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Hydrocarbon Specialisation and De-industrialisation in the Rentier Economy of Algeria

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Abstract:

This paper aims to display the natural specialisation in hydrocarbons in Algeria. It explores the nature of Algeria's resource-based industrialisation strategy and the underlying reasons for its shortcomings which has led to de-industrialisation with focus on roughly the first 30 years after the independence when the de-industrialisation has occurred. It also examines the link between the abundant hydrocarbons and the economic development and attempts to answer the question: why a resource rich economy like Algeria cannot benefit from its additional income for the promotion of industrial diversification? We finally argue that the analytical framework provided by theories considering the resource endowment as such as the root of the problem, like the Dutch disease theory, does not provide sufficient explanation for the Algerian case.

Keywords: Natural Resources, Industrialisation, Hydrocarbon Specialisation, Algerian Industry

ملخص:

تهدف هذه الورقة إلى إبراز التخصص الطبيعي للجزائر في المحروقات ودراسة طبيعة إستراتيجية التصنيع التي اتبعتها الجزائر والأسباب الكامنة وراء فشلها مع التركيز على الفترة التي شهدت ظاهرة اللاتصنيع خلال ما يقرب 30 سنة الأولى بعد الاستقلال، بالإضافة إلى النظر في العلاقة بين وفرة الموارد والتنمية الاقتصادية وكيف أن إقتصادا غنيا بالبترول والغاز مثل الجزائر لم يتمكن من الإستفادة من الدخل الإضافي من أجل تعزيز التنويع الصناعي. وفي الأخير نشير إلى أن الإطار التحليلي الذي تقدمه النظريات المتعلقة بوفرة الموارد الطبيعية باعتبارها مشكلا أساسيا - مثل نظرية المرض الهولندي - لا تقدم تفسيرا كافيا في حالة الجزائر.

الكلمات المفتاحية: الموارد الطبيعية، التصنيع، تخصص المحروقات، ، صناعة الجزائر.

Introduction :

Prior to the 1980's, it was widely perceived by neoclassical economists that a less developed country abundