more nuanced interpretation of the data. It is possible to assess the robustness of the findings and the level of confidence associated with rejecting the null hypothesis by examining alternative significance levels. It gives a set of criteria for determining statistical significance, taking into consideration various levels of possible error (Type I or Type II) and the required level of confidence. As a result, reporting results at several significance levels contributes to a more thorough and insightful analysis, allowing for a sound evaluation of statistical significance across different thresholds and make educated decisions based on the evidence offered (Kim & Choi, 2021).

For GDP per Capita (**Table *2***), when evaluating at level, both the ADF and PP tests imply that the variable has a unit root at the 10% significance level. When the first difference is taken, however, the unit root is rejected, suggesting that the variable remains stationary after differencing. Whereas, for TFP the tests reject the null hypothesis at the 1% significance level and the unit root is rejected at first difference suggesting stationarity after differencing. When examining at level, the ADF test for education indicates that the variable has a unit root at the 10% significance level. The PP test, on the other hand, does not support the presence of a unit root. When at first difference is taken into account, both tests show that the variable becomes stationary.

The ADF test for institutional quality reveals the presence of a unit root test at 10% significance level while the PP test shows a unit root test at 5% significance level. However, the null hypothesis is rejected for both test at first difference which indicates the stationarity of the variable. Both the ADF and PP tests reject the null hypothesis of a unit root at the 1% significance level for corruption. Similarly, when evaluating the first difference, the unit root is rejected, implying stationarity. While law and order when evaluated at level, the ADF test reveals the presence of a unit root at the 5% significance level, but the PP test indicates the presence of a unit root at the 10% significance level. When taking the first difference, however, both tests reject the unit root, suggesting stationarity. As for capital stock, oil rents and resource rents, when considering the level, both the ADF and PP tests reject the null hypothesis of a unit root at the 5% or 10% significant level. Consequently, the test suggest stationarity for the variables.

5.3 THE SHORT AND LONG-TERM REGRESSION RESULTS

5.3.1 The Long Run Relationship between Oil Rents and Economic Growth

Now that the prerequisites suggested by the Pesaran model have been met, the next step is to investigate the impact of oil rents on GDP per capita through the application of the ARDL bounds test approach for cointegration. The study uses GDP per capita (PGDP) as the dependent variable, Oil rents (Oil) as the dependent variable whereas the controlling variables include: corruption (CRP), law and order (LO), human capital represented by education (Edu) and total factor productivity (TFP) and capital stock (K). The sample of the study has been adjusted for the estimation from 1998 to 2019. There have been 1458 evaluated models but only one model was chosen using the Akaike Information Criterion

method which is ARDL model (2,1,1,2,2,2,2) (Appendix 2) with the assumption that the lags number has been fixed automatically at 2 (Appendix 3).

Table 3. Summary of ARDL model estimation

Variable	Coefficient	T-statistics
GDP per capita (-1)	0.124511***	0.918649
GDP per capita (-2)	0.859477**	3.524722
Corruption	0.037989***	2.608407
Corruption (-1)	-0.063662**	-3.623892
Education	2.290377**	3.707356
Education (-1)	-2.85917**	-4.605889
Stock capital	-0.004827***	-0.260248
Stock capital (-1)	-0.019806***	-2.83021
Stock capital (-2)	-0.03397**	-3.184004
Law and order	-0.191763**	-4.684243
Law and order (-1)	-0.014249***	-0.605017
Law and order (-2)	-0.172522*	-5.900178
Oil rents	0.01247***	2.040438
Oil rents (-1)	0.000129***	0.019874
Oil rents (-2)	0.051371*	7.039523
LTFP	0.544223*	6.110486
LTFP (-1)	0.359223**	3.417085
LTFP (-2)	0.115644***	0.926856
C	-12.935*	-5.309562
Model Criteria		
ARDL MODEL	ARDL (2, 1, 1, 2, 2, 2, 2)	
R-Squared	0.999889	
Adjusted R-squared	0.99922***	
Ljung-Box (residuals) TEST	46.386***	
Ljung-Box (residuals Squared) TEST	23.044***	
Diagnostic Test		
Jarque-Berra TEST	0.15891***	
Breusch-Godfrey Serial Correlation LM Test	4.354465***	
Heteroskedasticity Test: Breusch-Pagan Godfrey	52.97627***	
Heteroskedasticity Test: ARCH (2)	18.39116***	

Notes: (*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product; TFP = total factor productivity. **Source**: Student's calculation using EViews 10

The results of the estimation are summarized in **Table 3** along with the description of the model criteria and the different diagnostic tests which purpose serves to test for auto-correlation, normality, specification and heteroskedasticity. The results assure the absence of any heteroskedasticity problems. Lastly, the ARCH test is used to forecast future volatility or what theoreticians call conditional heteroskedasticity. The null hypothesis of the test assumes that a series of residuals show no conditional heteroskedasticity in other words, the absence of any ARCH effects (see **Appendix *4***). To sum up the results of the diagnostic tests, the series show no issues with error normality, heteroskedasticity is insignificant as well as the functional form does not show any issues therefore the model does not exhibit any issues and the estimation can proceed to the next step.

First, with the Jarque-Bera test the null hypothesis involves the skewness equals to zero and the excess kurtosis being zero as well. When p-value is greater than 5% it means that the null hypothesis has been rejected and the data does not originate from a normal distribution. The tabulated results of the test show a p-value of 0.92 which is greater than 0.05 meaning that null hypothesis has been rejected at 5% significance level and that sample data do not have a normal distribution. Next, the autocorrelation test, namely the Breusch-Godfrey Serial Correlation LM Test, which is conducted to test for the errors in a regression analysis. The null hypothesis states that there is no autocorrelation at any order less than or equal to p. The output of the test illustrates a corresponding p-value of 0.62 highlighting the absence of autocorrelation (see appendix). Similarly, the Breusch-Pagan Godfrey test is another test for Heteroskedasticity of errors in regression analysis. For this test, when a small chi-square value is obtained, it indicates that all error variances are equal.

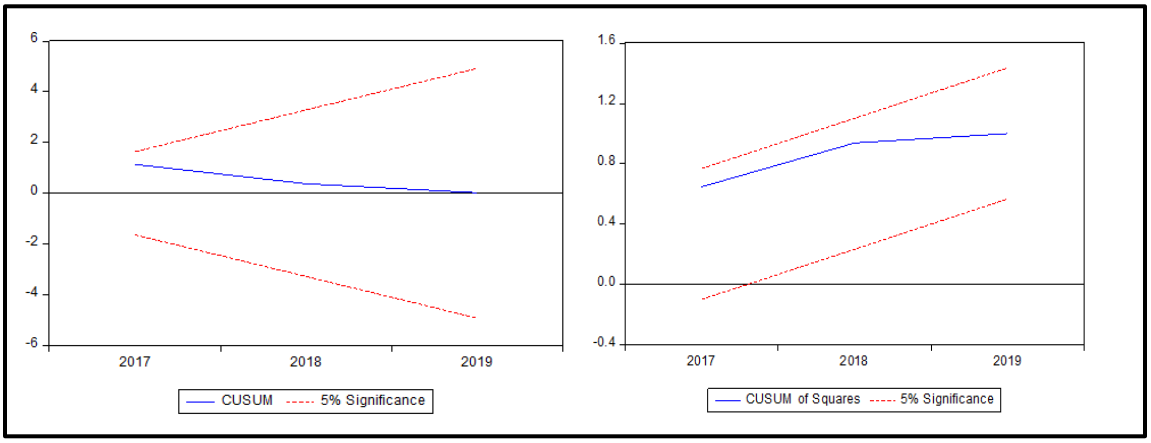
The obtained results assure the absence of any heteroskedasticity problems. Lastly, the ARCH test is used to forecast future volatility or what theoreticians call conditional heteroskedasticity. The null hypothesis of the test assumes that a series of residuals show no conditional heteroskedasticity in other words, the absence of any ARCH effects (see Appendix 4).

To sum up the results of the diagnostic tests, the series show no issues with error normality, heteroskedasticity is insignificant as well as the functional form does not show any issues therefore the model does not exhibit any issues and the estimation can proceed to the next step.

Another central issue that would engender unreliability and forecasting errors in the model estimation has been brought up by David Hendry, a professor of economics and econometrician, is the existence of structural breaks in the parameters of the regression analysis (Hackl et al., 1991). Structural breaks occur when an abrupt change takes place at a certain time in the time series. The breaks might take the form of a shift in the mean or a shift in any other parameter involved with the analysis (Aue & Horváth, 2013; Loginova & Mann, 2022; Maheu & Gordon, 2008). Hence, it is primordial to test for structural stability on a frequent basis. Different methods have been developed to detect data structural breaks such as the Wald test, the Chow test, the MZ test and many other tests that each serve for a specific purpose. The most fitting tests for the present study are the CUSUM (Cumulative sum) and CUSUMSQ (CUSUM of squares) which can verify the stability of the model. The process is considered to be out of control when the cumulative sums of the standardized deviations are greater than a certain range. The reported results (see Figure 2) show the

absence of recursive residuals and display the stability of the model hence, the analysis can be carried out.

Figure 2. *Plot of Cumulative sum and cumulative sum of squares of recursive residuals*



Note: CUSUM = Cumulative Sum control chart. The straight line stands for critical bounds at 5% significance level. **Source**: Secondary data using EViews10

5.3.1.1 Bounds test

Table 4. F-Bounds Test. Null hypothesis: No level relationship

Test statistics	Value	Significance	I(0)	I(1)
F-statistic	18.34349	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.50%	2.55	3.61
		1%	2.88	3.99

Source: Student's calculation using EViews 10

Pesaran also suggest the application of an F bound test to examine the cointegration between the variables of order I(0) and order I(1)and to establish whether a long run relationship exists. The F-statistic need to be compared to the values of I(0) and I(1). If it

is lower than I(0) then the null hypothesis is accepted and there exists no cointegration while if the value is higher than I(1) then the null hypothesis is rejected and there is the presence of cointegration between the variables.

The results shown in Table 4 display a F-statistic value of 18.34349 which is higher than the values present in I(1) hence, the null hypothesis is rejected and there exist cointegration which is the one of the prerequisites of the ARDL model in addition to the presence of a long run relationship between variables (Pesaran, 1999; Pesaran et al., 2001). Therefore, the study can proceed to estimate the long run model.

5.3.1.2 The Long Run Results of the Impact of Oil Rents on PGDP

The long run estimation results are summarized in Table 5. The estimation was run to measurers the impact the oil rents (Oil) have on GDP per capita (PGDP).

In the long run, a one unit increase in the 1-year lag of oil rents results in an increase of 0.063 units of GDP per capita. The relationship between natural resources rents in general and oil rents in specific and GDP per capita as a proxy for economic has been at the heart of countless empirical studies yet they never seem to reach a consensus on the impact that natural resource abundance and whether it deters economic growth or encourages it. Corruption engenders a decrease of 0.025 in GDP per capita for every 1% increase. However, the t-statistic value of -1.45334 suggests that the coefficient is not statistically significant at conventional levels (p-value = 0.2421). Therefore, there is insufficient evidence to conclude a significant long-run relationship between corruption and the dependent variable. Furthermore, many empirical studies demonstrate how a decrease in corruption can lead to a better economic performance and a higher GDP per capita

(Dreher & Herzfeld, 2005; Moiseev et al., 2020; Mustapha, 2014; Rose-Ackerman & Søreide, 2011; Ugur, 2014).

Table 5. **ARDL Long Run Form**

Variable	Coefficient	t-Statistic	Prob.
Corruption (-1)	-0.025673	-1.45334	0.2421
Education (-1)	-0.568793	-3.64048	0.0357
Stock capital (-1)	-0.058604	-3.16316	0.0507
Law and order (-1)	-0.378506	-6.05938	0.009
Oil rents (-1)	0.06397	6.724111	0.0067
LTFP (-1)	1.019089	4.113983	0.0260
C	-12.935	-5.30956	0.013

EC=LGDPPC- (-1.6033*LCRP -35.5226*LEDU -3.6599*LK -23.6387*LLO +3.9951*LOil + 63.6447*LTFP -807.8235)

Notes:(*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product; TFP = total factor productivity. **Source**: Constructed using EViews 10 output

Education shows a negative relationship with GDP per capita as well. For each 1% increase in the 1-year lag of education a decrease of -0.56 occurs to GDP per capita. The t-statistic value of -3.64048 indicates that the coefficient is statistically significant at the 5% level (p-value = 0.0357). This indicated he presence of a significant long-run relationship between education and GDP per capita. In this regard, education plays a significant role in encouraging growth and productivity as knowledge and skill are important drivers for achieving a better economic performance (Habibi & Zabardast, 2020; Kobzev Kotásková

et al., 2018; Marquez-Ramos & Mourelle, 2019). However, recent studies show that education can have a negative impact on economic growth through the effect oil rents. Education is important, as stated before, however if not accompanied with sound institutional quality their impact can turn detrimental instead (Farzanegan & Thum, 2020; Mohtadi, 2022). Another parameter that shows a negative relationship with GDP per capita is capital stock since for every unit of increase in the 1-year lag of capital stock a decrease of 0.05 occurs in GDP per capita. The t-statistic value of -3.16316 indicates that the coefficient is statistically significant at the 5% level (p-value = 0.0507). Hence, there is evidence of a significant long-run relationship between stock capital and PGDP.

The Results indicate a strong and significant long run relationship between law and order and PGDP since the coefficient for the lagged law and order variable is -0.378506 where every time it increase one unit it causes a decrease of 0.37 in GDP per capita.in addition, the t-statistic value of -6.05938 indicates that the coefficient is statistically significant at the 1% level (p-value = 0.009). The coefficient for the lagged oil rents variable is 0.06397 whereas, the t-statistic value of 6.724111 indicates that the coefficient is statistically significant at the 1% level (p-value = 0.0067). Therefore, there is strong evidence of a significant long-run relationship between oil rents and the dependent variable.

Total factor productivity (TFP) results show a positive causality with GDP per capita where for every unit of increase in 1-year lag TFP, GDP per capita reaches an increase of 1.01 which shows the importance of this parameter in the long run. As for the intercept coefficient, the results shown in **Table 5** reveal a coefficient of -12.935 with a t-statistic of -5.30956, indicating that it is statistically significant at the 5% level (p-value = 0.013). This implies that there is a significant constant term in the long-run relationship.

5.3.1.3 The Short run Estimation Results

Table 6 shows the results of the short run estimation or what is called error correction method (ECM). In a nutshell, the ECM model can be derived from the ARDL model through a simple reparameterization to observe the dynamics between the variables in the short run. For the Algerian economy, the error correction term (CointEq) is negative with a value of 0.12 which denotes that 12% of error is corrected each year. In addition, the negative value shows the stability of the model.

Table 6. ARDL Error Correction Regression Results

Variable	Coefficient	t-Statistic	Prob.
GDP per capita (-1)	-0.859477***	-14.12602	0.0008
Corruption	0.037989***	6.79849	0.0065
Education	2.290377***	17.18998	0.0004
Stock capital	-0.004827*	-1.80541	0.1688
Stock capital (-1)	0.03397***	14.47816	0.0007
law and order	-0.191736***	-14.80052	0.0007
Law and order (-1)	0.172522***	15.87951	0.0005
oil rents	0.01247 ***	6.36048	0.0079
Oil rents (-1)	-0.051371***	-17.92433	0.0004
TFP	0.544223***	22.89113	0.0002
TFP (-1)	-0.115644**	-3.04506	0.0556
CointEq(-1)[a]		-0.016012	
R-squared		0.995216	
Adjusted R-squared		0.989954	

Notes:(*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product; TFP = total factor productivity. [a]: p-value incompatible with t-Bounds distribution. **Source**: Constructed using EViews 10 output

The reported results in **Table 6** show that, on the short run, institutional quality has positive relationship with GDP per capita with both corruption and the 1-year lag of law and order. However, the law and order parameter has a negative value of 0.19. with a value of 0.012, Oil rents mark a positive relationship with GDP per capita, an assumption that have been studied and tested by different literature. Whereas, the 1-year lag of oil rents has a negative value of 0.05. Education is shown to have the value of 2.29 which means there is a positive relationship with GDP per capita. On the one hand, TFP and the lag form of stock capital also have a positive relationship with a value of 0.54 and 0.03, respectively, for every one-unit increase. On the other hand, stock capital and the 1-year lag of TFP and have negative values indicating a negative relationship and that every 1% increase in each respectively, results in a 0.05 and 0.12 decrease in GDP per capita. As for CointEq(-1) and R-squared results. The first is the coefficient for the ARDL model's lagged error correction term. The number -0.016012 indicates that the lagged error correction term and the dependent variable have a negative relationship. While the latter, the R-squared number, expresses how well the model's independent variables explain the variance in the dependent variable. In this situation, the R-squared value is 0.995216, suggesting that the independent variables in the model can explain about 99.52% of the variance in the dependent variable. As for the adjusted R-squared, the value shows a score of 0.989954 which accounts for the model's complexity and sample size. When compared to R-squared, it gives a more conservative estimate of model fit. The high adjusted R-squared in this scenario indicates that the model's independent variables continue to have a large collective effect on the dependent variable, even after accounting for the model's complexity and sample size.

5.3.2 The Long Run Relationship between Resource Rents and TFP

In this section, the study will investigate the impact of resource rents on total factor productivity TFP through the application of the ARDL bounds test approach for cointegration. The study uses TFP as the dependent variable, resource as the dependent variable whereas the controlling variables include: Education (Edu), corruption (CRP) and law and order (LO). The sample of the study has been adjusted for the estimation from 1998 to 2019. There have been 162 evaluated models but only one model was chosen using the Akaike Information Criterion method which is ARDL model (2,2,0,0,2) (Appendix 2) with the assumption that the lags number has been fixed automatically at 2 (Appendix 3).

The results of the estimation are summarized in **Table 7** along with the description of the model criteria and the different diagnostic tests which purpose serves to test for auto-correlation, normality, specification and heteroskedasticity. The results (see **Appendix *4***) illustrate the absence of any issues with error normality, heteroskedasticity is insignificant as well as the functional form does not show any issues therefore the model does not exhibit any issues and the estimation can proceed to the next step.

The coefficients represent the estimated values for each variable in the ARDL model, while the T-statistics indicate the significance of each coefficient. A significant coefficient (indicated by a T-statistic greater than the critical value) suggests a strong association between the independent variable and the dependent variable. In , the lagged values of the total factor productivity (LTFP) show a positive coefficient for LTFP(-1) and a negative coefficient for LTFP(-2). This suggests that the current and past values of LTFP

have different effects on the dependent variable. The T-statistics indicate that the coefficient for LTFP(-2) is statistically significant, while the coefficient for LTFP(-1) is not.

Table 7. *Summary of ARDL model estimation*

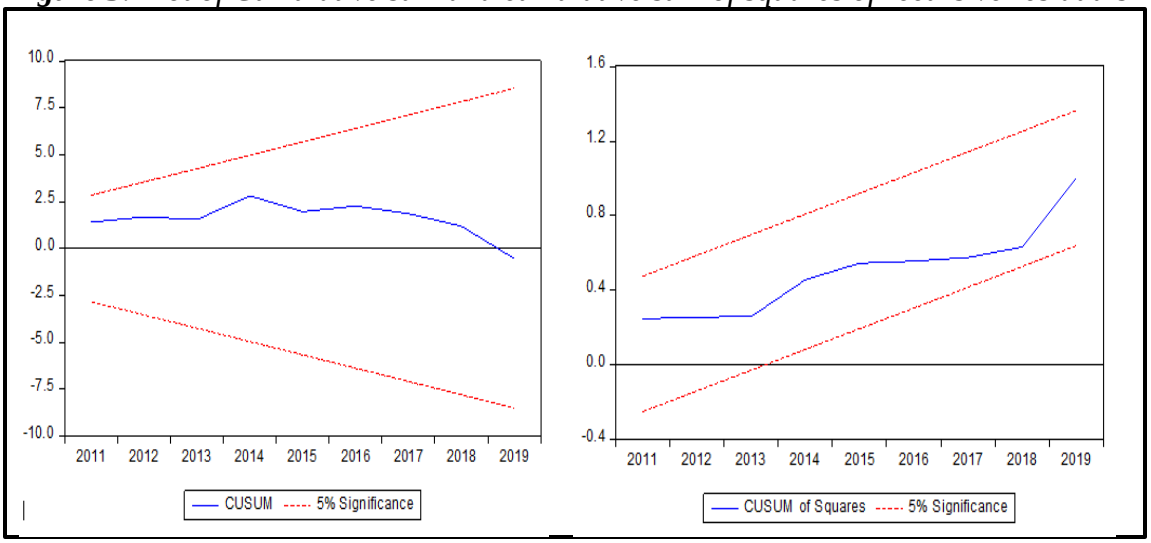
Variable	Coefficient	T-statistics
LTFP(-1)	0.516131	1.474922
LTFP(-2)	-0.417505	-3.040332
Resource rents	0.007180	0.528028
Resource rents (-1)	-0.010701	-0.441697
Resource rents (-2)	0.043013	1.928401
Corruption	0.037894	1.281964
Law and order	0.127203	1.36742
Education	2.376090	1.894951
Education (-1)	-4.750648	-2.446119
Education (-2)	3.577245	2.844846
C	12.20803	2.168707
Model Criteria		
ARDL MODEL	ARDL(2, 2, 0, 0, 2)	
R-Squared	0.993295	
Adjusted R-squared	0.987200	
Ljung-Box(residuals) TEST	25.966***	
Ljung-Box(residuals Squared) TEST	8.3529*	
Diagnostic Test		
Jarque-Berra TEST	0.320345*	
Breusch-Godfrey Serial Correlation LM Test	2.786981*	
Heteroskedasticity Test: Breusch-Pagan Godfrey	8.305038*	
HeteroskedasticityTest: ARCH (2)	0.011107*	

Notes: (*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product; TFP = total factor productivity. **Source**: Student's calculation using EViews 10

The coefficients for the resource rents and corruption indicate a positive association with the dependent variable. However, the T-statistics indicate that neither of these coefficients is statistically significant, meaning that their relationship with the dependent variable might not be reliable or significant in the given model. Both Law and order and Education have positive coefficients, suggesting a positive impact on the dependent variable. The T-statistics indicate that the coefficient for Law and order is statistically significant, while the coefficient for Education is not. The intercept term in the model is represented by the coefficient C. In this case, it has a positive value of 12.20803, indicating a constant positive effect on the dependent variable. The T-statistic suggests that this coefficient is statistically significant. The diagnostic tests, the Ljung-Box test for residuals and residuals squared, as well as the Jarque-Bera test, are used to assess the assumptions of the model. The significant p-values for the Ljung-Box test indicate the presence of serial correlation in the residuals, suggesting that the model might not capture all the autocorrelation patterns. The Jarque-Bera test suggests that the residuals might not follow a normal distribution. And finally, the heteroskedasticity tests including the Breusch-Pagan Godfrey and ARCH tests are used to assess the presence of heteroskedasticity in the model. The significant p-values indicate the presence of heteroskedasticity in the residuals, suggesting that the assumption of constant variance might not hold.

The reported results of the CUSUM and CUSUMSQ test (see **Figure 3**) show the absence of recursive residuals and display the stability of the model hence, the analysis can be carried out.

***Figure 3**. Plot of Cumulative sum and cumulative sum of squares of recursive residuals*



Note: CUSUM = Cumulative Sum control chart. The straight line stands for critical bounds at 5% significance level. **Source**: Secondary data using EViews10

5.3.2.1 Bounds test

Pesaran also suggest the application of an F bound test to examine the cointegration between the variables of order I(0) and order I(1)and to establish whether a long run relationship exists. The F-statistic need to be compared to the values of I(0) and I(1). If it is lower than I(0) then the null hypothesis is accepted and there exists no cointegration while if the value is higher than I(1) then the null hypothesis is rejected and there is the presence of cointegration between the variables.

***Table 8**.* F-Bounds Test. Null hypothesis: No level relationship

Test statistics	Value	Significance	I(0)	I(1)
F-statistic	4.025377	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.50%	2.88	3.87
		1%	3.29	4.37

Source: Student's calculation using EViews 10

The results shown in **Table 8** display a F-statistic value of 4.02 which is higher than the values present in I(1) hence, the null hypothesis is rejected and there exist cointegration which is the one of the prerequisites of the ARDL model in addition to the presence of a long run relationship between variables (Pesaran, 1999; Pesaran et al., 2001). Therefore, the study can proceed to estimate the long run model.

5.3.2.2 The Long Run Results of the Impact of Resource Rents on TFP

The long run estimation results are summarized in Table **9**. The estimation was run through the application of equation (21) which measures the impact the resource rents (RR) have on total factor productivity (TFP).

Table 9. *ARDL Long run Form*

Variable	Coefficient	t-Statistic	Prob.
Resource rents	0.043814**	2.439413	0.0329
Corruption	0.042040*	1.118187	0.2873
Law and order	0.141122***	3.12397	0.0097
GDP per capita	1.334282***	19.89216	0.0000
C	13.54381***	235.4128	0

EC=LTPD- (0.0420*LRR +0.0420*LCRP +0.1411*LLAW + 1.3343*LEDU +13.5438)

Notes:(*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product. **Source**: Constructed using EViews 10 output

In the long run, a one unit increase in resources rents results in an increase of 0.04 units of TFP. Corruption also causes an increase in TFP of 0.04 units for every 1% increase.

GDP per capita also has a positive value of 1.33 units of increase in TFP. Whereas the latter has a significant positive relationship with law and order as it increases 0.14 units for every unit of increase. In other words, the reported values showcase a positive relationship between TFP and the other parameters.

5.3.2.3 The Short Run Estimation Results

Table 10 shows the results of the short run estimation or what is called error correction method (ECM). In a nutshell, the ECM model can be derived from the ARDL model through a simple reparameterization to observe the dynamics between the variables in the short run. For this model the error correction term (CointEq) is negative as well with a value of 0.90 which denotes that 90% of error is corrected each year. In addition, the negative value shows the stability of the model.

Table 10. ARDL Error Correction Regression Results

Variable	Coefficient	t-Statistic	Prob.
TFP (-1)	0.417505***	3.107582	0.0100
Resource rents	0.007180*	0.603881	0.5582
Resource rents (-1)	-0.043013***	-3.178034	0.0088
Education	2.376090**	2.607083	0.0244
Education (-1)	-3.577245**	-3.538256	0.0046
CointEq(-1)*		-0.901374	
R-squared		0.645568	
Adjusted R-squared		0.534809	

Notes:(*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product; TFP = total factor productivity. **Source**: Constructed using EViews 10 output

The reported results in **Table 10** show that, in the short run, a one unit increase in the one-year lag of TFP causes an increase of 0.42 units in TFP translating into a significant positive relationship between TFP and education. Resource rents affect TFP positively with the positive value of 0.07 for every unit of increase. Resource rents as well have a positive impact while the lag value has a negative impact of 0.04. Both education and the one-year lag of education have a positive effect on TFP with values of 2.38 and 3.58 respectively.

5.3.3 The Long Run Relationship between Resource Rents and Human Capital

For this model which endeavors to estimate the long run relationship between natural resources and human capital, education (Edu) is employed as a proxy for human capital. Therefore, education is the dependent variable, resource rents the dependent variable and the controlling variables include: corruption (CRP), law and order (LO) and GDP per capita (PGDP). The sample of the study has been adjusted for the estimation from 1998 to 2019. There have been 162 evaluated models but only one model was chosen using the Akaike Information Criterion method which is ARDL model (2, 1, 2, 2, 2) (Appendix 2) with the assumption that the lags number has been fixed automatically at 2 (Appendix 3). The results of the estimation are summarized in **Table 11** along with the description of the model criteria and the different diagnostic tests which purpose serves to test for auto-correlation, normality, specification and heteroskedasticity. The results illustrate the absence of any issues with error normality, heteroskedasticity is insignificant as well as the functional form does not show any issues therefore the model does not exhibit any issues and the estimation can proceed to the next step.

Table 11. *Summary of ARDL model estimation*

Variable	Coefficient	T-statistics
Education (-1)	2.159210***	5.620982
Education (-2)	-1.404428**	-3.256158
Resource rents	0.007187**	2.737201
Resource rents (-1)	-0.011370***	-3.925606
Corruption	-0.035662**	-2.547317
Corruption (-1)	0.022462**	2.988001
Corruption (-2)	-0.039774**	-2.567061
Law and order	-0.009869*	-0.737444
Law and order (-1)	0.030250**	2.36767
Law and order (-2)	0.012724*	1.620561
GDP per capita	0.163953**	2.498756
GDP per capita (-1)	-0.144321*	-2.024937
GDP per capita (-2)	-0.216575***	-3.424155
C	1.708560**	2.974103
@TREND	0.006566**	2.870328
Model Criteria		
ARDL MODEL	ARDL(2, 1, 2, 2, 2)	
R-Squared	0.999855	
Adjusted R-squared	0.999565	
Ljung-Box(residuals) TEST	18.398*	
Ljung-Box(residuals Squared) TEST	9.9569*	
Diagnostic Test		
Jarque-Berra TEST	2.285006**	
Breusch-Godfrey Serial Correlation LM Test	29.85962*	
Heteroskedasticity Test: Breusch-Pagan Godfrey	0.846637*	
HeteroskedasticityTest: ARCH (2)	0.888942*	

Notes: (*), (**), (***) denote significance at 10%, 5% and 1% respectively.

GDP= gross domestic product. **Source**: Student's calculation using EViews 10

The reported results in **Table 11** summarises the estimation results for each variable. A one-unit increase in education (-1) is connected with an increase in the dependent variable, according to the coefficient of 2.159210. The t-statistic of 5.620982 suggests that this coefficient is statistically significant, indicating a strong positive association between schooling and the dependent variable that is one period behind. Whereas, a one-unit increase in education (-2) is connected with a drop in the dependent variable, according to the coefficient of -1.404428. The t-statistic of -3.256158 indicates that this coefficient is statistically significant, demonstrating a substantial negative association between two periods of schooling and the dependent variable. The coefficient of 0.007187 shows that a one-unit rise in resource rents corresponds to an increase in the dependent variable. This coefficient is statistically significant, according to the t-statistic of 2.737201, showing a positive link between resource rents and the dependent variable. While one-unit rise in corruption is connected with a one-unit decline in the dependent variable, according to the coefficient of -0.035662. This coefficient is statistically significant, as indicated by the t-statistic of -2.547317, showing a substantial negative association between corruption and the dependent variable.

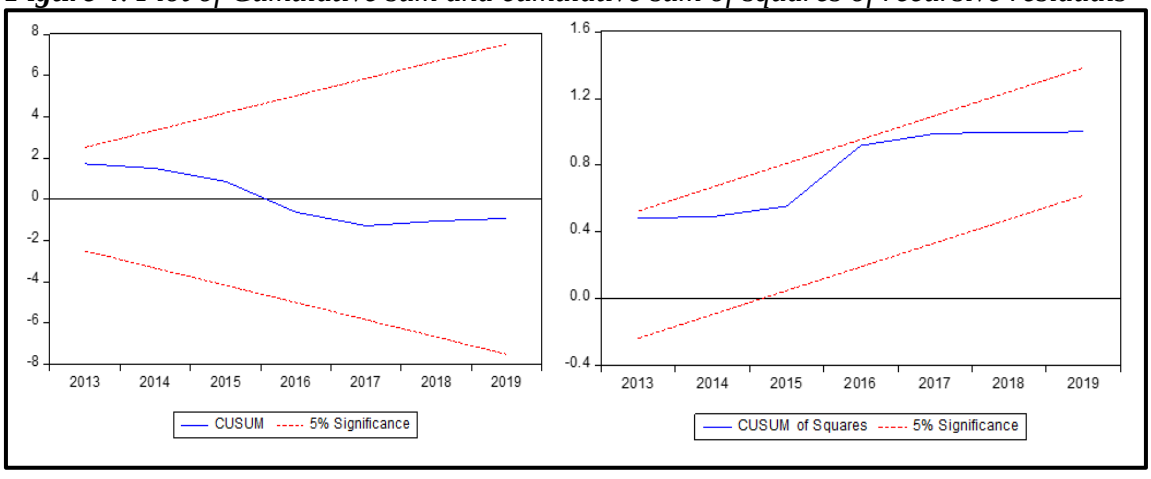
For the law and order variable, a one-unit rise is connected with a one-unit drop in the dependent variable, according to the coefficient of -0.009869. The t-statistic of -0.737444, however, indicates that this coefficient is not statistically significant. In addition, a one-unit rise in GDP per capita is connected with an increase in the dependent variable, according to the coefficient of 0.163953. The t-statistic of 2.498756 indicates that this coefficient is statistically significant, showing that GDP per capita has a positive association with the dependent variable. The results of the C constant indicte that when all other variables are zero, the coefficient of 1.708560 reflects the intercept or baseline value of the

dependent variable. This coefficient is statistically significant, according to the t-statistic of 2.974103.

As for the assessment of the overall model fit, the results reveal that the result of 0.999855 for the R-squared shows that the model's independent variables explain a significant part of the variance in the dependent variable. R-squared adjusted for the number of predictors in the model has a value of 0.999565 which indicates the R-squared adjusted for the number of predictors in the model, providing a measure of the model's goodness of fit. The Ljung-Box and Jarque-Berra tests look for autocorrelation and normality assumptions in the model's residuals. Significance levels (*, **, ***) imply that the null hypothesis is rejected. Heteroskedasticity tests and the Breusch-Godfrey test measure serial correlation and heteroskedasticity in the model's residuals. Significance levels (*, **) imply that the null hypothesis is rejected.

The reported results of the CUSUM and CUSUMSQ test (see **Figure 4**) show the absence of recursive residuals and display the stability of the model hence, the analysis can be carried out.

Figure 4. *Plot of Cumulative sum and cumulative sum of squares of recursive residuals*



Note: CUSUM = Cumulative Sum control chart. The straight line stands for critical bounds at 5% significance level. **Source**: Secondary data using EViews10

5.3.3.1 Bounds test

Pesaran also suggest the application of an F bound test to examine the cointegration between the variables of order I(0) and order I(1)and to establish whether a long run relationship exists. The F-statistic needs to be compared to the values of I(0) and I(1). If it is lower than I(0) then the other hypothesis is accepted and there exists no cointegration while if the value is higher than I(1) then the null hypothesis is rejected and there is the presence of cointegration between the variables.

Table 12. F-Bounds Test. Null hypothesis: No level relationship

Test statistics	Value	Significance	I(0)	I(1)
F-statistic	5.416560	10%	3.03	4.06
k	4	5%	3.47	4.57
		2.50%	3.89	5.07
		1%	4.4	5.72

Source: Student's calculation using EViews 10

The results shown **Table 12** display a F-statistic value of 5.42 which is higher than the values present in I(1) hence, the null hypothesis is rejected and there exist cointegration which is the one of the prerequisites of the ARDL model in addition to the presence of a long run relationship between variables (Pesaran, 1999; Pesaran et al., 2001). Therefore, the study can proceed to estimate the long run model.

5.3.3.2 The Long run results of the impact of resource rents on Human Capital

The long run estimation results are summarized in **Table 13**. The estimation was run through the application of equation (22) which measurers the impact the resource rents (RR) have on human capital (Edu).

Table 13. *ARDL Long run Form*

Variable	Coefficient	t-Statistic	Prob.
Resource rents	-0.017061*	-1.811825	0.1129
Corruption	-0.216026*	-2.208873	0.0629
Law and order	0.134999*	1.496363	0.1782
GDP per capita	-0.803135**	1.496363	0.0480
C	1.70856**	2.974103	0.0207

EC=LEDU- (-0.0171*LRR -0.1350*LLAW -0.8031*LPGDP)

Notes:(*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product. **Source**: Constructed using EViews 10 output

In the long run (**Table 13**), a one unit increase in resources rents results in a decrease of 0.02 units of Education based on a coefficient of -0.017061. The t-statistic of -1.811825, however, indicates that this coefficient is not statistically significant. The probaility of 0.1129 verifies that there is insufficient evidence to reject the null hypothesis of zero coefficient. Corruption also causes a decrease in Education of 0.21 units for every 1% increase according to the coefficient of -0.216026. This coefficient is statistically significant at a moderate level, according to the t-statistic of -2.208873. Although the

likelihood of 0.0629 implies that there is some evidence to support the hypothesis that the coefficient is not zero, it falls slightly short of conventional significance criteria.

The coefficient of 0.134999 indicates that a one-unit rise in law and order corresponds to an increase in the dependent variable. The t-statistic of 1.496363, on the other hand, indicates that this coefficient is not statistically significant. The probability of 0.1782 implies that no compelling evidence exists to reject the null hypothesis. A one-unit rise in GDP per capita is connected with a drop in the dependent variable, according to the coefficient of -0.803135. This coefficient is statistically significant at a moderate level, according to the t-statistic of 1.496363. The probability of 0.0480 indicates that there is some evidence to support the hypothesis that the coefficient is not zero, but it falls slightly short of the standard significance criteria.

5.3.3.3 The Short Run Estimation Results

Table 14 shows the results of the short run estimation or what is called error correction method (ECM). In a nutshell, the ECM model can be derived from the ARDL model through a simple reparameterization to observe the dynamics between the variables in the short run. For this model the error correction term (CointEq) is negative as well with a value of 0.02 which denotes that 2% of error is corrected each year. In addition, the negative value shows the stability of the model.

Table 14. ARDL Error Correction Regression Results

Variable	Coefficient	t-Statistic	Prob.
Education (-1)	-0.859477***	-14.12602	0.0008
Resource rents	0.037989***	6.79849	0.0065
Corruption	2.290377***	17.18998	0.0004

corruption (-1)	-0.004827*	-1.80541	0.1688
Law and order	0.03397***	14.47816	0.0007
Law and order (-1)	0.172522***	15.87951	0.0005
GDP per capita	0.01247 ***	6.36048	0.0079
GDP per capita (-1)	-0.051371***	-17.92433	0.0004
CointEq (-1)*		-0.016012	
R-squared		0.995216	
Adjusted R-squared		0.989954	

Notes:(*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product. **Source**: Constructed using EViews 10 output

The reported results in **Table 14** show that, in the short run, a one unit increase in the one-year lag of education causes a decrease of 0.86 units in Education. Resource rents affect education positively with the positive value of 0.04 for every unit of increase. Corruption as well has a positive impact while the one-year lag of corruption has a negative impact of 0.004. Both law and order and the one-year lag of law and order have a positive effect on Education with values of 0.03 and 0.17 respectively. As for GDP per capita, every unit of increase result in an increase of 0.012 in education and every 1% increase in the lag form of PGDP causes a decrease in education of 0.051.

5.3.4 The Long Run Relationship between Resource Rents and Institutional Quality

The last model focusses on the relationship between resource rents and institutional quality. Institutional quality is the dependent variable while resource rents is the independent variable. Education (Edu) and GDP per capita (PGDP) were used as control variables. The sample of the study has been adjusted for the estimation from 1998 to 2019. There have been 54 evaluated models but only one model was chosen using the Akaike Information

Criterion method which is ARDL model (2, 0, 0, 2) (Appendix 2) with the assumption that the lags number has been fixed automatically at 2 (Appendix 3).

Table 15. Summary of ARDL model estimation

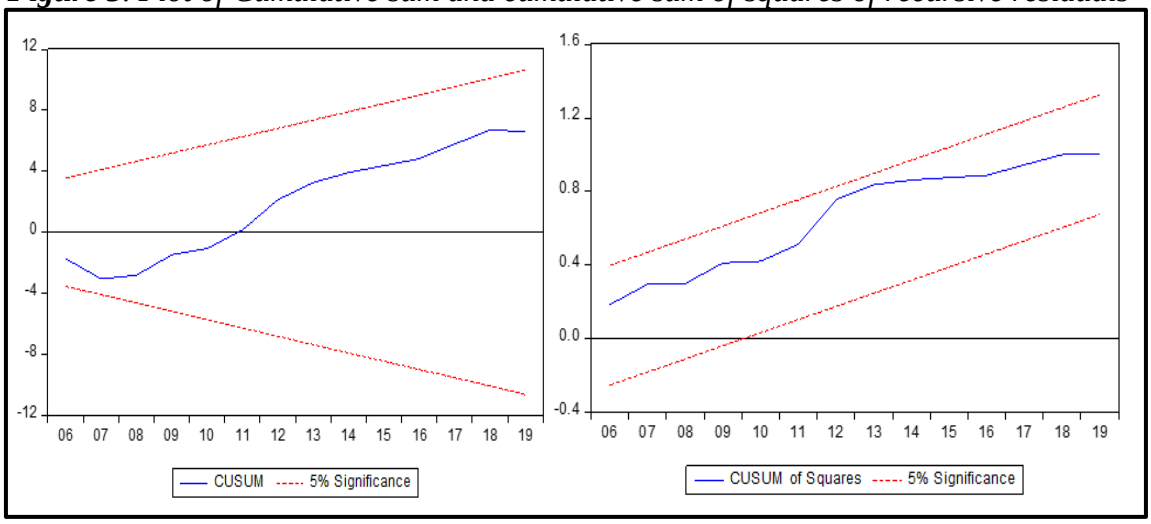
Variable	Coefficient	T-statistics
Institutional quality (-1)	0.766541***	0.0003
Institutional quality (-2)	-0.600297***	0.0000
Resource rents	0.135541*	0.3501
GDP per capita	8.429034***	0.0013
Education	-59.27377***	0.0004
Education (-1)	86.37024***	0.0071
Education (-2)	-31.06123*	0.1332
C	-66.97832***	0.0008
Model Criteria		
ARDL MODEL	ARDL(2, 0, 0, 2)	
R-Squared	0.942581	
Adjusted R-squared	0.913872	
Ljung-Box(residuals) TEST	6.9051*	
Ljung-Box(residuals Squared) TEST	8.1182*	
Diagnostic Test		
Jarque-Berra TEST	5.378387*	
Breusch-Godfrey Serial Correlation LM Test	1.825315*	
Heteroskedasticity Test: Breusch-Pagan Godfrey	0.791809*	
Heteroskedasticity Test: ARCH (2)	3.987754*	

Notes: (*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product. **Source**: Student's calculation using EViews 10

The results of the estimation are summarized in **Table 15** along with the description of the model criteria and the different diagnostic tests which purpose serves to test for auto-correlation, normality, specification and heteroskedasticity. The results (see appendix) illustrate the absence of any issues with error normality, heteroskedasticity is insignificant as well as the functional form does not show any issues therefore the model does not exhibit any issues and the estimation can proceed to the next step.

The reported results of the CUSUM and CUSUMSQ test (see **Figure 3**) show the absence of recursive residuals and display the stability of the model hence, the analysis can be carried out.

Figure 5*. Plot of Cumulative sum and cumulative sum of squares of recursive residuals*



Note: CUSUM = Cumulative Sum control chart. The straight line stands for critical bounds at 5% significance level. **Source**: Secondary data using EViews10

5.3.4.1 Bounds test

Pesaran also suggest the application of an F bound test to examine the cointegration between the variables of order I(0) and order I(1) and to establish whether a long run relationship exists. The F-statistic needs to be compared to the values of I(0) and I(1). If it

is lower than I(0) then the other hypothesis is accepted and there exists no cointegration while if the value is higher than I(1) then the null hypothesis is rejected and there is the presence of cointegration between the variables.

Table 16. F-Bounds Test. Null hypothesis: No level relationship

Test statistics	Value	Significance	I(0)	I(1)
F-statistic	3.698903	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.50%	3.15	4.08
		1%	3.65	4.66

Source: Student's calculation using EViews 10

The results shown in **Table 16** display a F-statistic value of 3.70 which is higher than the values present in I(1) hence, the null hypothesis is rejected and there exist cointegration which is the one of the prerequisites of the ARDL model in addition to the presence of a long run relationship between variables (Pesaran, 1999; Pesaran et al., 2001). Therefore, the study can proceed to estimate the long run model.

5.3.4.2 The long run results of the impact of resource rents on Institutional Quality

The long run estimation results are summarized in **Table 17**. The estimation was run through the application of equation (21) which measurers the impact the resource rents (RR) have on institutional quality (IQ).

The long run estimation's results show a positive relationship with two out of three variables. Where for every unit of increase in resource rents an increase of 0.16 occurs in intuitional quality units and for 1% increase in GDP per capita an increase of 10.10 happens for institutional quality. As for education, there exists a negative relationship with

institutional quality where a one unit increase in education causes a decrease of 4.75 in institutional quality.

Table 17. *ARDL Long run Form*

Variable	Coefficient	t-Statistic	Prob.
Resource rents	0.162567*	0.903301	0.3816
GDP per capita	10.10972***	7.885155	0.0000
Education	-4.755303**	-2.603997	0.0208
C	-79.75757***	-8.931394	0.0000

EC=IQ- (0.1626*LRR +10.1097*LPGDP + -4.7553*LEDU -79.7576)

Notes:(*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product. **Source**: Constructed using EViews 10 output

5.3.4.3 The Short Run Estimation Results

Table 18 shows the results of the short run estimation or what is called error correction method (ECM). In a nutshell, the ECM model can be derived from the ARDL model through a simple reparameterization to observe the dynamics between the variables in the short run. For this model the error correction term (CointEq) is negative as well with a value of 0.83 which denotes that 83% of error is corrected each year. In addition, the negative value shows the stability of the model.

Table 18. ARDL Error Correction Regression Results

Variable	Coefficient	t-Statistic	Prob.
Institutional quality (-1)	0.600297***	4.283594	0.0008
Education	-59.27377***	-3.696369	0.0024
Education (-1)	31.06123*	1.918604	0.0757
CointEq(-1)*		-0.833756	
R-squared		0.685443	
Adjusted R-squared		0.633017	

Notes:(*), (**), (***) denote significance at 10%, 5% and 1% respectively. GDP= gross domestic product; **Source**: Constructed using EViews 10 output

The reported results in **Table 18** show that, in the short run, a one unit increase in the one-year lag of institutional quality causes a decrease of 0.60 units in institutional quality. Education, on the one hand, effects institutional quality negatively with a value of 59.23 for every unit of increase. The lag year of education, on the other hand, has a positive impact with a value of 31.60 for each unit of increase.

Chapter 6: Analysis

The importance of natural resources in the Algerian economy lies in the contribution of the revenues generated by these commodities to the state's total exports and total income. In addition, oil and natural resource help with the general budget in the form of tax revenues, the share of GDP and other macroeconomic indicators. This is what made natural wealth endowments the center of the attention of public authorities in an attempt to protect and develop this wealth. In this chapter, the results obtained from the empirical study will be discussed in addition to dissecting their implications on an economic level and their relevance to the previously discussed literature.

6.1 OIL AND ECONOMIC GROWTH

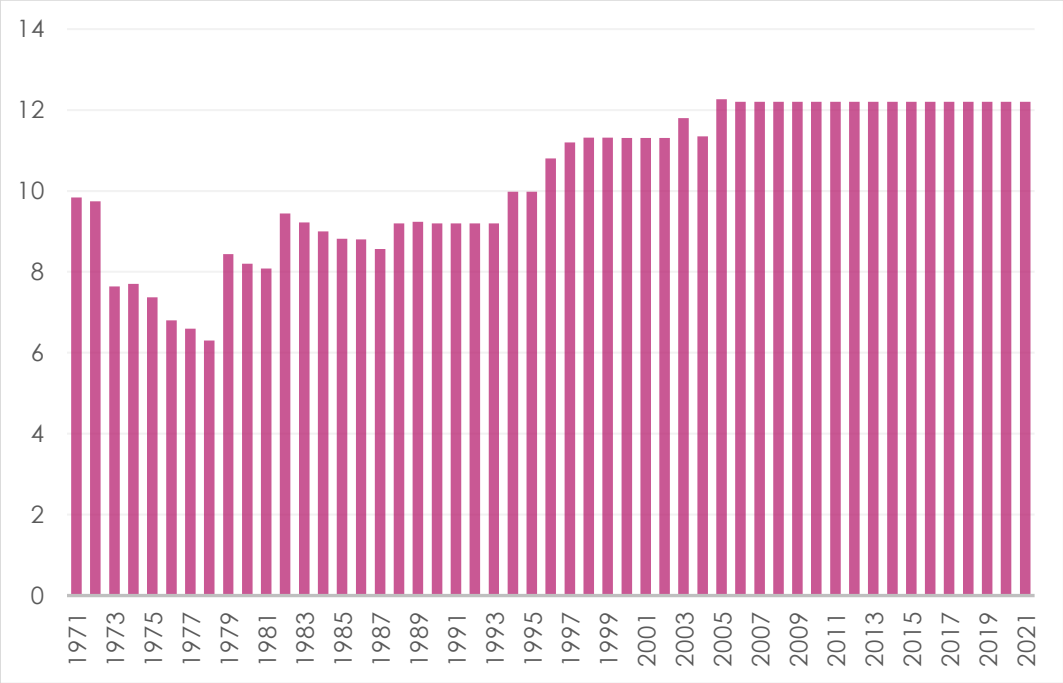
Algeria possesses significant oil potentials which grants the country an important position in the global oil market today as an oil producing and exporting country.

6.1.1 Oil Reserves

Algeria is rich in significant oil reserves which, as of December 2021, reached 12.2 billion barrels of proven crude oil reserves according to OPEC. The country ranks sixteenth in world proven oil reserves and the second country in Africa after Nigeria. Furthermore, most of these reserves are concentrated in the southeast of the country, so that Hassi Messaoud contains 70% of the total oil reserves, but these reserves are constantly increasing and this has been since Algeria's nationalization of hydrocarbons in 1971 until the present day, as a result of the tremendous efforts made by the state to explore the territory for more new oil wells that would enhance the continuation of the life of oil in Algeria such as the

Sonatrach's investing $30 billion to increase exploration (Entelis, 1999). The following chart (**Figure *6***) shows the development of oil reserves during the period (1971-2019).

Figure 6: Crude Oil Reserves in Algeria 1971-2021 (in Billion Barrels)



Source: Constructed with (1971-1978) data collected from (Ben Ouali, 2016), (1879-2000) data from (*Annual Statistical Bulletin- OPEC*, 1999) and (2000-2021) from (*OPEC MOMR*, 2022).

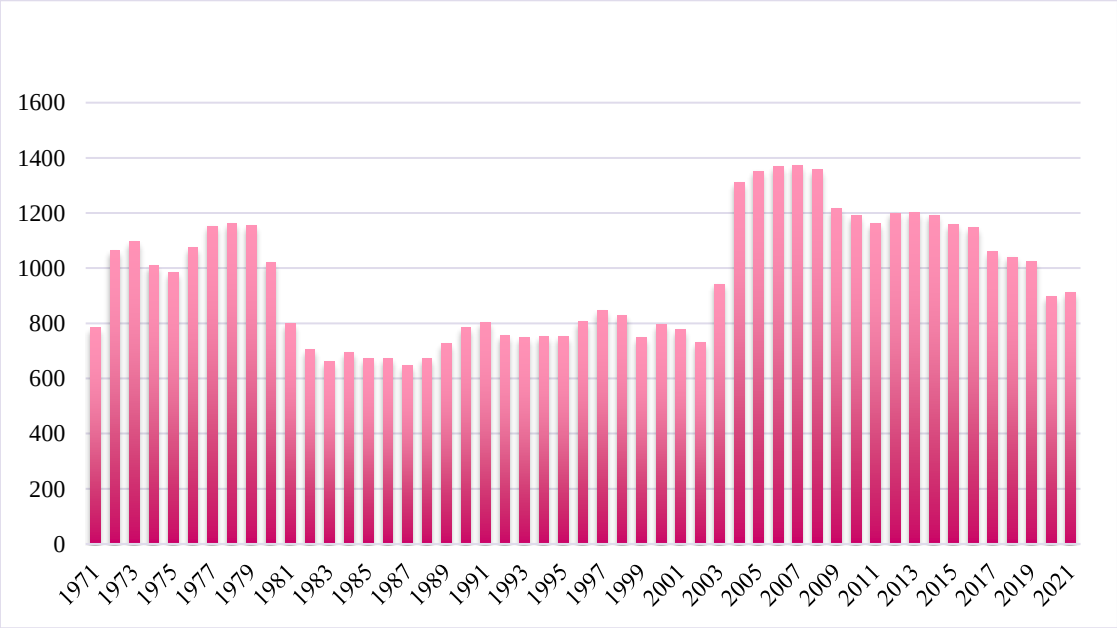
As shown in the chart, the amount of the proven oil reserves in Algeria kept mostly declining between 1973 and 1978. In the 1970's, Algeria became highly dependent on the hydrocarbons sector to finance the different reforms that were planned at the time and the oil revenues allowed the socialite state created by Houari Boumedienne to achieve social experiments and launch the industrialization of the economy (Entelis, 1999). The instability of the oil reserves continues for the next years with a slight improvement in values until 2005 where Algeria witnessed a peak at 12.27. In 2021, the reserves amounted to 12.2 billion barrels which has been a stable value since 2006. According to Sonatrach, the reason the level of proven reserves in hydrocarbons remained practically the same for more than

10 years is a demonstration of the constant of renewal of reserves which reflects the country's continued efforts at sustaining exploration (*Rapport Annuel - Sonatrach*, 2017).

6.1.2 Oil Production

Algeria is considered one of the most important oil producing countries in the world. With the production of 911 thousand barrels per day (tb/d), the country ranks 17th in the world (*OPEC MOMR*, 2022). This offered the economy an active position in the global oil market. Since the nationalization of oil in 1971, oil production in Algeria has been in continuous development as a result of the efforts made in exploration, research and exploration, and this is what the following chart shows (**Figure *7***).

Figure 7: Oil production in Algeria from 1971 to 2021 (in 1,000 barrels per day)



Source: Constructed with (1971-1978) data collected from (Ben Ouali, 2016), (1879-2021) data from OPEC Annual Statistical Bulletin.

The chart illustrates the fluctuations that the crude oil production witnessed by the Algerian economy. The first years after the nationalization, the amounts produced of crude oil varied between 785.4 tb/d and 1019.9 tb/d reaching a high of 1161.2 tb/d in 1978. The eighties and the nineties witnessed a decrease in production with lowest amount reaching

660 tb/d in 1983 and the highest amount of crude oil produced attaining 846.1 tb/d in 1997. With the beginning of the new millennium, and as shown in **Figure *7***, the sector entered a state of recovery, which resulted in a continuous increase in production, where the largest produced amount of crude oil was estimated at 1371.6 tb/d in 2007, which was the result of increasing global demand for oil at the beginning of the 2007, in addition to the increase in wells discovered during the same year due to the efforts made by the state. Furthermore, the issuance of the hydrocarbons law 05/07[1], which opened the way for foreign investors in the hydrocarbons sector and the great privileges that they obtained, and this was the result of this great demand for foreigners to invest Within the sector. However, a decrease in production, due to the global financial crisis, was recorded in 2008 and the decline continued until 2012. Yet, production in this year recorded a somewhat improvement compared to previous years, amounting to 1199.8 tb/d, and this is in light of the increasing global demand, which in 2013 reached 1202.6 tb/d as a result of new discoveries of oil wells in various regions of the country.

6.1.3 The Importance of Oil for the Algerian Economy

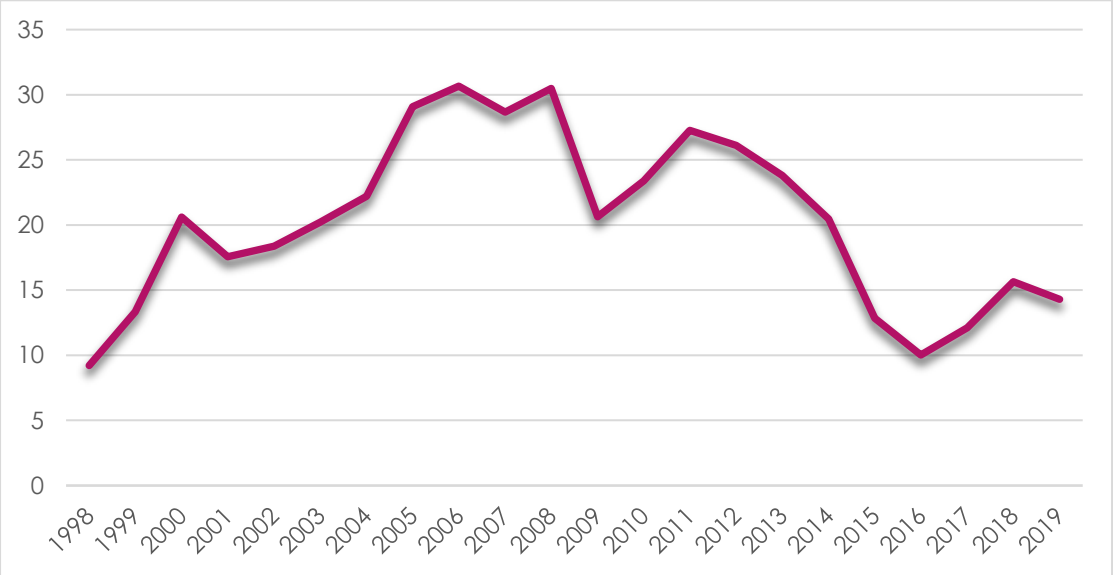
The Algerian regime depends almost entirely on the oil sector, as the latter is considered the backbone on which the economic activity relies on thanks to the large revenues procured by this commodity. Since the economy relies heavily on oil rents, the contribution of the latter has branched out to reach most of the macroeconomic indicators including, GDP, state's financial budget and exports.

[1] Law No. 05-07 covered all matters pertaining to oil and gas activities within Algeria and created the current regulatory authorities in the Algerian government (IEA, 2022).

6.1.3.1 Oil Contribution to GDP

The Gross Domestic Product (GDP) expresses the sum of all goods and services produced by society during a specific period of time, usually a year, within a country. Oil is an important commodity produced by Algeria, and given the great importance occupied by this commodity, it has become a complete economic sector that has its own weight in the Algerian national economy. Furthermore, it has become one of the branches of production and as a result, its growth has become closely linked to the growth of the oil sector which is showcased in the following trend (**Figure *8***) of the oil rents as a share of GDP from 1998 to 2019.

Figure 8: Oil Rents (% of GDP)



Source: constructed using World Bank data.

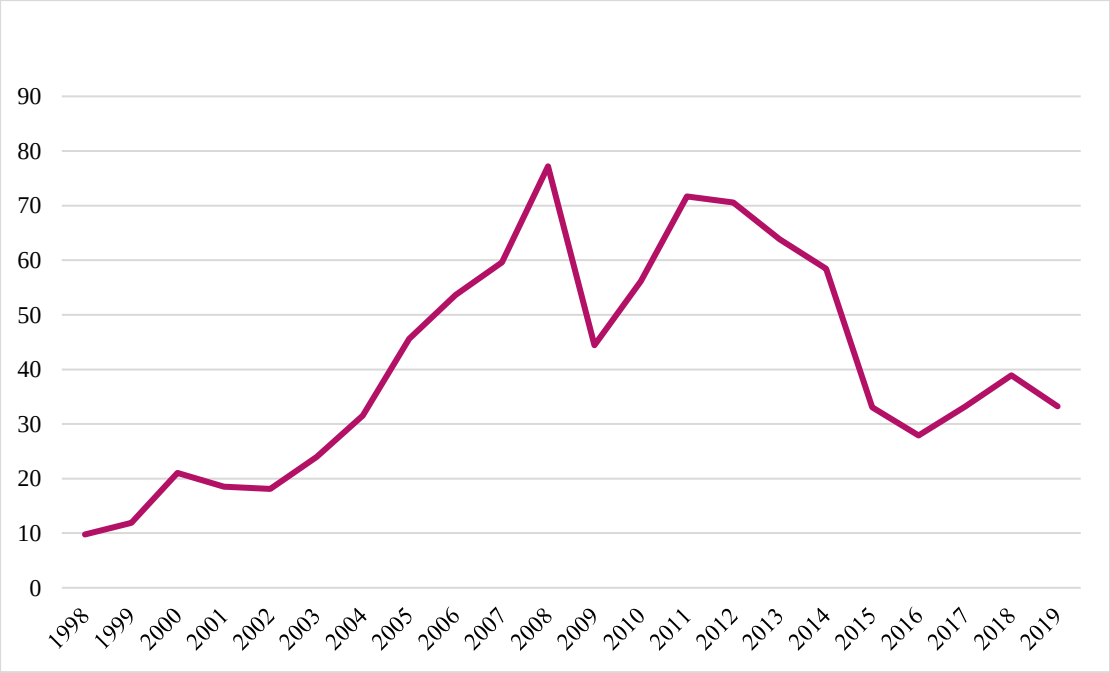
By observing the trend (**Figure *8***), it is clear that the oil sector contributes a large percentage to Algeria's GDP. Based on the World Bank data, the average percentage of contribution from 1998 to 2019 was equivalent to 20.32% of GDP. This could be explained by the new adopted policy to encourage investment in the oil sector by foreigners. Therefore, the oil sector achieved a good percentage in the first decade of the twenty-first

century compared to the end of the nineties, as the year 1998 recorded the lowest rate of 9.21% of the GDP which amounts to an estimate of $8.30 billion[1], and this is due to the oil crisis that affected the world that year, which resulted in a drop in oil prices in global markets. As for the highest value recorded was in 2006 at 30.65%, which amounts to an estimate of $4980.62 billion[2], and this was due to the substantial rise in oil prices during this year compared to other years.

6.1.3.2 The Oil Contribution to Budget

The revenues of the state budget consist of revenues and expenses. To cover government expenses, the state collects revenues mainly from taxes. In Algeria, financing the budget relies heavily on the taxes on hydrocarbon revenues and the latter are highly linked to oil prices fluctuations. The following trend exposes the development of oil tax revenues in Algeria for the period 1998- 2019.

Figure 9: Oil Tax Revenues in Algeria 1998-2019 (Billion Dollars)



[1] Calculated using World Bank GDP (constant 2015 US$).
[2] Calculated using World Bank GDP (constant 2015 US$).

Source: Constructed using data from Bank of Algeria (*Bulletin Retrospective - Bank of Algeria*, 2022)

The chart exposes a gradual increase in tax revenues between 1998 and 2008 where the revenues peaked at $77.19 billion. The trend of the oil tax revenues is highly linked to oil prices in global market which explains the low amount accounted for in 2008. That year the world witnessed a global financial crisis that paralyzed all economic activity which led to causing a severe recession, the first in the 21st century. As the world recovered and economic activity regained its course, the oil prices started to increase and with them the oil tax revenues until 2012 where they started to decline from $71.66 billion in 2011 to $70.58 billion in 2012. The decrease continued to reach its lowest of the period in 2006 with an amount of $27.92 billion. The impact of the overreliance of the state budget on oil taxes can be exposed through the latter's ability to cover for the government expenses. In the period 2000-2005, the revenues generated from hydrocarbon sector were able to cover all expenditures. With the oil prices crashes and the financial crises the revenues declined and with them the ability to cover expenditure where in the period of 2006-2018 only 56% of expenses were covered for. In addition, the government was focused on the economic reform plan which took its share of the revenues since the operating expenses were too heavy to cover (Boutayeb & Rezazi, 2019).

6.1.3.3 Oil contribution to Exports

The exports of the hydrocarbons sector have always dominated most of the value of exports in Algeria. Hence, they constitute the primary source of foreign currency in Algeria. The following table illustrates the share of oil revenues of exports in Algeria from 1998 to 2019.

Table 19: Share of Hydrocarbons Export Revenues of Total Exports in Algeria 1998-2019 (billion dollars)

Year	Total Exports	Hydrocarbons	%
1998	10.14	9.77	96%
1999	12.32	11.91	97%
2000	21.65	21.06	97%
2001	19.09	18.53	97%
2002	18.71	18.11	97%
2003	24.46	23.99	98%
2004	32.22	31.55	98%
2005	46.33	45.59	98%
2006	54.74	53.61	98%
2007	60.59	59.61	98%
2008	78.59	77.19	98%
2009	45.19	44.42	98%
2010	57.09	56.12	98%
2011	72.89	71.66	98%
2012	71.74	70.58	98%
2013	64.87	63.82	98%
2014	60.13	58.46	97%
2015	34.57	33.08	96%
2016	29.31	27.92	95%
2017	34.57	33.2	96%
2018	41.11	38.9	95%
2019	35.31	33.24	94%

Source: Constructed and calculated using Bank of Algeria data (*Bulletin Retrospective - Bank of Algeria*, 2022)

As shown in **Table *19***, the values of oil exports revenues contribute a significant percentage to total exports, as the average percentage of their contribution during the period 1998-2019 was equivalent to 97% of the total revenues. For a decade, between 2003 and 2013, the share of crude oil exports revenues to total exports maintained the same value at 98% even though the values kept shifting with the fluctuating oil prices but since the total exports are mostly composed of oil exports, the share remained rather stable. The oil export revenues peaked in 2008 at $77.19 billion to crash the year after to the amount of $44.42 billion because of the crashing oil prices.

As for the value of total exports, it is directly affected by the movement of oil exports, and as it is noted that there is a positive relationship between total exports and oil

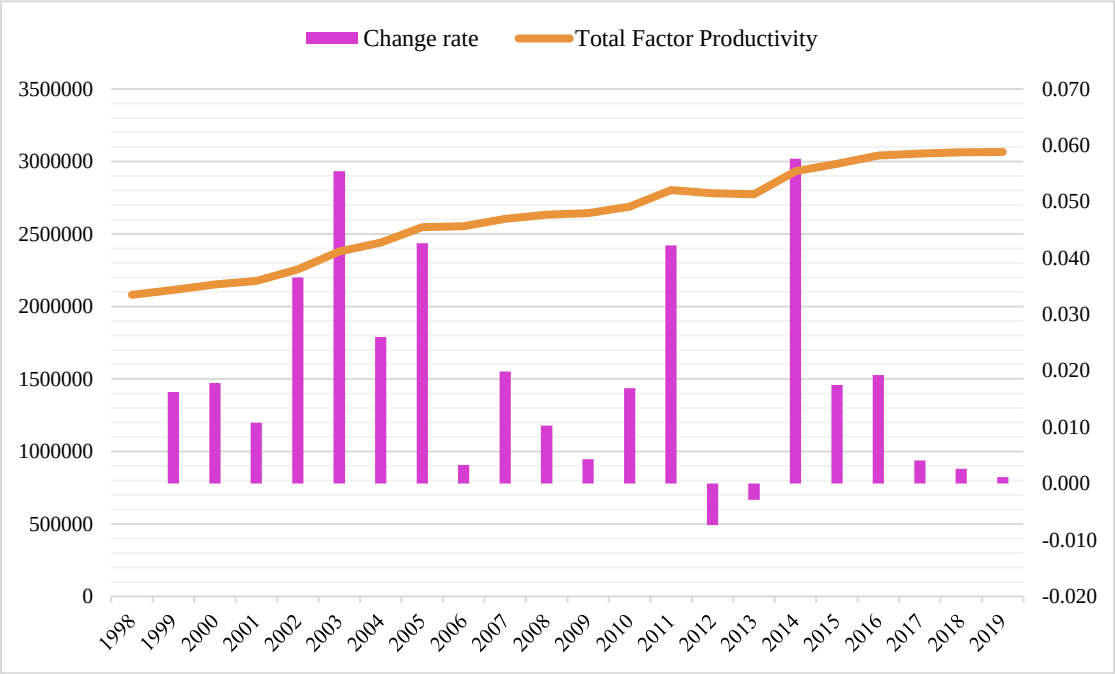
exports, the more the latter recorded an increase in their value, there was an increase in total exports and vice versa. These large revenues achieved by the oil sector, through the value of its exports, have a great merit in the accumulation of foreign currency reserves, the level of which has been strengthening from day to day, and therefore the latter is considered the result of the oil sector compared to what is achieved by exports outside hydrocarbons, which contribute only by 2 percent of total exports. The government has made efforts to reduce the reliance on oil revenues by diversifying exports and this shows in the slightly declining percentage of the share of oil exports revenues from total exports where in 2019, the accounted share was 94%.

6.1.4 Oil contribution to Total Factor Productivity

Total factor productivity is a measure of efficiency of the production. And, the relationship between oil rents and TFP lies at the heart of the resource curse theory (Ahumada & Villarreal, 2022). The following trend illustrate the growth of TFP in Algeria between 1998 and 2019.

The chart (**Figure 1**) represents the growth of TFP in Algeria from 1998 to 2019. The trend mostly lies between $2 and $3.1 million showing an upward growing trend for the duration of the period under study with a varying change rate that is mostly positive. The 1990's witness modest growth rates between a positive 0.01 and 0.02%. then an upsurge was recorded in 2003. The highest registered growth rate reached 0.06% in 2014 after recovering from a negative rate of 0.01% in 2012. According to Cobb-Douglas formula of production, total factor productivity equals the division of output by the weighted geometric average of labor and capital input, where the standard weighing of labor is 0.7 and the standard weighing of capital is 0.3.

Figure 10: Total Factor Productivity Growth in Algeria 1998-2019 (Constant $US)

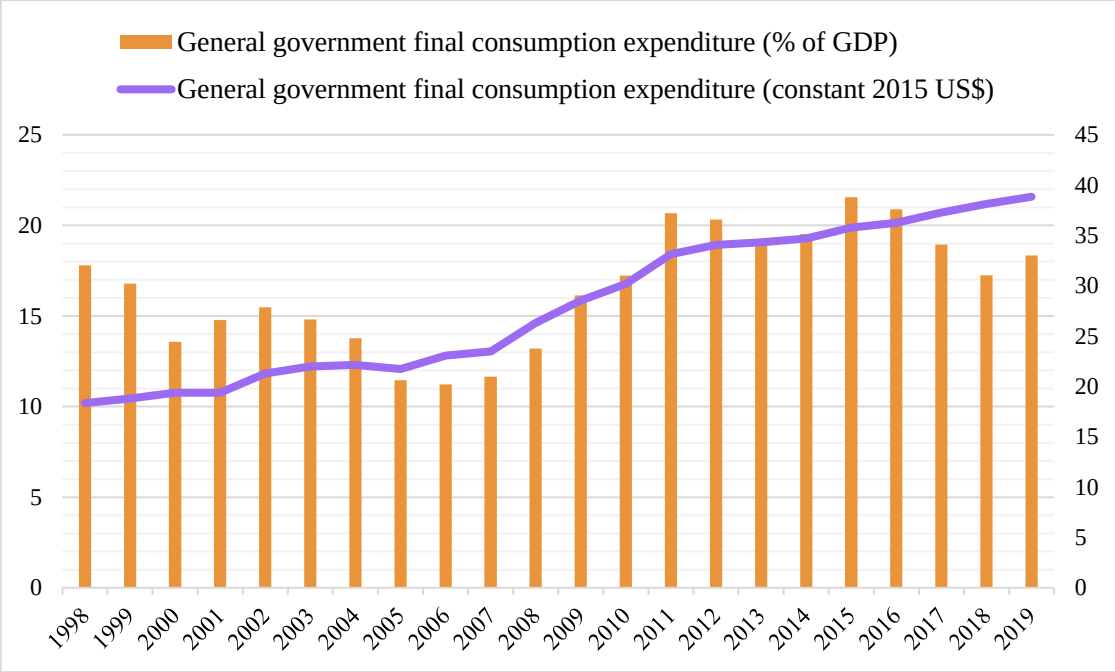


Source: Constructed using calculated data (see4.1)

The gains in total factor productivity could be explained by the accumulating resource rents which have been directed towards operating expenditure and financing public institutes which drove growth in capital, hence, it the driving factor and this what explains the positive relationship between oil rents and total factor productivity. The Algerian government has given great importance to structural reforms and this requires public spending and investing. The following chart (**Figure *11***) illustrates the growth of public spending in Algeria in the period 1998-2019.

Figure *11* presents a combination of two charts. The line represents the growth of general government expenditure for the period of 1998-2019 and the columns showcase expenditure as a percentage of GDP for the same period. The lowest point witnessed in expenditure was in 2006 with a value of 11.23% of GDP while the highest percentage of GDP was reached in 2015 with a value of 21.56%.

Figure 11: General Government Expenditure in Algeria 1998-2019



Source: Constructed using World Bank Data

The chart (**Figure *11***) illustrate the government effort in terms of expenditure. According to the Algerian state law, these expenditures are divided into two types, namely operating and management expenditure. All these finances have been allocated to benefit the reform plans during the studied period and the amounts have recorded a rising trend starting 2007(Bakreti & Laid, 2020).

6.2 OIL CONTRIBUTION TO HUMAN CAPITAL DEVELOPMENT

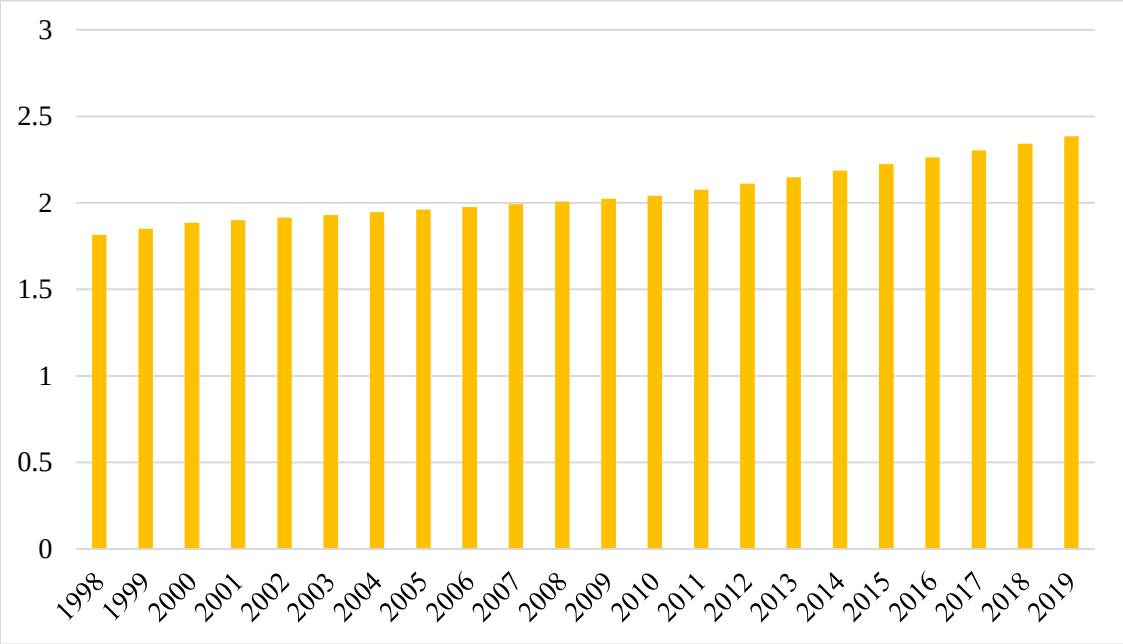
While examining the relationship between oil rents and human capital, the study reached the conclusion that the impact of oil rents was both positive and negative in nature. The revenues generated from oil exports, have had a significant impact on human capital development in Algeria from 1998 to 2019. During this time, Algeria was one of the largest oil-producing countries in Africa, and the oil sector played a dominant role in the country's

economy. As a result, the revenue generated from oil had a far-reaching impact on various aspects of society, including human capital development.

6.2.1 The Contribution of Oil to the Education Sector

Human capital development is an important component of economic growth because the higher education rates are the higher number of skilled workers is and that will enhance production output leading to a better economic development. The following (**Figure *12***) exposes the development of human capital index in Algeria between 1998 and 2019.

Figure 12: Human Capital Index in Algeria 1998-2019



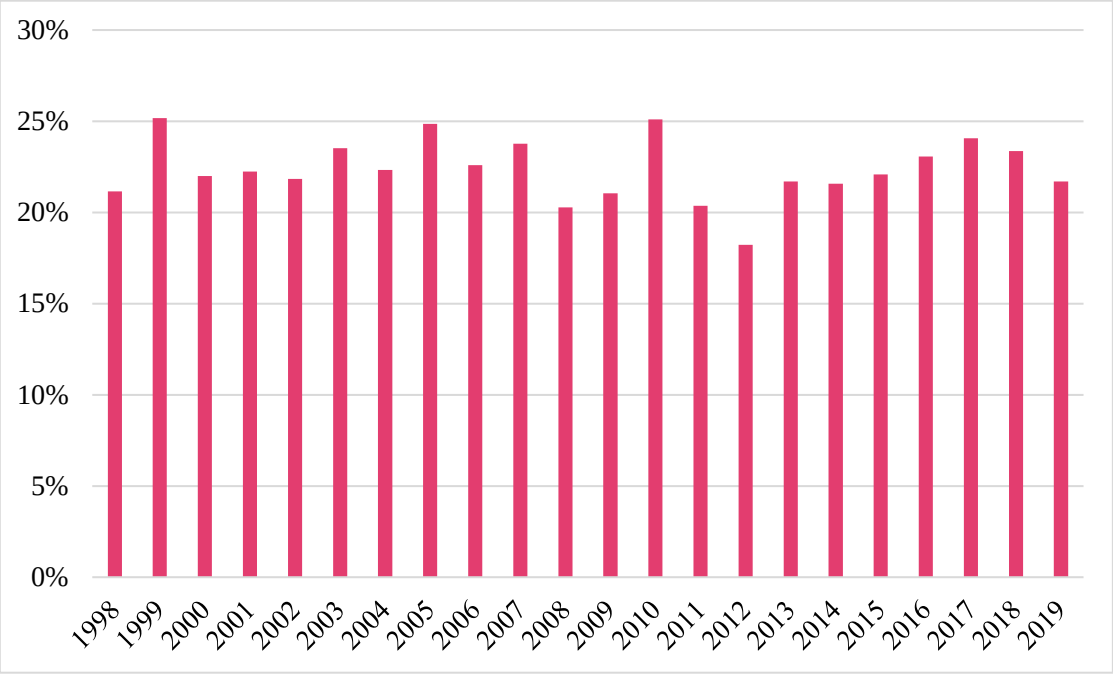
Source: Constructed using PWT v10.0 data

Figure *12* illustrates the development of the index of human capital in Algeria for the period of 1998-2019. This index is based on the years of schooling and returns to education. Throughout the years of the study, the index achieved continuous growth starting at 1.81 in 1998 and reaching 2.38 in 2019. Education has always been one of the main concerns of the Algerian state, which since its independence has opted for free and compulsory education until the age of 16. Thanks to the state's efforts and the continuous budget for the

field of education that represents about a quarter of its total budget Algeria now provides access to school for about 98% of children over the age to enroll (Kadari, 2022).

Education has always had a share of the finances allocated to the reforms plans in Algeria. The following chart **Figure *13*** shows the government expenditure on education in Algeria from 1998 to 2019.

Figure 13: Share of Government Expenditure on education in Algeria 1998-2019 (% of government management expenditure)



Source: Calculated using Finance Law and Complementary Finance Law 1998-2019

The data shown in **Figure *13*** illustrate the share of government expenditure on education (all levels included). The calculation was done using data collected from the Algerian finance law and complementary finance law for the period of 1998-2019 since the data provided by the world Bank is missing for some years. As shown in **Figure *13***, the results vary between 20% and 25% of total management expenditure.

6.2.2 The Contribution of Oil to the Employment Sector

Despite the great importance that oil occupies in the national economy through its significant contribution to the gross domestic product as well as to the collection of public budget revenues through tax revenues, as well as its contribution to providing foreign currency for the state, its contribution to employment remains modest. Mainly because the nature of work in the oil sector does not require labor-intensive work due to its dependence mainly on capital-intensive technologies. However, the impact oil rents have on employment has been known to be direct and indirect where the first manifests through the number of labor force employed in the energy sector and the latter is shown through the employment of oil rents in boosting the employment sector and answering its needs. For the direct impact, the following chart **Figure *14*** shows the number of the workforce employed in the oil industry sector.

Figure 14: Employment in Hydrocarbon Sector (% of total labor force)



Source: Ministry of Energy, World Bank Data

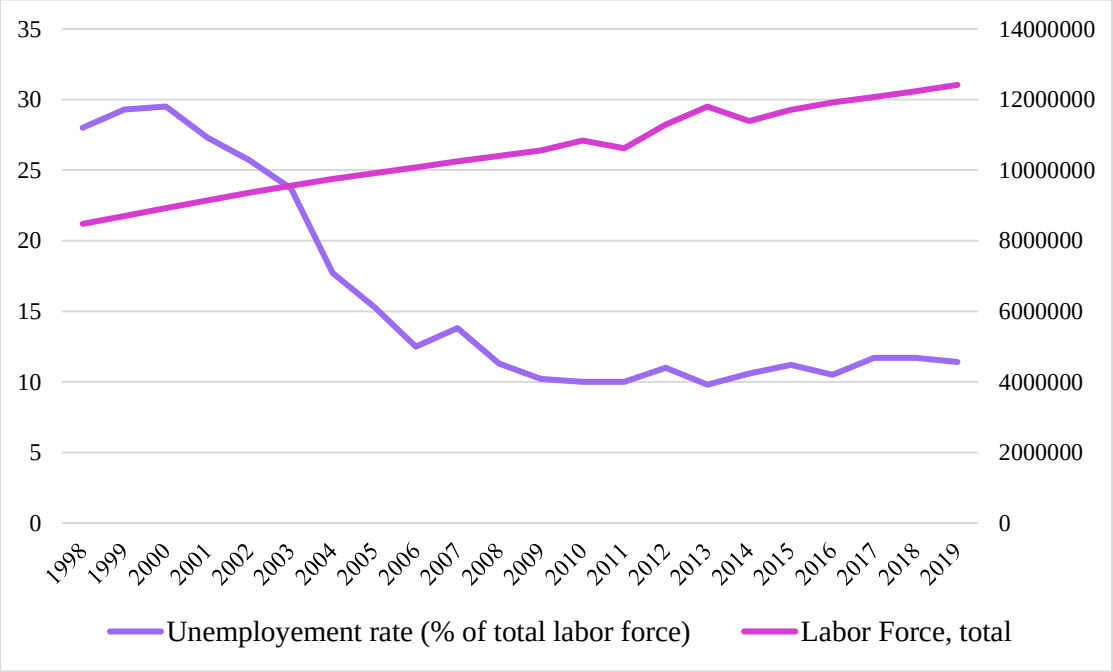
Through the above chart (**Figure *14***), the displayed data show that the hydrocarbon sector does not contribute to employment except by a very small percentage, which ranged during the period 2000-2018 (period reduced due to lack of data available) between 2.0% and 2.47% of total labor force in Algeria. The average of the workforce employed in the energy sector for the same period reached 230590 employees (including permanent and other categories) (**Figure *14***). The data included the employees hired at SONATRACH and other affiliates (such as Naftal, ENTP, ENSP, GCB) (Ministry of Energy, 2017). The highest number of employees attained was in 2011 when SONATRACH made the acquisition of Entreprise Nationale de la Pétrochimie (ENIP). The reason that could explain the small contribution is because of the nature of work required by the oil sector, as compared with the rest of the other sectors, such as the agricultural sector and the services sector, which contributes the largest percentage in employment, as well as the construction sector. The hydrocarbon sector employs highly skilled workforce hence, the rate of the total labor force is small compared to other sectors. However, in spite of the insignificant direct contribution, resource rents play a major role in the development of employment in Algeria.

Natural resource rents have made substantial contribution to fight unemployment and achieve better standards of living. The Algerian government developed a plan for confronting unemployment through the policy of evaluating the national program to combat unemployment and developing a strategy for the intensive growth of work, by setting strong and specialized structures capable of carrying the size of the tasks entrusted to it. In addition, other agencies (old and new) have been placed under the direct supervision of the Ministry including The National Employment Agency (ANEM)[1], the National Youth

[1] Agence National de L'emploi

Employment Support Agency (ANSEJ)[1], the Social Development Agency (ADS)[2], and the National Microcredit Management Agency. The strategic objectives of the employment sector with its various structures revolve around reducing pressure on the labor market through the implementation of the aforementioned state-funded labor promotion devices and programs, which are considered one of the pillars of efforts aimed at combating unemployment and encouraging professional integration. The unemployment rates are shown is the following chart (**Figure *15***).

Figure 15: Labor Force and Unemployment Rate in Algeria 2000-2019



Source: constructed using IMF data

Figure *15* shows the development of employment in Algeria as compared to the unemployment rate trend for the period from 1998 to 2019. The labor force trend shows a constant growth ranging between 8 million and 12 million workers with an average of 10 million. A trend witnessed a spike in 2013 with 11.7 million workers which slowed down

[1] Agence Nationale de Soutien à l'emploi des jeunes
[2] Agence du développement social

to 11.3 million workers in the following year. The years after, the growth marked an upward trend reaching 12.4 million workers in 2019. Over the observed period, the unemployment rate has been subject to fluctuation while following a downward trend. The highest witnessed rates have been during the period 1998-2002 where unemployment ranged between 25% and 28%. From 2006 to 2009, the fluctuation of the unemployment rate was contained between 10% and 15%.

The conducted empirical investigation of the relationship between resource rents abundance and human capital show a negative correlation between the two variables which is consistent with the previously discussed studies (Coulibaly & Asirvatham, 2021; Kufenko, 2015; Manning, 2004; Rahim et al., 2021; Shao & Yang, 2014; Suslova & Volchkova, 2012). The negative relationship can be explained by the crowding out effect of the resource curse. Because, although the Algerian government has allocated substantial investment in the education and health sector the resource rents still impeded the development of human capital. The negative inverse relationship between government spending on education and economic growth in Algeria can manifest in the weak attained results and the educational achievement of the sector since the outcome of this sector is not in accordance to the needs of the employment sector an issue that increases unemployment rates which results in the spread of poverty and a decline of the standard of living and purchasing power. As a result, this will cause a decline in corporate profits and, consequently, a decline in the state's general budget.

Similarly for employment, as shown in **Figure *15***, the fluctuations in the unemployment trend reflect the government efforts to control its rate. Several studies have conducted empirical investigation and the results reached showed that there is a causal relationship between unemployment and government spending (Si Mohammed & Seddiki,

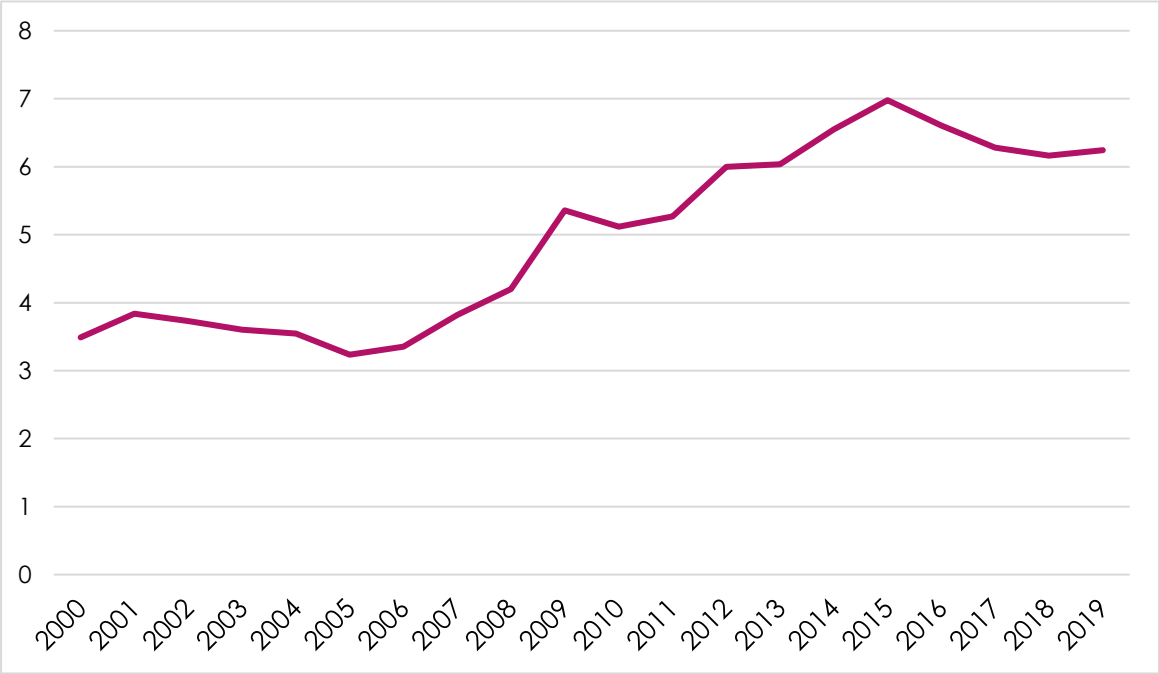
2022; Zerbout & Rezazi, 2022). Hence, it reflects the indirect impact of natural resource rents on employment as the government employs those rents to alleviate the effects on unemployment and create more employment opportunities to boost economic activity and enhance the standards of living.

However, the government seeks to increase the quality of the labor force as well. Undoubtedly, reliability has made quality an important and much-needed factor on a global scale. For example, it is better to train 100 engineers with irreplaceable qualifications than 10,000 of mediocre quality, because the first will be able to innovate, create and establish businesses, and produce wealth for the country. Perhaps the best example of this is China, which has established thousands of academic and vocational training institutions with the best global standards to qualify the majority of executives in their positions, in addition to training future generations with international standards (Kadari, 2022). This was one of the factors of Chinese success. In Algeria, however, the training of the labor force is still not sufficient for the current needs of the labor market, although the flexibility of the latter has improved in recent years through the recognition of freedom of action and through the possibility for employers to conclude an employment contract directly with the workers. However, the relatively low cost of labor in Algeria could contribute as a first step to increasing the country's competitiveness and attractiveness to foreign investors. Algeria can also benefit from the technological external factors favored by its policy of openness to foreign capital, provided that it develops human capital. But the development of human capital requires deep institutional reforms not only in the various levels of training and education, but also by eliminating the causes which encourage graduates and qualified persons to move abroad (Kadari, 2022).

6.2.3 The Contribution of Oil Rents to the Health Sector

The revenues generated from the export of oil have played a significant role in financing the healthcare sector in Algeria from 1998 to 2019. The government has used a portion of this income to invest in the development of healthcare infrastructure and services. This has led to the expansion of healthcare facilities, the procurement of modern medical equipment, and the training of healthcare professionals. However, the reliance on oil rents has also created challenges for the healthcare sector in Algeria. The fluctuations in global oil prices can negatively impact the government's ability to fund healthcare initiatives, and the mismanagement of oil revenue has resulted in corruption and a lack of accountability in the sector. The following charts portrays the development of the government expenditure on healthcare in Algeria for the period 2000-2019.

Figure 16. Current Health Expenditure in Algeria 2000-2019(% of GDP)



Source: World Bank

The data in ***Figure 16*** shows the current health expenditure as a percentage of GDP in Algeria from the year 2000 to 2019. The current health expenditure increased from 3.49% in 2000 to 6.24% in 2019. This indicates an overall upward trend in the country's investment in healthcare. There are some fluctuations in the health expenditure as a percentage of GDP over the period, with some years showing a higher increase compared to others. For example, the health expenditure increased from 3.82% in 2007 to 4.20% in 2008, and from 5.36% in 2009 to 5.12% in 2010.

The highest percentage of current health expenditure as a percentage of GDP was observed in 2014, at 6.55%. The lowest was in 2005, at 3.24%. Overall, the data suggests that the Algerian government has made a steady effort to increase its investment in healthcare.

In general, the revenues generated by oil have had both a positive and negative effect on human capital. One of the most significant positive impacts of oil rents on human capital in Algeria consisted of the increase in government spending on education and healthcare and employment. The government was able to allocate more resources towards the improvement of these essential sectors. This resulted in the construction of new schools, hospitals, and other infrastructure, as well as the hiring of additional staff and the provision of better training for teachers and healthcare professionals. Consequently, and as a result of these efforts, the quality of education and healthcare in Algeria improved significantly during the observed period. The literacy rate in the country increased, and the government was able to provide more opportunities for citizens to acquire the skills and knowledge they needed to succeed in the workforce. Additionally, the improvement of healthcare infrastructure and services helped to reduce the burden of disease and improve the overall health and wellbeing of the population.

However, despite the positive impact of oil rents on human capital in Algeria, there were also several negative effects. The first of these was the reliance of the Algerian economy on oil exports, which made it vulnerable to fluctuations in oil prices. When oil prices declined, the government was unable to allocate as much money towards education and healthcare, and the quality of these services suffered as a result. This instability in the economy hindered the development of other sectors, such as agriculture and manufacturing, which could have created additional job opportunities and helped to diversify the economy. Another negative impact of oil rents on human capital in Algeria was the distribution of wealth. Despite the large amounts of money generated by oil exports, much of this wealth was not distributed evenly throughout the population. This led to high levels of income inequality and limited opportunities for many people to improve their human capital. Additionally, the concentration of wealth in the hands of a few individuals and corporations contributed to corruption, which further hindered the development of human capital in Algeria.

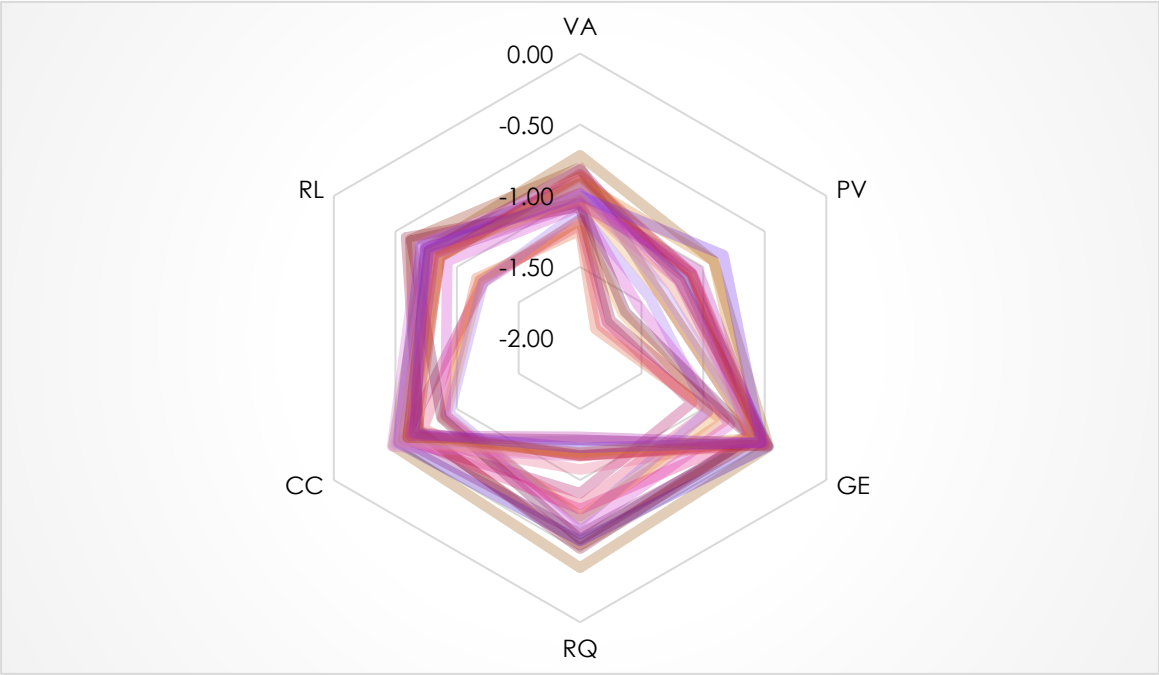
6.3 THE RELATIONSHIP OF OIL RENTS AND INSTITUTIONAL QUALITY

Institutional quality is an important factor in determining the success of oil rents in resource-rich countries. It is an umbrella term for the environment of rules, regulations, and laws that govern a country's economic system and shape its ability to promote growth. Good institutional quality can help ensure that oil rents are used efficiently and correctly, while poor institutional quality can lead to corruption and misappropriation of funds and trigger the rent seeking behavior. The impact of oil rents on institutional quality in resource-rich countries is a complex issue. On the one hand, oil rents can increase the government's

resources and allow it to invest in better policies and regulations that help promote economic growth. On the other hand, the high oil revenues often provide incentives to governments to reduce the quality of institutions, leading to the misuse of funds.

To understand the relationship between oil abundance and institutional quality, and similar to the extant literature on the resource curse, the study measures institutional quality through the use of the World Bank's World Governance Indicators (WGI). The data set is composed of six dimensions as shown in **Figure *17***.

Figure 17: The Development of the six dimensions of WGI in Algeria 1998-2019



Source: Constructed using World Bank data set

The data set provided by the World Bank illustrate governance through six dimensions; voice and accountability (VA), political stability and absence of violence (PV), government effectiveness (GE), regulatory quality (RQ), rule of law (RL), and control of corruption (CC). As shown in **Figure *17***, all six dimensions of governance in Algeria range between a -0.5 and -2 points. The available data (see **Appendix *5***) show fluctuating values over the years of the observed period with an average of -0.89 points.

6.3.1 Voice and Accountability

Voice and Accountability captures perceptions of a country's citizens' ability to participate in choosing their government, and freedom of expression and association and freedom of the media (World Bank). The historical development of this indicator (see **Appendix *5***) shows that Algeria has a poor performance in relation to voice and accountability. The average value during the studied period was -0.98 point with a minimum of -1.24 points in 1998 and the maximum points of -0.72 in 2005. The latest value in 2019 reached -1.06 points. This indicator reflects the people's ability to participate in political life and how freely they can express their opinion through the institutional channels (Kherraz & Alami, 2021).

6.3.2 Government Effectiveness

The World Bank set this measurement to assess the quality of public services, civil services, policy making and implementation and the government credibility in achieving these standards with efficiency. The reported data for the Algerian government during the period under study present the obtained points. The average point reached was -0.60 with a minimum of -0.96 in 2000 and a maximum of -0.47 in 2005-2006 consecutively. The latest value as indicated by the available data is -0.52 in 2019.

Basic public services are available throughout Algeria, but their efficiency has been criticized. The modernization of infrastructure has achieved remarkable results, with Chinese and Turkish construction companies managing a large number of contracts. However, some areas still suffer from frequent water shortages and power outages, sparking outrage and demonstrations. According to the World Bank, in 2015, 88 percent of households had access to sanitation facilities and 84 percent had access to an improved

water source. In October 2020, the Home Secretary announced additional funding for public modernization Serve (BTI, 2022).

6.3.3 Political Stability and Absence of Violence

The index measures the degree to which a country is affected by political instability, violence and terrorism. During the period under observation (see appendix), the PV index average reached -1.32 with the highest value of -1.88 registered in 1998 and the highest value of -0.84 registered in 2018. Among the six governance dimensions, Algeria performed the worst in this index. The beginning of the 2000's witnessed a slight improvement after the end of a difficult decade when the country was faced political turmoil in the form of a civil war (1990-2002). The index showed a gradual decrease until 2010-2011 when it started to show higher values again because of the political instability caused by the Arab Spring wave in North Africa (BTI, 2022).

6.3.4 Regulatory Quality

Regulatory quality is the government's capacity to design and implement regulations that promote growth, protect rights, and improve quality of life. In Algeria, regulatory quality has experienced significant improvements from 2000 to 2019. The reported data (see **Appendix *5***) registered an average value of -0.91 with a minimum of -1.30 in 2019 and a maximum of -0.38 in 2005. The provided data provides a visual presentation of a downward trend where the performance of the index shows a sharp falling after 2005.

Since 2000, Algeria's government has improved the overall quality of life by creating and implementing high-quality regulations. These regulations included protecting citizens' rights and promoting economic growth. The government has implemented changes to the business environment in order to reduce unnecessary bureaucratic hurdles and make

starting a business easier. In addition, these reforms have led to increased investment from foreign entities and increased entrepreneurship. The creation of a land registry system and a new property law by the government have helped to increase transparency in the property market and reduce corruption which have greatly bolstered the rights of private property owners. The government implemented new laws for bettering their business climate, increased rights for citizens, and decreased corruption however, there still exist several challenges facing the Algerian economy which explains the poor performance of the regulatory quality index.

6.3.5 Rule of Law

According to the World Bank, the rule of law embodies perceptions of the extent to which agents are trusted and obey the rules of society, particularly the quality of contract enforcement, property rights, police and courts, and the likelihood of crime and violence. The country's overall score of the rule of law index has witnessed slight fluctuations between -1.21 and -0.82 points during the period under review with an average of -0.82 points. Starting the 2000's, the registered scores showed a slight improvement.

6.3.6 Control of Corruption

The World Bank's Control of Corruption Index measures the perception of how corrupt a country's public sector is. It can be used to compare corruption levels between countries and to track changes in corruption over time. The index for Algeria has fluctuated over the past two decades, with its highest score being -0.47 in 2013 and its lowest score being -0.94 in 2000. Since then, the index has gradually increased, reaching -0.62 in 2019. This slight increase in the perception of corruption control in Algeria over the past two decades is likely due to a variety of factors.

The period under study witnessed some of the most dramatic political developments in Algeria's recent history. The spark was a decision by the ruling National Liberation Front (FLN) that ailing President Abdulaziz Bouteflika would run for a fifth term and popular outrage violated the constitution, which redefined presidential terms in 2016 upper limit. This decision has triggered large-scale demonstrations in cities across the country since February 22, 2019. Millions of citizens peacefully marched for democracy and continued to march every week for 54 weeks until the COVID-19 pandemic locked down March 2020. Algeria has managed to avoid violence as the response from all sides, the population, the army and the police has been mostly peaceful. On April 2, 2019, the military fired Bouteflika, and Army Chief of Staff Ahmed Gaed Salah confirmed his central role in decision-making (until his December 23, 2019, accidental death).

In summary, institutional quality in Algeria has improved over the 1998-2019 period, with the government implementing reforms to enhance transparency, accountability, and the rule of law. Some key developments include:

- Reforms to the legal and regulatory framework for business, such as the adoption of a new investment law and the simplification of business registration procedures.
- Efforts to combat corruption and improve governance, including the establishment of anti-corruption bodies and the implementation of a National Anti-Corruption Strategy.
- Strengthening of the judiciary and the protection of human rights, through the appointment of more judges, the adoption of new laws and regulations, and the creation of a National Human Rights Commission.

- Implementation of e-government initiatives, aimed at improving access to information and services, and reducing corruption and bureaucracy. Overall, while challenges remain in terms of the implementation of reforms, the institutional quality in Algeria has improved during the 2000-2019 period.

Chapter 7: Conclusion

The concluding chapter involves an overview of the research at hand. In addition, the main findings are discussed and their implication is divulged. Next, the thesis outline is tackled explaining the content of each chapter and the main elements that has been dealt with leading to the research contribution and significance.

7.1 RESEARCH OVERVIEW AND MAIN FINDINGS

The debate over the impact of natural resource abundance on economic growth has sparked a lot of interest as the dilemma of the wealth gap that emerged between countries with the same natural resource abundance instigated countless research. Intrigued, scholars, economists and policy makers run estimations and compared experiences to reach the conclusion that the phenomenon of the resource curse occurs when the country is over dependent on natural resources rents. In fact, abundance was not at the heart of the problem, but overreliance on one primary sector and the latter crowding out other vital sectors was hurting the economy the most and impeding growth in the countries under study.

Ever since the independence, the Algerian government has executed several economic reforms that had for an objective to achieve economic growth and sustain development. Algeria gained independence from France in 1962. Since then, the country has gone through several significant economic changes. In 1971, the country nationalized its oil and gas industries; this was the largest source of revenue for foreign companies. As a result of this move, people lost faith in technological advancements and investment in the industry. In the 1970s, Algeria's oil was discovered to be a much higher value than expected. As a result, the country's primary export rose in price significantly. This created a windfall of revenue

for the country, which allowed the government to invest heavily in infrastructure and social programs. However, it also led to Algeria being financially dependent on oil as the country's main source of income.

Algeria went through significant financial reforms in the 1980s and 1990s to balance their economy and grow. These changes included reducing government subsidies, opening up trade, and privatizing state-owned businesses. However, this led to significant unemployment and increased inequality in the country. This led to ongoing popular discontent with the reform process. The Algerian government has taken steps to reduce their reliance on oil and gas as a source of income. Along with encouraging private investment in their country, they've expanded into other sectors such as tourism and farming. However, the lack of a business-friendly climate continues to impede progress.

The COVID-19 pandemic has had a major impact on Algeria's economy, with oil prices falling sharply and economic activity down. The government has responded by increasing public spending and providing financial support to businesses and households, but the long-term impact of the outbreak on the economy remains unclear. Hence, the country’s historical pattern of economic growth shows that Algeria’s economic performance is highly dependent on the oil prices fluctuations. Indeed, the economy has shown a lack of immunity in the face of the resource curse. Hence, the objective of this research project was to examine the existence of the resource curse in Algeria.

The main focus of the present research project was to investigate the three transmission channels through which the resource curse attains the Algerian economy, namely, the economic, political and the social drivers which highlight the negative effects of overreliance on the revenues obtained from the exploitation of the natural resources. To examine the cointegrating relationship between economic growth hand natural resource

abundance, the study has applied an autoregressive distributed lag (ARDL), a well-known approach developed by Pesaran et al. (2001). The evidence was derived from a time-series data collected from 1998 to 2019 and the estimation was run to assess the impact of natural resource abundance on the economic, social and political dimensions of economic growth. The three transmission channels were chosen as a response to the research gap that exists since most of the literature focused on proving the existence of the resource curse either through economic channels, namely, the Dutch disease or through political channels in the form of institutional quality. The results are summarized as follows:

- In the long run, a one unit increase in the 1-year lag of oil rents results in an increase of 0.063 units of PGDP which reflects a positive relationship between PGDP and oil rents whereas corruption, which was used as a control variable causes a decrease of 0.025 in PGDP for every unit it increases. However, the t-statistical value of -1.45334 indicates that the coefficient is not statistically significant at conventional level (p-value= 0.2421) which could imply that the changes in corruption may not have a strong long-term effect on PGDP. Similarly, ccapital stock and law and order show the same statistically insignificance.

- The dynamics between the same variables slightly differ in the short run. Corruption has a positive impact on PGDP (past period) which reflects a potential for growth albeit weak. TFP and education have a positive impact as well whereas oil rents have a negative impact on the 1-year lag of PGDP.

- The impact of oil rents is positive in the presence of TFP in the long run. Where every 1 unit increase causes 0.04 increase in TFP. The same positive impact

applies to corruption and PGDP. In the short run, the impact of oil rents on TFP is positive although weak.

- In the presence of institutional quality, there is a positive relationship between corruption and the 1-year lag of law and order, oil rents and GDP per capita. While the relationship takes a negative turn between the 1-year lag of oil rents (value of -0.05) and GDP per capita.
- TFP has a positive impact with all variables involved which reflects the importance of this parameter
- The estimation results for the relationship between human capital and resource rents present a negative impact of resource rents with a decrease of 0.02 units in education for every increase in resource rents. The same applies for the other variables with varying units of change except for law and order which has a positive impact on PGDP in the presence of human capital.
- Long run estimation results show positive relationship with two out of three variables. For every unit increase in resource rents results in an increase of 0.16 in institutional quality units. Similarly, PGDP has a positive impact on institutional quality whereas the latter has a negative cointegration with education.

7.2 THESIS OUTLINE

This research journey embarked on an introductory chapter where the research background has been tackled first. The topic of the natural resource abundance has been introduced in relation to the phenomenon of the resource curse. The context revolved around the Algerian

economy and how despite all the efforts made to achieve growth and sustainability the economy still suffered every time the oil prices crushed which sparked the interest at the heart of this research project. Furthermore, the chapter dealt with introducing the main objectives of the research and the research questions that the study had been attempting to investigate in addition to the general structure of the thesis.

The second chapter, the literature review, focused on the different research discussing the topic at hand. In order to reach substantial evidence, it was necessary to visit the different studies that recently revolved around the resource curse phenomenon. The chapter had been divided into three main parts. First, a general overview of the concept of the resource curse and the development of theory in addition to the different channels, economic and institutional, through which the resource curse affects the economy. Also, the chapter dealt with some of the remedies that have been suggested by the literature. The second part of the chapter discussed the mechanisms linking natural resources to economic growth. The focus here was targeting studies that investigating the relationship between natural resources and the different drivers of economic growth, mainly, total factor productivity as a proxy for economic growth, human capital representing the social aspect and institutional quality standing for the political dimension. The last part of the chapter addressed the literature that approached the phenomenon in the Algerian economy. The studies focusing on Algeria as a case study attempted to find the impact of the resource curse on the country's economy.

The development of the Algerian economy has been dealt with in the third chapter. Understanding the historical patterns of economic growth and the circumstances surrounding them was necessary for the investigation at hand. The chapter started with the post-independence development of the Algerian economy. The transition, at the time, was

marked with the adoption of the socialite system. The transition went through three main stages where each had a different plan with different outcomes. Social, political and economic factors drove the Algerian government to head towards market economy. The process involved different structural adjustment that helped enhance the overall economic indicators at the time. The last part of the chapter tackled the economy of the country during the new millennia. The government adopted a new economic recovery support plan where the main objectives have been to mitigate the effects of the resource curse, diversify the revenues of the economy and achieve sustainability for the generations to come.

The fourth chapter elaborated on the methodology and the research design employed in the study to lead the economic investigation. First, the process of data collection had been described. The discussion also involved the reason behind selecting each of the data and the literature that used the same method. Second, a short historical background was provided for the chosen model. The theoretical specifics have been discussed and the mathematical logic behind the model has been explained. Last the estimation strategy and the econometric methodology was explained in details to justify the choice of the model and its pertinence to the empirical investigation at hand.

Chapter five dealt with the results obtained from the empirical study. A quick description of the employed data was employed. The second part of the chapter involved the unit root test and stationarity test which are necessary for determining whether the study can proceed with the chosen model or not. Once the prerequisites suggested by Pesaran et al. (2001) are met, the regression is applied on four model and the results are discussed in the third part of the fifth chapter. The regression focused on assessing the short and long-term relationship between natural resource rents and different variables specific to each model. The first model aimed to investigate the cointegration between oil rents and the

economic growth using the per capita GDP as a proxy for economic growth. The second model dealt with the impact of the rents on total factor productivity. The third model assessed the effect mainly on human capital and the last one addressed the impact of oil rents on institutional quality. All of the results have been linked to the literature discusses in the review of literature chapter to ascertain their pertinence and validity.

Chapter six depicted the analysis of the reached results. Each model represented the nature of the relationship between natural resources (oil especially) and the other four parameters. The first section was devoted for the impact of oil rents on economic growth hand TFP. The second section explained how oil rents contribute to human capital development through employment and education. And the last section outline the relationship of oil rents with institutional quality through the six dimension of World Bank's Worldwide Governance Index.

In summary, the study investigated the impact of natural resources rents on the three dimensions of economic growth, namely, economic, social and political drivers that interfere with the economic performance of the country. Most studies, as discussed in the resource curse literature, focus mainly on the economic factors as transmission channels for the resource curse. Hence, the purpose of this thesis was to prove that all drivers are intertwined and that the economic mechanisms behind the resource curse in Algeria are actually escalated by the quality of institutional quality on the one hand and the social and political factors on the other hand.

7.3 RESEARCH CONTRIBUTION AND SIGNIFICANCE

While sifting through the literature related to the curse of overreliance on natural resources rents, there was a serious lack of single case studies in general and countries from middle

east and north Africa in particular. Hence, in an attempt to flesh out the gap in the literature, this thesis involved different contributions.

The extant literature of the resource curse, as discussed in chapter two, revolves, mainly, around panel data studies where economic performance of different countries is being compared and analyzed to understand the nature of the impact of natural resource abundance on economic growth. Auty (1993), for example, highlights the detrimental effect of depending on resource revenues through the use of cross-sectional studies and comparative cases. Sachs and Warner (1995), as well, explore the negative relationship between natural resource exports and GDP in a cross-country empirical study. Other studies followed suit in using cross-sectional data and panel data, namely, (Boschini et al., 2013; Gylfason, 2011, 2001; Gylfason & Zoega, 2006; Ross, 2001; J. D. Sachs & Warner, 1997, 1999; van der Ploeg, 2011).

Most studies investigate the existence of the impact of resource curse through one transmission channel. Therefore, assessing all three economic, political and social transmission channels at once is another contribution of the present thesis.

This research project can help other research projects that are based on countries which are similar the political, economic and social structure of the Algerian economy. The model adopted for the study would be helpful in assessing the impact of oil revenues fluctuation and the dependence on natural resource income in economic growth.

Recommendations and Research Perspectives:

At the end of the previous concluding remarks the study proposes the following recommendations:

- Diversification is key to the economy: Encouraging other industries besides oil and gas, like agriculture, tourism, and manufacturing, can help reduce the country's reliance on the resource sector.
- Improve governance and transparency: Strengthening institutions and improving transparency in the management of resource revenues can help reduce the risk of corruption and mismanagement of funds.
- Promote domestic investment: Encouraging domestic investment and entrepreneurship can create jobs and spur economic growth, reducing dependence on resource exports.
- Invest in human capital: Investing in education, health and infrastructure can help improve the skills and productivity of the workforce, boosting long-term economic growth.
- Manage natural resource revenues effectively: Setting up a sovereign wealth fund to save and invest resource revenues can help ensure that they are used to benefit future generations.
- Encourage foreign investment: Attracting foreign investment can bring in new technology, management practices, and capital to help stimulate economic growth.
- Address regional and income inequality: Implementing policies to address regional and income inequality can help ensure that the benefits of economic growth are shared more broadly.

Bibliography

American Psychological Association (APA). (2010). *Publication Manual of the American Psychological Association* (6th Ed.). Washington, DC: Author.

Abbas, Q., & Mujahid-Mukhtar, E. (2000). The Role of Human Capital in Economic Growth: A Comparative Study of Pakistan and India [with Comments]. *The Pakistan Development Review*, *39*(4), 451–473. JSTOR.

Acemoglu, D., & Robinson, J. (2008). *The Role of Institutions in Growth and Development* [Working Paper]. World Bank. https://openknowledge.worldbank.org/handle/10986/28045

Adams, D., Ullah, S., Akhtar, P., Adams, K., & Saidi, S. (2019). The Role of Country-Level Institutional Factors in Escaping the Natural Resource Curse: Insights from Ghana. *Resources Policy*, *61*, 433–440. https://doi.org/10.1016/j.resourpol.2018.03.005

Adamson, K. (2005). Understanding Post-Independence Visions of Economic Prosperity in Algeria through the Mirror of the Second Napoleonic Empire. *Topics in Middle Eastern and North African Economies*, *7*.

Adel, Z., KhaterTarek, & Karima, H. (2016). *Dawr baramij al'iineash alaqtisadii khilal alfatra (2001- 2014) fi tahqiq 'iiqlae watanwie alaiqtisad aljazayirii—Dirasat tahliliat wataqyimia [The Role of the Economic Recovery Programs during the Period (2001- 2014) to Achieve Takeoff and Diversification of the Algerian Economy—Analytical and Evaluative Study]*.

Agboola, M. O., Bekun, F. V., & Joshua, U. (2021). Pathway to Environmental Sustainability: Nexus between economic Growth, Energy Consumption, CO2

Emission, Oil Rent and Total Natural Resources Rent in Saudi Arabia. *Resources Policy, 74,* 102380. https://doi.org/10.1016/j.resourpol.2021.102380

Aghion, P., & Durlauf, S. N. (Eds.). (2014). *Handbook of Economic Growth*. Elsevier/North Holland.

Agnani, B., & Iza, A. (2011). Growth in an Oil Abundant Economy: The Case of Venezuela. *Journal of Applied Economics*, *14*(1), 61–79. https://doi.org/10.1016/S1514-0326(11)60005-6

Ahmadov, A. K. (2014). *Blocking the pathway out of the resource curse: What hinders diversification in resource-rich developing countries?* (Working Paper No. 2014/98). GEG Working Paper. https://www.econstor.eu/handle/10419/196358

Ahrend, R. (2005). Can Russia Break the "Resource Curse"? *Eurasian Geography and Economics*, *46*(8), 584–609. https://doi.org/10.2747/1538-7216.46.8.584

Ahumada, V. M. C., & Villarreal, C. C. (2022). Oil Rents, Institutional Development, and Total Factor Productivity. *Investigación Económica*, *81*(322), 52–72.

Aimen, A. (2018). From territorial governance to the governance of public enterprises in Algeria. APE Sonatrach. *Economic Sciences, Management and Commercial Sciences Review*, *11*(1), 01–16.

Akacem, M., & Cachanosky, N. (2015). The Myth of the Resource Curse: A Case Study for Algeria. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2633793

Al Suwaidi, H. A. H., & Caruana, J. (2008). *Sovreign Wealth Finds: Santiago Principles*. International Working Group of Sovereign Wealth Funds.

Alexeev, M., & Conrad, R. (2009). The Elusive Curse of Oil. *Review of Economics and Statistics*, *91*(3), 586–598. https://doi.org/10.1162/rest.91.3.586

Alhinai, A. A. (2017). *Economic Diversification Obstacles in Resource-Dependent States Through the Lens of Resource Curse Theory: Oman as a Case Study* [Durham Thesis, Durham University]. http://etheses.dur.ac.uk/12446/

Aljarallah, R. A. (2021). An assessment of the economic impact of natural resource rents in kingdom of Saudi Arabia. *Resources Policy*, *72*, 102070. https://doi.org/10.1016/j.resourpol.2021.102070

Aljarallah, R. A., & Angus, A. (2020). Dilemma of Natural Resource Abundance: A Case Study of Kuwait. *SAGE Open*, *10*(1), 215824401989970. https://doi.org/10.1177/2158244019899701

Al-Kasim, F., Søreide, T., & Williams, A. (2013). Corruption and Reduced Oil Production: An Additional Resource Curse Factor? *Energy Policy*, *54*, 137–147. https://doi.org/10.1016/j.enpol.2012.11.007

Almosabbeh, I. A. (2019). The Role of Human Capital and Total Factor Productivity in Promoting Economic Growth: A Comparative International Study. *مجلة رؤى اقتصادية*, *9*(1), 41–51.

Amar, J., Lecourt, C., & Kinon, V. (2018). Is the Emergence of New Sovereign Wealth Funds a Fashion Phenomenon? *Review of World Economics*, *154*(4), 835–873. https://doi.org/10.1007/s10290-018-0319-3

Annual Statistical Bulletin- OPEC. (1999). https://www.opec.org/opec_web/static_files_project/media/downloads/publications/ASB1999.pdf

Arezki, R., & Ploeg, F. van der. (2007). Can the Natural Resource Curse Be Turned Into a Blessing? The Role of Trade Policies and Institutions. *IMF Working Papers*, *07*(55), 1. https://doi.org/10.5089/9781451866193.001

Aslaksen, S. (2010). Oil and Democracy: More than a Cross-Country Correlation? *Journal of Peace Research*, *47*(4), 421–431. https://doi.org/10.1177/0022343310368348

Attou, C., & Ajri, K. (2015). Muhadadat alnumui alaiqtisadii fi aljazayir dirasat qiasiat khilal alfatrat 1970- 2011 [Determinants of economic growth in Algeria, an econometric study during the period 1970-2011]. *مجلة الإستراتيجية والتنمية*, *5*(8), 139–172.

Aue, A., & Horváth, L. (2013). Structural Breaks in Time Series. *Journal of Time Series Analysis*, *34*(1), 1–16. https://doi.org/10.1111/j.1467-9892.2012.00819.x

Auty, R. M. (1993). *Sustaining Development in Mineral Economies: The Resource Curse Thesis*. Routledge.

Auty, R. M. (1997). Natural Ressource Endowment, the State and Development Strategy. *Journal of International Development*, *9*(4), 651–663. https://doi.org/10.1002/(SICI)1099-1328(199706)9:4<651::AID-JID474>3.0.CO;2-4

Auty, R. M. (2003). Third Time Lucky for Algeria? Integrating an Industrializing Oil-Rich country into the Global Economy. *Resources Policy*, *29*(1–2), 37–47. https://doi.org/10.1016/j.resourpol.2004.02.001

Awosusi, A. A., Mata, M. N., Ahmed, Z., Coelho, M. F., Altuntaş, M., Martins, J. M., Martins, J. N., & Onifade, S. T. (2022). How Do Renewable Energy, Economic Growth and Natural Resources Rent Affect Environmental Sustainability in a Globalized Economy? Evidence From Colombia Based on the Gradual Shift Causality Approach. *Frontiers in Energy Research*, *9*, 739721. https://doi.org/10.3389/fenrg.2021.739721

Ayad, A. el B., & Bensaci, M. Y. (2019). Aliaat alhukm alraashid ka'adaat limukafahat alfasad wa'athariha ealaa alnumui alaiqtisadii dirasat qiasiat—Muqaranat bayn alduwal almutaqadimat walduwal alnaamiat—Lilfatrat almumtadat min 1996 alaa ghayat 2016 [Mechanisms of Good Governance as an Instrument to Combat Corruption and its Impact on economic Growth An Econometric study- Comparison between Developed and Developing Countries during the Period (1996 – 2016)]. *"Majalt Abhat Naw'ia Wa Kamiya Fi El 'ouloum El Iqtisadiya Wa El Idariya"Journal of Quantitative and Qualitative Research in Economic and Administrative Sciences*, *1*(1), 37–60.

Baier, S. L., Jr, G. P. D., & Tamura, R. (2002). *How Important are Capital and Total Factor Productivity for Economic Growth?* (Working Paper No. 2002–2a; p. 52). Federal Reserve Bank of Atlanta.

Bakreti, B., & Laid, M. (2020). Al'iinfaq alhukumiu walnumuu alaiqtisadiu fi aljazayir dirasat tajribiat watahlilia (2000-2019) [Public expenditure and economic growth in Algeria empirical and analytical study (2000-2019)]. *Finance & Markets Review*, *7*(2), 333–355.

Bakwena, M., Bodman, P., Le, T., & Tang, K. K. (2009). Avoiding the Resource Curse: The Role of Institutions. *MRG Discussion Paper Series*, Article 3209. https://ideas.repec.org//p/qld/uqmrg6/32.html

Baliamoune-Lutz, M., & Ndikumana, L. (2007). *The Growth Effects of Openness to Trade and the Role of Institutions: New Evidence from African Countries* (Working Paper No. 2007–05). UNIVERSITY OF MASSACHUSETTS AMHERST. https://www.umass.edu/economics/publications/2007-05.pdf

Barbier, E. (2005). *Natural Resources and Economic Development*. Cambridge University Press.

Barro, R. J. (1996). *Health, Human Capital and Economic Growth*.

Barro, R. J. (1999). Determinants of Democracy. *Journal of Political Economy, 107*(S6), S158–S183. https://doi.org/10.1086/250107

Belaid, F., Dagher, L., & Filis, G. (2021). Revisiting the Resource Curse in the MENA Region. *Resources Policy*, *73*, 102225. https://doi.org/10.1016/j.resourpol.2021.102225

Belarbi, Y., Hamdi, F., Khalfi, A., & Souam, S. (2021). Growth, Institutions and Oil Dependence: A Buffered Threshold Panel Approach. *Economic Modelling*, *99*, 105477. https://doi.org/10.1016/j.econmod.2021.02.018

Ben Mim, S., & Ben Ali, M. S. (2020). Natural Resources Curse and Economic Diversification in GCC Countries. In H. Miniaoui (Ed.), *Economic Development in the Gulf Cooperation Council Countries* (Vol. 1, pp. 1–18). Springer Singapore. https://doi.org/10.1007/978-981-15-6058-3_1

Ben Mohamed, H. (2020). Eard watahlil albaramij altanmawiat fi aljazayir khilal alfatrat 2001-2019" [Presentation and analysis of development programs in Algeria during the period 2001-2019]. *Politics and Econoomic University Journal*, *5*, 35–68.

Ben Ouali, K. (2016). *Astikhdam aleawayid alnaftiati: Dirasat muqaranat bayn tajribat aljazayir watajribat alnurwij [The use of oil revenues: A comparative study between the experience of Algeria and the experience of Norway]* [Magister, Mohemed Ben Ahmed -Oran 2]. shorturl.at/myAJ4

Bengharbi, M. (2021). The Orientations and Nature of Algerian Foreign Policy inIinternational and Regional Organizations Algerian Diplomacy in the Arab League as a Model. *السياسة العالمية*, *5*(3), 772–788.

Benghida, S. (2017). Factors and Challenges in Developing Countries under the Resource Curse. *International Journal of Civil Engineering and Technology*, *8*(11), 901–910.

Benramdane, A. (2017). Oil price volatility and economic growth in Algeria. *Energy Sources, Part B: Economics, Planning, and Policy*, *12*(4), 338–343. https://doi.org/10.1080/15567249.2015.1128015

Bergougui, B., Sami, L., & Talbi, B. (2017). *Natural Resources, Institutional Quality and economic development in Oil-Rich Countries: The case of Arab Countries*. 10.

Berlemann, M., & Wesselhöft, J.-E. (2014). Estimating Aggregate Capital Stocks Using the Perpetual Inventory Method: A Survey of Previous Implementations and New Empirical Evidence for 103 Countries. *Review of Economics*, *65*(1), 1–34. https://doi.org/10.1515/roe-2014-0102

Bevans, R. (2020, March 26). *Akaike Information Criterion | When & How to Use It (Example)*. Scribbr. https://www.scribbr.com/statistics/akaike-information-criterion/

Beveren, I. V. (2007). *Total Factor Productivity Estimation: A Practical Review* (LICOS Discussion Paper No. 182). Katholieke Universiteit Leuven, LICOS Centre for Institutions and Economic Performance. http://hdl.handle.net/10419/75015

Boschini, A., Pettersson, J., & Roine, J. (2013). The Resource Curse and its Potential Reversal. *World Development*, *43*, 19–41. https://doi.org/10.1016/j.worlddev.2012.10.007

Boukaroun, H. (1991). The Privatization Process in Algeria. *The Developming Economics*, *XXXIX*(2), 89–124.

Bouketir, D., & Mecheri, M. (2019). Public Expenditure and Economic Growth in Algeria: An Analytical Study of the Wanger's Law of Increasing Public Expenditure. *مجلة الدراسات المالية والمحاسبية والإدارية*, *6*(2), 225–241.

Bouredja, S., & Zerouat, F. Z. (2020). An Econometric Analysis of The Sources of economic growth in Algeria Using Growth accounting and Autoregressive Distributed Lag (ARDL) model. *مجلة البشائر الاقتصادية*, *6*(1), 695–714.

Boutayeb, E., & Rezazi, O. (2019). 'athar aljibayat albitruliat ealaa alnafaqat aleamat fi aljazayir-dirasat qiasiat lilfatrat 1990-2018 biastikhdam namudhaj ARDL-[The impact of petroleum collection on public expenditure in Algeria -An econometric study for the period 1990-2018 using ARDL]. *جملة العلوم االقتصادية والتسيري والعلوم التجارية*, *12*(02), 52–65.

Brunnschweiler, C. N., & Bulte, E. H. (2008). The Natural Resource Curse Revisited and Revised: A Tale of Paradoxes and Red Herrings [Application/pdf]. *Journal of Environmental Economics and Management*, *55*(3), 248–264. https://doi.org/10.3929/ETHZ-A-005303746

BTI. (2022). *BTI 2022 Country Report: Algeria*. https://bti-project.org/fileadmin/api/content/en/downloads/reports/country_report_2022_DZA.pdf

Bulletin retrospective—Bank of Algeria. (2022). https://www.bank-of-algeria.dz/pdf/Bulletin_retro_juin_2022.pdf

Busse, M., & Gröning, S. (2013). The Resource Curse Revisited: Governance and Natural Resources. *Public Choice*, *154*(1/2), 1–20. JSTOR.

Cater, C. (2014). The Resource Curse and Transparency. In B. Currie-Alder, R. Kanbur, D. M. Malone, & R. Medhora (Eds.), *International Development* (pp. 395–411). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780199671656.003.0024

Cavanaugh, J. E., & Neath, A. A. (2019). The Akaike information criterion: Background, derivation, properties, application, interpretation, and refinements. *WIREs Computational Statistics*, *11*(3). https://doi.org/10.1002/wics.1460

Chekouri, S. M., Benbouziane, M., & Chibi, A. (2017). Oil Rents and Institutional Quality: Empirical Evidence from Algeria. *Economic Development.*, *19*(2), 32.

Chekouri, S. M., Chibi, A., & Benbouziane, M. (2013). *Natural resource abundance and Structural Change in Algeria*. 11.

Chekouri, S. M., Chibi, A., & Benbouziane, M. (2017). Algeria and the Natural Resource Curse: Oil Abundance and Economic Growth. *Middle East Development Journal*, *9*(2), 233–255. https://doi.org/10.1080/17938120.2017.1366772

Chekouri, S. M., Chibi, A., & Benbouziane, M. (2020). Resource Abundance and Financial Development: Evidence from Algeria. *Asian Journal of Economics, Finance and Management*, 78–93.

Comin, D. (2010). Total factor productivity. In S. N. Durlauf & L. E. Blume (Eds.), *Economic Growth* (pp. 260–263). Palgrave Macmillan UK. https://doi.org/10.1057/9780230280823_32

Corden, W. M., & Neary, J. P. (1982). Booming Sector and De-Industrialisation in a Small Open Economy. *The Economic Journal*, *92*(368), 825–848. JSTOR. https://doi.org/10.2307/2232670

Costa, H. K. de M., & Santos, E. M. dos. (2013). Institutional analysis and the "resource curse" in developing countries. *Energy Policy*, *63*, 788–795. https://doi.org/10.1016/j.enpol.2013.08.060

Coulibaly, I., & Asirvatham, J. (2021). Does Human Capital Mitigate Resource Curse? Evidence in the Short- and Long-Run. *International Journal of Economics and Finance*, *13*(10), 157. https://doi.org/10.5539/ijef.v13n10p157

Dawson, J. W. (1998). INSTITUTIONS, INVESTMENT, AND GROWTH: NEW CROSS-COUNTRY AND PANEL DATA EVIDENCE. *Economic Inquiry*, *36*(4), 603–619. https://doi.org/10.1111/j.1465-7295.1998.tb01739.x

de Haan, J., & Sturm, J.-E. (2000). On the relationship between economic freedom and economic growth. *European Journal of Political Economy*, *16*(2), 215–241.

Dept, I. M. F. R. (2006). *World Economic Outlook, September 2006: Financial Systems and Economic Cycles*. International Monetary Fund.

Djeflat, A., & Lundvall, B. Å. (2016). The resource curse and the limited transformative capacity of natural resource-based economies in Africa: Evidence from the oil and gas sector in Algeria and implications for innovation policy. *Innovation and Development*, *6*(1), 67–85. https://doi.org/10.1080/2157930X.2015.1121564

Dreher, A., & Herzfeld, T. (2005). The Economic Costs of Corruption: A Survey and New Evidence. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.734184

Dymitrowska, Y. (2020). EFFECTIVENESS OF A NATIONAL RESOURCE FUND IN COUNTERACTING THE RESOURCE CURSE. *Organizacja i Zarządzanie : Kwartalnik Naukowy*, *1*(49), 23–40. http://dx.doi.org/10.29119/1899-6116.2020.49.2

Easton, S. T., & Walker, M. A. (1997). Income, Growth, and Economic Freedom. *The American Economic Review*, *87*(2), 328–332. JSTOR.

Elhannani, F. E., Boussalem, A. B., & Benbouziane, M. (2016). *Financial development and the oil curse: Evidence from Algeria*. *18*(1), 14.

Entelis, J. P. (1999). Sonatrach: The Political Economy of an Algerian State Institution. *Middle East Journal*, *53*(1), 9–27.

Eregha, P. B., & Mesagan, E. P. (2020). Oil resources, deficit financing and per capita GDP growth in selected oil-rich African nations: A dynamic heterogeneous panel approach. *Resources Policy*, *66*, 101615. https://doi.org/10.1016/j.resourpol.2020.101615

Fagbemi, F., & Kotey, R. A. (2022). Interconnections between governance shortcomings and resource curse in a resource-dependent economy. *PSU Research Review*, *ahead-of-print*(ahead-of-print). https://doi.org/10.1108/PRR-09-2021-0052

Farzanegan, M. R., & Thum, M. (2020). Does oil rents dependency reduce the quality of education? *Empirical Economics*, *58*(4), 1863–1911. https://doi.org/10.1007/s00181-018-1548-y

Fernandez, E., & Mauro, P. (2000). *The Role of Human Capital in Economic Growth: The Case of Spain* (SSRN Scholarly Paper No. 879322). https://papers.ssrn.com/abstract=879322

Frynas, J. G. (2017). Sovereign Wealth Funds and the Resource Curse. *The Oxford Handbook of Sovereign Wealth Funds*. https://doi.org/10.1093/oxfordhb/9780198754800.013.13

Fuinhas, J. A., Marques, A. C., & Couto, A. P. (2015). Oil rents and economic growth in oil producing countries: Evidence from a macro panel. *Economic Change and Restructuring*, *48*(3–4), 257–279. https://doi.org/10.1007/s10644-015-9170-x

Fukao, K., Makino, T., & Settsu, T. (2021). HUMAN CAPITAL AND ECONOMIC GROWTH IN JAPAN: 1885–2015. *Journal of Economic Surveys*, *35*(3), 710–740. https://doi.org/10.1111/joes.12419

Gasmi, F., & Laourari, I. (2017). Has Algeria Suffered from the Dutch Disease? Evidence from 1960-2016 Data. *Revue d'économie Politique*, *127*(6), 1029. https://doi.org/10.3917/redp.276.1029

GDP growth (annual %)—Algeria | Data. (n.d.). Retrieved September 18, 2022, from https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2021&locations=DZ&start=1991

GDP per capita (constant 2015 US$)—Algeria | Data. (n.d.). Retrieved September 18, 2022, from https://data.worldbank.org/indicator/NY.GDP.PCAP.KD?end=2021&locations=DZ&start=1998

Ghaddar, R. (2012). Daem 'iintajiat eawamil al'iintaj wadawruha fi tahfiz masadir alnumui alaiqtisadii halat aljazayir wadual muqaranatin [Supporting factor productivity and its role in stimulating sources of economic growth, the case of Algeria and comparative countries]. *Economic Studies*, *6*(3), 215–231.

Gross fixed capital formation (constant 2015 US$)—Algeria | Data. (n.d.). Retrieved September 19, 2022, from https://data.worldbank.org/indicator/NE.GDI.FTOT.KD?locations=DZ

Grossman, G. M., Helpman, E., Oberfield, E., & Sampson, T. (2020). *Endogenous Education and Long-run factor Shares* (Working Paper No. 27031; Nber Working Paper Series). NATIONAL BUREAU OF ECONOMIC RESEARCH. https://www.nber.org/system/files/working_papers/w27031/w27031.pdf

Guan, L., Zhang, W.-W., Ahmad, F., & Naqvi, B. (2021). The volatility of natural resource prices and its impact on the economic growth for natural resource-dependent economies: A comparison of oil and gold dependent economies. *Resources Policy*, *72*, 102125. https://doi.org/10.1016/j.resourpol.2021.102125

Gwartney, J. D., Holcombe, R. G., & Lawson, R. A. (2006). Institutions and the Impact of Investment on Growth. *Kyklos*, *59*(2), 255–273. https://doi.org/10.1111/j.1467-6435.2006.00327.x

Gylfason, T. (2011). Natural Resource Endowment: A Mixed Blessing? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1766385

Gylfason, T. (2001). *Lessons from the Dutch Disease: Causes, Treatment, and Cures*.

Gylfason, T., & Zoega, G. (2006). Natural Resources and Economic Growth: The Role of Investment. *The World Economy*, *29*(8), 1091–1115. https://doi.org/10.1111/j.1467-9701.2006.00807.x

Haber, S. H. (Ed.). (2004). *How Latin America fell behind: Essays on the economic histories of Brazil and Mexico, 1800 - 1914* (Nachdr). Stanford Univ. Press.

Habibi, F., & Zabardast, M. A. (2020). Digitalization, education and economic growth: A comparative analysis of Middle East and OECD countries.

Technology in Society, *63*, 101370. https://doi.org/10.1016/j.techsoc.2020.101370

Hackl, P., Westlund, A. H., & International Institute for Applied Systems Analysis (Eds.). (1991). *Economic structural change: Analysis and forecasting ; 56 tables*. Springer-Verl.

Haddad, C., Ghazaly, S., & Shediac, R. (2011). *Resilient, stable, sustainable: The benefits of economic diversification* (p. 20). Booze & Company. https://www.strategyand.pwc.com/m1/en/reports/strategyand-resilient-stable-sustainable-benefits-economic-diversification.pdf

Hamdi, H., & Sbia, R. (2013). The relationship between natural resources rents, trade openness and economic growth in Algeria. *Economics Bulletin*, *33*(2), 1649–1659.

Haouas, I., & Heshmati, A. (2014). Can the UAE Avoid the Oil Curse by Economic Diversification? *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2406325

Hedi Mohamed. (2019). Eard albaramij altanmawiat fi aljazayir khilal alfatrat min 2001 ali 2019 [Presentation of Development Programs in Algeria during the Period from 2001 to 2019]. *Majalt Alsiyasa Wal Iqtisad [Politics and Economics Journal]*, *2*(1), 35–69. https://doi.org/10.21608/jocu.2020.91597

Himed, M., & Belil, M. (2021). La stratégie de libération du pétrole en Algérie, de l'indépendance à la nationalisation [Algeria's Oil Liberation Strategy, From Independence to Nationalization]. مجلة الواحات للبحوث و الدراسات, *14*(2), 1550–1574.

IEA. (2022). *Law No. 05-07 – Law concerning Hydrocarbons – Policies*. IEA. https://www.iea.org/policies/11808-law-no-05-07-law-concerning-hydrocarbons

Jović, S., Maksimović, G., & Jovović, D. (2016). Appraisal of natural resources rents and economic development. *Resources Policy*, *50*, 289–291. https://doi.org/10.1016/j.resourpol.2016.10.012

Kadari, W. (2022). *Alaistithmar alaijnabiu almubashiru: Maeayir alaikhtiar [Foreign direct investment: Selection criteria]* [Ph.D.]. Djilali Liabes University, Sidi Bel Abbes.

Kansheba, J. M. P., & Marobhe, M. I. (2022). Institutional quality and resource-based economic sustainability: The mediation effects of resource governance. *SN Business & Economics*, *2*(2), 19. https://doi.org/10.1007/s43546-021-00195-x

Karabegović, A. (2009). *Institutions, Economic Growth, and the "Curse" of Natural Resources* (Studies in Mining Policy). Fraser Institute.

Karl, T. L. (2004). Oil-Led Development: Social, Political, and Economic Consequences. In *Encyclopedia of Energy* (pp. 661–672). Elsevier. https://doi.org/10.1016/B0-12-176480-X/00550-7

Khendek, S., Bounoua, C., & Benjeddou, S. (2021). *Institutions, growth and natural resources in Algeria Econometric study using the ARDL model*. 17.

Kherraz, L., & Alami, K. (2021). Good Governance and health in the Arab world. *مجلة الإبتكار والتسويق*, *8*(1), 273–291.

Kim, J. H., & Choi, I. (2021). Choosing the Level of Significance: A Decision-theoretic Approach. *Abacus*, *57*(1), 27–71. https://doi.org/10.1111/abac.12172

Kissell, R., & Poserina, J. (2017). Regression Models. In *Optimal Sports Math, Statistics, and Fantasy* (pp. 39–67). Elsevier. https://doi.org/10.1016/B978-0-12-805163-4.00002-5

Kobzev Kotásková, S., Procházka, P., Smutka, L., Maitah, M., Kuzmenko, E., Kopecká, M., & Hönig, V. (2018). The Impact of Education on Economic

Growth: The Case of India. *Acta Universitatis Agriculturae et Silviculturae Mendelianae Brunensis*, *66*(1), 253–262. https://doi.org/10.11118/actaun201866010253

Kriskkumar, K., Naseem, N. A. M., & Azman-Saini, W. N. W. (2022). Investigating the Asymmetric Effect of Oil Price on the Economic Growth in Malaysia: Applying Augmented ARDL and Nonlinear ARDL Techniques. *SAGE Open*, *12*(1), 21582440221079936. https://doi.org/10.1177/21582440221079936

Kronenberg, T. (2002). *The curse of natural resources in the transition economies*. Osteuropa-Inst.

Kufenko, V. (2015). The resource curse and human capital. In V. Kufenko, *Economic Growth and Inequality* (pp. 42–61). Springer Fachmedien Wiesbaden. https://doi.org/10.1007/978-3-658-08083-9_2

Laframboise, N., NLaframboise@imf.org, Alonso-Gamo, P., PAlonso-Gamo@imf.org, Feler, A., AFeler@imf.org, Bazzoni, S., SBazzoni@imf.org, Nashashibi, K., KNashashibi@imf.org, Paris Horvitz, S., & SParis Horvitz@imf.org. (1998). *Algeria: Stabilization and Transition to Market*. International Monetary Fund. https://doi.org/10.5089/9781557756916.084

Lashitew, A. A., & Werker, E. (2020). Do natural resources help or hinder development? Resource abundance, dependence, and the role of institutions. *Resource and Energy Economics*, *61*, 101183. https://doi.org/10.1016/j.reseneeco.2020.101183

Leamer, E. E. (2009). Gross Domestic Product. In E. E. Leamer, *Macroeconomic Patterns and Stories* (pp. 19–38). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-540-46389-4_2

Loginova, D., & Mann, S. (2022). Measuring stability and structural breaks: Applications in social sciences. *Journal of Economic Surveys*, joes.12505. https://doi.org/10.1111/joes.12505

Maheu, J. M., & Gordon, S. (2008). Learning, forecasting and structural breaks. *Journal of Applied Econometrics*, *23*(5), 553–583. https://doi.org/10.1002/jae.1018

Manning, A. (2004). Human Capital as a Transmission Mechanism of the Resource Curse. *The Park Place Economist*, *12*(1), 14.

Marquez-Ramos, L., & Mourelle, E. (2019). Education and economic growth: An empirical analysis of nonlinearities. *Applied Economic Analysis*, *27*(79), 21–45. https://doi.org/10.1108/AEA-06-2019-0005

Matallah, S., & Matallah, A. (2016). Oil rents and economic growth in oil-abundant MENA countries: Governance is the trump card to escape the resource trap. *Topics in Middle Eastern and North African Economies*, *18*(2). https://ecommons.luc.edu/meea/239

Mehlum, H., Moene, K., & Torvik, R. (2006). Cursed by Resources or Institutions? *The World Economy*, *29*(8), 1117–1131. https://doi.org/10.1111/j.1467-9701.2006.00808.x

Meres, M. (2015). Dirasat ’athar baramij a’iilneash aaliqtisadii 1002- 1022 ealaa mutaghayirat qitae altijarat alkharijia fi aljazayir "biastikhdam namadhij altanabuw w aalisstishraf VAR [Studying the Impact of Economic Recovery Programs 2001-2014 on the Variables of the Foreign Trade Sector in Algeria "Using VAR Forecasting Models]. *Majalat Albashayir Aliaiqtisadia [Al-Bashaer Economic Journal]*, *1*(2), 29–47.

Mideksa, T. K. (2013). The economic impact of natural resources. *Journal of Environmental Economics and Management*, *65*(2), 277–289. https://doi.org/10.1016/j.jeem.2012.07.005

Ministry of Energy. (2017). *Bilan des réalisation du secteur de l'Energie de l'année 2016 (Edition 2017) [Review of the achievements of the Energy sector for the year 2016 (Edition 2017)]*. https://www.energy.gov.dz/Media/galerie/bilan_realisations_eam_2000-2008_fr_edition_2009_5b4373b9d705c.pdf

Mohamed, E. S. E. (2020). Resource Rents, Human Development and Economic Growth in Sudan. *Economies*, *8*(4), 99. https://doi.org/10.3390/economies8040099

Mohtadi, S. (2022). *An Empirical Analysis on the Relationship Between Oil and Gas Rents and Education: The Role of Institutional Quality Thresholds* (SSRN Scholarly Paper No. 3777892). https://doi.org/10.2139/ssrn.3777892

Moiseev, N., Mikhaylov, A., Varyash, I., & Saqib, A. (2020). Investigating the relation of GDP per capita and corruption index. *Entrepreneurship and Sustainability Issues*, *8*(1), 780–794. https://doi.org/10.9770/jesi.2020.8.1(52)

Mukhtarov, S., Alalawneh, M. M., Ibadov, E., & Huseynli, A. (2019). The impact of foreign direct investment on exports in Jordan: An empirical analysis. *Journal of International Studies*, *12*(3), 38–47. https://doi.org/10.14254/2071-8330.2019/12-3/4

Mustapha, N. (2014). The Impact of Corruption on GDP Per Capita. *Journal of Eastern European and Central Asian Research*, *1*(2). https://doi.org/10.15549/jeecar.v1i2.76

Nkoro, E., & Uko, A. K. (2016). *Autoregressive Distributed Lag (ARDL) cointegration technique: Application and interpretation*. 29.

Nwokoye, E., Uwajumogu, N. R., & Dimnwobi, S. K. (2019). *Identifying Domestic Macroeconomic Drivers for Economic Diversification in Nigeria* (SSRN Scholarly Paper ID 3321153). Social Science Research Network. https://papers.ssrn.com/abstract=3321153

OECD. (2008). *OECD Glossary of Statistical Terms*. OECD. https://doi.org/10.1787/9789264055087-en

OECD. (2011). *The Economic Significance of Natural Resources: Key Points for Reformers in Eastern Europe, Caucasus and Central Asia*. OECD. https://www.oecd.org/env/outreach/2011_AB_Economic%20significance%20of%20NR%20in%20EECCA_ENG.pdf

OECD & World Trade Organization. (2019). *Aid for Trade at a Glance 2019: Economic Diversification and Empowerment*. OECD. https://doi.org/10.1787/18ea27d8-en

OPEC Monthly Oil Report (OPEC MOMR, p. 95). (2022). OPEC.

Ouoba, Y. (2016). Natural resources: Funds and economic performance of resource-rich countries. *Resources Policy*, *50*, 108–116. https://doi.org/10.1016/j.resourpol.2016.09.003

Palley, T. (2004). Lifting the Natural Resource Curse. *Oil, Gas & Energy Law Journal*. https://www.semanticscholar.org/paper/Lifting-the-Natural-Resource-Curse-Palley/4da96d7532ebca2fcfd45297614feb3cbc6a4ef3

Pelinescu, E. (2015). The Impact of Human Capital on Economic Growth. *Procedia Economics and Finance*, *22*, 184–190. https://doi.org/10.1016/S2212-5671(15)00258-0

Pesaran, M. H. (1999). An autoregressive distributed lag modelling approach to cointegration analysis. *Cambridge University*, 134–150.

Pesaran, M. H., Shin, Y., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics*, *16*(3), 289–326. https://doi.org/10.1002/jae.616

Rahim, S., Murshed, M., Umarbeyli, S., Kirikkaleli, D., Ahmad, M., Tufail, M., & Wahab, S. (2021). Do natural resources abundance and human capital development promote economic growth? A study on the resource curse hypothesis in Next Eleven countries. *Resources, Environment and Sustainability*, *4*, 100018. https://doi.org/10.1016/j.resenv.2021.100018

Rapport Annuel—Sonatrach. (2017). https://sonatrach.com/wp-content/uploads/2019/03/Rapport-Annuel_2017.pdf

Resche, C. (2013). *Economic Terms and Beyond: Capitalising on the Wealth of Notions*. Peter Lang CH. https://doi.org/10.3726/978-3-0351-0589-6

Robinson, J. A., Torvik, R., & Verdier, T. (2006). Political foundations of the resource curse. *Journal of Development Economics*, *79*(2), 447–468. https://doi.org/10.1016/j.jdeveco.2006.01.008

Rose-Ackerman, S., & Søreide, T. (2011). *International Handbook on the Economics of Corruption, Volume Two*. Edward Elgar Publishing. https://doi.org/10.4337/9780857936523

Ross, M. L. (2001). Does Oil Hinder Democracy? *World Politics*, *53*(3), 325–361. JSTOR.

Rosser, A. (2006). *The Political Economy of the Resource Curse: A Literature Survey* (Working Paper No. 268; Institute of Development Studies).

https://www.yumpu.com/en/document/view/43100150/working-paper-268-institute-of-development-studies

Roy, B. C., Sarkar, S., & Mandal, N. R. (2013). Natural Resource Abundance and Economic Performance—A Literature Review. *Current Urban Studies*, *01*(04), 148–155. https://doi.org/10.4236/cus.2013.14016

Sachs, J. D., & Warner, A. M. (1997). Fundamental Sources of Long-Run Growth. *The American Economic Review*, *87*(2), 184–188. JSTOR.

Sachs, J. D., & Warner, A. M. (1999). The big push, natural resource booms and growth. *Journal of Development Economics*, *59*(1), 43–76. https://doi.org/10.1016/S0304-3878(99)00005-X

Sachs, J., & Warner, A. (1995). *Natural Resource Abundance and Economic Growth* (No. w5398; p. w5398). National Bureau of Economic Research. https://doi.org/10.3386/w5398

Saeed, K. A. (2022). Determinants of institutional quality and per capita growth in natural resource-dependent countries. *Cogent Economics & Finance*, *10*(1), 2122189. https://doi.org/10.1080/23322039.2022.2122189

Sakamoto, Y., Ishiguro, M., & Kitagawa, G. (1986). *Akaike information criterion statistics*. KTK Scientific Publishers ; D. Reidel ; Sold and distributed in the U.S.A. and Canada by Kluwer Academic Publishers.

Sala-i-Martin, X., & Subramanian, A. (2003). *Addressing the Natural Resource Curse: An Illustration from Nigeria* (No. w9804; p. w9804). National Bureau of Economic Research. https://doi.org/10.3386/w9804

Sali, M. (2016). *Tathir albinyat alsukaaniat w altanmiat alaiqtisadia ealaa tatwr alshaghl fay aljazayr [The impact of population structure and economic development on the development of employment in Algeria]* [Ph.D.]. Oran 2.

Salim Badreddine, B., & Maachi, M. (2019). *The Dutch Disease Reality in Algeria .over the period 1990 -2016*. *2*, 183–220

Shao, S., & Yang, L. (2014). Natural resource dependence, human capital accumulation, and economic growth: A combined explanation for the resource curse and the resource blessing. *Energy Policy*, *74*, 632–642. https://doi.org/10.1016/j.enpol.2014.07.007

Si Mohammed, K., & Seddiki, M. (2022). taqdir mueadal albitalat altabieiu fi aljazayir dirasat qiasiat 1994—2019 [Estimating the natural unemployment rate in Algeria, an econometric study 1994-2019]. *مجلة البشائر الاقتصادية*, *8*(1), 19–34.

Smith, B. (2004). Oil Wealth and Regime Survival in the Developing World, 1960-1999. *American Journal of Political Science*, *48*(2), 232–246. JSTOR. https://doi.org/10.2307/1519880

Smith, B. (2015). The resource curse exorcised: Evidence from a panel of countries. *Journal of Development Economics*, *116*, 57–73. https://doi.org/10.1016/j.jdeveco.2015.04.001

Sokoloff, K. L., & Engerman, S. L. (2000). History Lessons: Institutions, Factor Endowments, and Paths of Development in the New World. *Journal of Economic Perspectives*, *14*(3), 217–232. https://doi.org/10.1257/jep.14.3.217

Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, *70*(1), 65. https://doi.org/10.2307/1884513

Suslova, E., & Volchkova, N. (2012). Human Capital, Industrial Growth and Resource Curse. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1023523

Taallah, L., & Chine, L. (2020). Total facor productivity and sources of economic growth in Algeria (1970—2018) by using ARDL approach. *Revue Des*

Reformes Economique et Intégration Dans l'économie Mondiale, *14*(3), 326–336.

Torvik, R. (2009). Why do some resource-abundant countries succeed while others do not? *Oxford Review of Economic Policy*, *25*(2), 241–256. https://doi.org/10.1093/oxrep/grp015

Tsani, S. (2013). Natural resources, governance and institutional quality: The role of resource funds. *Resources Policy*, *38*(2), 181–195. https://doi.org/10.1016/j.resourpol.2012.11.001

Tsui, K. K. (2011). More Oil, Less Democracy: Evidence from Worldwide Crude Oil Discoveries. *The Economic Journal*, *121*(551), 89–115. https://doi.org/10.1111/j.1468-0297.2009.02327.x

Ugur, M. (2014). CORRUPTION'S DIRECT EFFECTS ON PER-CAPITA INCOME GROWTH: A META-ANALYSIS. *Journal of Economic Surveys*, *28*(3), 472–490. https://doi.org/10.1111/joes.12035

van der Ploeg, F. (2011). Natural Resources: Curse or Blessing? *Journal of Economic Literature*, *49*(2), 366–420. JSTOR.

Vijge, M. J., Metcalfe, R., Wallbott, L., & Oberlack, C. (2019). Transforming institutional quality in resource curse contexts: The Extractive Industries Transparency Initiative in Myanmar. *Resources Policy*, *61*, 200–209. https://doi.org/10.1016/j.resourpol.2019.02.006

Weinthal, E., & Luong, P. J. (2006). Combating the Resource Curse: An Alternative Solution to Managing Mineral Wealth. *Perspectives on Politics*, *4*(01). https://doi.org/10.1017/S1537592706060051

Zerbout, A., & Rezazi, O. (2022). Dirasat tahliliat qiasiat li'athar al'iinfaq alhukumii ealaa mueadal albitalat fi aljazayir biastikhdam namudhaj (ardl)khilal alfatra

(1990-2019) [A assessment analytical study of the impact of government spending on the unemployment rate in Algeria using the (ARDL) model during the period(1990-2019)]. مجلة الإقتصاد الجديد, *13*(1), 223–241.

Zhu, M. (Ed.). (2012). *Business, Economics, Financial Sciences, and Management*. Springer.

Appendix 1

Unit Root Tests

UNIT ROOT TEST RESULTS TABLE (ADF)
Null Hypothesis: the variable has a unit root

At Level

		PGDP	TFP	EDU	IQ	CRP2	LAW2	K	OIL	RR
With Constant	t-Statistic	-2.2310	-0.5694	1.8123	-1.7899	-4.1248	-1.7591	0.4855	-1.4925	-1.4640
	Prob.	***0.2014***	***0.8593***	***0.9995***	***0.3757***	***0.0043***	***0.3895***	***0.9821***	***0.5194***	***0.5333***
		n0	n0	n0	n0	***	n0	n0	n0	n0
With Constant & Trend	t-Statistic	0.4660	-2.1861	0.2098	-0.9274	-4.1270	-3.8179	-1.7938	-1.4364	-1.4087
	Prob.	***0.9984***	***0.4745***	***0.9965***	***0.9351***	***0.0183***	***0.0350***	***0.6730***	***0.8217***	***0.8307***
		n0	n0	n0	n0	**	**	n0	n0	n0
Without Constant & Trend	t-Statistic	1.4295	4.3727	9.4990	-2.1607	-1.6888	-0.2585	1.2925	-0.5573	-0.5209
	Prob.	***0.9571***	***1.0000***	***1.0000***	***0.0324***	***0.0858***	***0.5814***	***0.9451***	***0.4646***	***0.4799***
		n0	n0	n0	**	*	n0	n0	n0	n0

At First Difference

		d(PGDP)	d(TFP)	d(EDU)	d(IQ)	d(CRP2)	d(LAW2)	d(K)	d(OIL)	d(RR)
With Constant	t-Statistic	-2.7042	-4.5411	-3.1397	-3.0553	-3.7497	-3.5209	-4.0666	-4.1663	-4.0045
	Prob.	***0.0892***	***0.0018***	***0.0381***	***0.0452***	***0.0104***	***0.0172***	***0.0052***	***0.0041***	***0.0059***
		*	***	**	**	**	**	***	***	***
With Constant & Trend	t-Statistic	-2.9815	-4.4803	-3.6445	-3.3890	-3.8167	-4.5590	-3.8690	-3.3697	-3.8935
	Prob.	***0.0125***	***0.0092***	***0.0489***	***0.0787***	***0.0351***	***0.0083***	***0.0317***	***0.0855***	***0.0335***
		***	***	**	*	**	***	**	*	**
Without Constant & Trend	t-Statistic	-1.8620	-2.6227	-0.5248	-3.0093	-3.8891	-3.6078	-1.4487	-4.2689	-4.1026
	Prob.	***0.0608***	***0.0113***	***0.4772***	***0.0044***	***0.0005***	***0.0010***	***0.1338***	***0.0002***	***0.0003***
		*	**	n0	***	***	***	n0	***	***

UNIT ROOT TEST RESULTS TABLE (PP)
Null Hypothesis: the variable has a unit root

At Level

		PGDP	TFP	EDU	IQ	CRP2	LAW2	K	OIL	RR
With Constant	t-Statistic	-1.9309	-0.5661	1.4734	-1.7822	-3.7460	-1.5828	1.1845	-1.4925	-1.5926
	Prob.	***0.3132***	***0.8600***	***0.9986***	***0.3793***	***0.0102***	***0.4750***	***0.9970***	***0.5194***	***0.4701***
		n0	n0	n0	n0	**	n0	n0	n0	n0
With Constant & Trend	t-Statistic	0.0383	-2.1861	-0.1897	-1.1245	-4.1334	-2.5582	-2.6222	-1.4672	-1.4317
	Prob.	***0.9942***	***0.4745***	***0.9891***	***0.9024***	***0.0180***	***0.3003***	***0.2746***	***0.8113***	***0.8233***
		n0	n0	n0	n0	**	n0	n0	n0	n0
Without Constant & Trend	t-Statistic	2.5411	4.4820	7.7094	-1.7916	-1.5283	-0.2316	3.7925	-0.5554	-0.5213
	Prob.	***0.9958***	***1.0000***	***1.0000***	***0.0700***	***0.1161***	***0.5918***	***0.9998***	***0.4654***	***0.4797***
		n0	n0	n0	*	n0	n0	n0	n0	n0

At First Difference

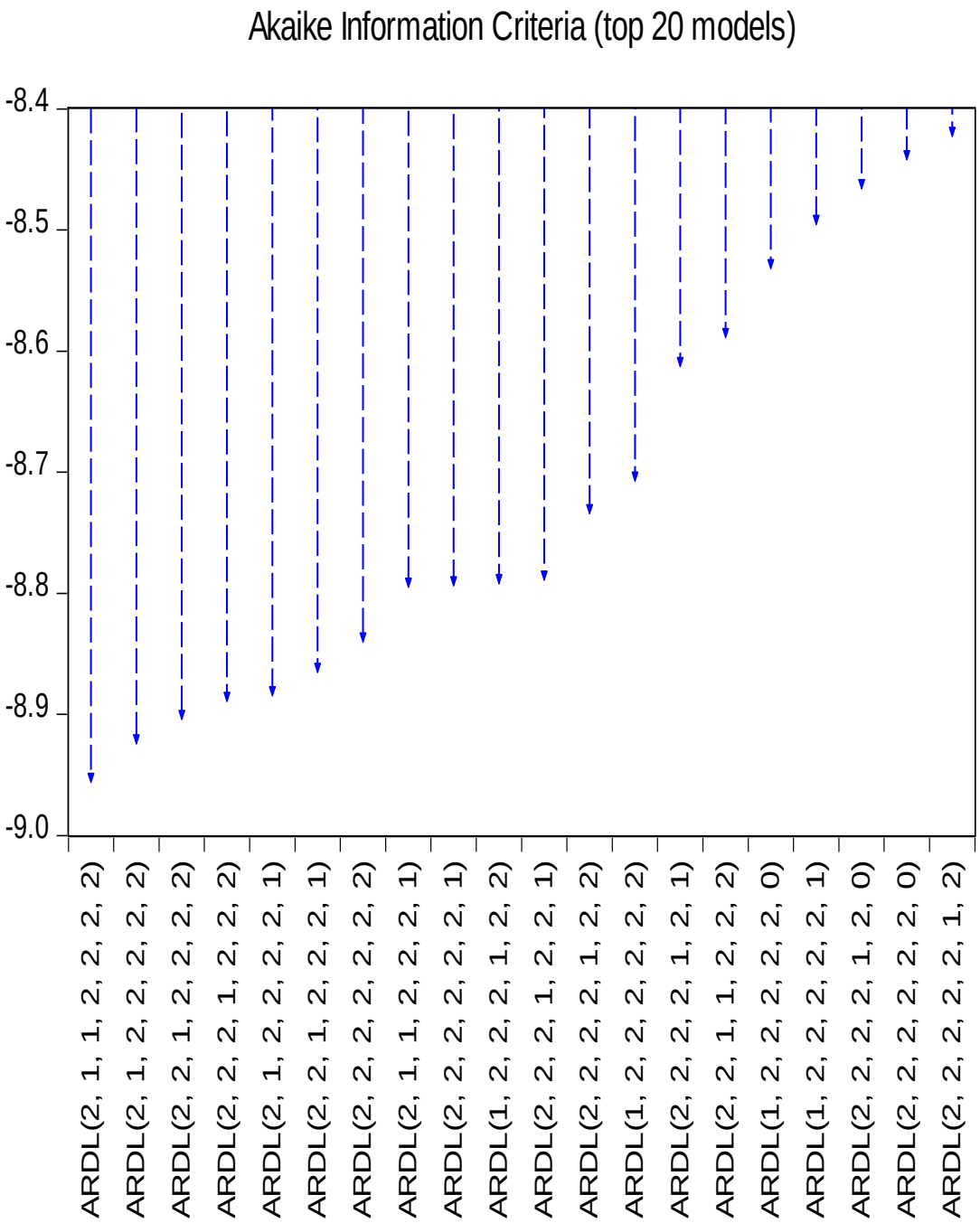
		d(PGDP)	d(TFP)	d(EDU)	d(IQ)	d(CRP2)	d(LAW2)	d(K)	d(OIL)	d(RR)
With Constant	t-Statistic	-2.8351	-4.5545	-3.1734	-3.0094	-3.8653	-3.5280	-4.0765	-4.1368	-3.9491
	Prob.	***0.0697***	***0.0017***	***0.0356***	***0.0495***	***0.0081***	***0.0169***	***0.0051***	***0.0044***	***0.0067***
		*	***	**	**	***	**	***	***	***
With Constant & Trend	t-Statistic	-4.0043	-4.5603	-3.6021	-3.2654	-3.8272	-3.5335	-3.9358	-4.5329	-4.3535
	Prob.	***0.0243***	***0.0078***	***0.0105***	***0.0308***	***0.0344***	***0.0236***	***0.0278***	***0.0083***	***0.0120***
		**	***	**	**	**	**	**	***	**
Without Constant & Trend	t-Statistic	-1.7796	-2.6227	-1.2057	-2.9670	-4.0850	-3.6144	-1.4487	-4.2498	-4.0692
	Prob.	***0.0265***	***0.0113***	***0.0478***	***0.0049***	***0.0003***	***0.0010***	***0.0197***	***0.0002***	***0.0003***
		**	**	**	***	***	***	**	***	***

Notes:
a: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1% and (no) Not Significant
b: Lag Length based on SIC
c: Probability based on MacKinnon (1996) one-sided p-values.

Source: Calculated using EViews 10

Appendix 2

Akaike Information Criteria (top 20 models)



Source: Calculated using EViews 10

Appendix 3

ARDL model estimation

Dependent Variable: LGDPPC
Method: ARDL
Date: 08/31/22 Time: 18:20
Sample (adjusted): 1998 2019
Included observations: 22 after adjustments
Maximum dependent lags: 2 (Automatic selection)
Model selection method: Akaike info criterion (AIC)
Dynamic regressors (2 lags, automatic): LCRP LEDU LK LLAW LOIL LTFP
Fixed regressors: C
Number of models evalulated: 1458
Selected Model: ARDL(2, 1, 1, 2, 2, 2, 2)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LGDPPC(-1)	0.124511	0.135537	0.918649	0.4260
LGDPPC(-2)	0.859477	0.243843	3.524722	0.0388
LCRP	0.037989	0.014564	2.608407	0.0798
LCRP(-1)	-0.063662	0.017567	-3.623892	0.0361
LEDU	2.290377	0.617792	3.707356	0.0341
LEDU(-1)	-2.859170	0.620764	-4.605889	0.0192
LK	-0.004827	0.018549	-0.260248	0.8115
LK(-1)	-0.019806	0.006998	-2.830210	0.0662
LK(-2)	-0.033970	0.010669	-3.184004	0.0499
LLAW	-0.191736	0.040932	-4.684243	0.0184
LLAW(-1)	-0.014249	0.023551	-0.605017	0.5879
LLAW(-2)	-0.172522	0.029240	-5.900178	0.0097
LOIL	0.012470	0.006112	2.040438	0.1340
LOIL(-1)	0.000129	0.006516	0.019874	0.9854
LOIL(-2)	0.051371	0.007297	7.039523	0.0059
LTFP	0.544223	0.089064	6.110486	0.0088
LTFP(-1)	0.359223	0.105126	3.417085	0.0419
LTFP(-2)	0.115644	0.124770	0.926856	0.4224
C	-12.93500	2.436171	-5.309562	0.0130

R-squared	0.999889	Mean dependent var	8.225264
Adjusted R-squared	0.999220	S.D. dependent var	0.112558
S.E. of regression	0.003144	Akaike info criterion	-8.951827
Sum squared resid	2.97E-05	Schwarz criterion	-8.009563
Log likelihood	117.4701	Hannan-Quinn criter.	-8.729857
F-statistic	1495.207	Durbin-Watson stat	3.630437
Prob(F-statistic)	0.000025		

*Note: p-values and any subsequent tests do not account for model selection.

Source: Calculated using EViews 10

Appendix 4

Diagnostic tests

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	4.354465	Prob. F(2,1)	0.6232
Obs*R-squared	19.73404	Prob. Chi-Square(2)	0.3278

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	52.97627	Prob. F(18,3)	0.6261
Obs*R-squared	21.93100	Prob. Chi-Square(18)	0.5412
Scaled explained SS	0.325952	Prob. Chi-Square(18)	0.9615

Heteroskedasticity Test: ARCH

F-statistic	18.39116	Prob. F(1,19)	0.4485
Obs*R-squared	10.32903	Prob. Chi-Square(1)	0.4236

Source: Calculated using EViews 10

Appendix 5

The Six Dimensions of Governance in Algeria 1998-2019

Year	VA	PV	GE	RQ	CC	RL	Average
1998	-1.24	-1.88	-0.83	-0.74	-0.88	-1.16	-1.12
1999	-1.18	-1.65	-0.90	-0.73	-0.91	-1.19	-1.09
2000	-1.11	-1.43	-0.96	-0.71	-0.94	-1.21	-1.06
2001	-1.08	-1.53	-0.78	-0.64	-0.91	-0.92	-0.98
2002	-1.04	-1.63	-0.60	-0.58	-0.88	-0.63	-0.89
2003	-1.08	-1.75	-0.61	-0.52	-0.69	-0.59	-0.87
2004	-0.80	-1.36	-0.57	-0.54	-0.68	-0.62	-0.76
2005	-0.72	-0.92	-0.47	-0.38	-0.48	-0.75	-0.62
2006	-0.92	-1.13	-0.47	-0.57	-0.52	-0.71	-0.72
2007	-0.98	-1.15	-0.57	-0.62	-0.56	-0.77	-0.78
2008	-0.98	-1.09	-0.63	-0.79	-0.59	-0.74	-0.81
2009	-1.04	-1.20	-0.58	-1.07	-0.58	-0.79	-0.88
2010	-1.02	-1.26	-0.48	-1.17	-0.52	-0.78	-0.87
2011	-1.00	-1.36	-0.56	-1.19	-0.54	-0.81	-0.91
2012	-0.91	-1.33	-0.53	-1.28	-0.50	-0.77	-0.89
2013	-0.89	-1.20	-0.53	-1.17	-0.47	-0.69	-0.83
2014	-0.82	-1.19	-0.48	-1.28	-0.60	-0.77	-0.86
2015	-0.85	-1.09	-0.50	-1.17	-0.65	-0.86	-0.85
2016	-0.86	-1.10	-0.53	-1.17	-0.68	-0.86	-0.87
2017	-0.90	-0.92	-0.59	-1.19	-0.60	-0.86	-0.85
2018	-1.00	-0.84	-0.53	-1.23	-0.66	-0.74	-0.83
2019	-1.06	-1.04	-0.52	-1.30	-0.62	-0.82	-0.89

Average	-0.98	-1.27	-0.60	-0.91	-0.66	-0.82
Minimum	-1.24	-1.88	-0.96	-1.30	-0.94	-1.21
Maximun	-0.72	-0.84	-0.47	-0.38	-0.47	-0.59

Source: World Bank WGI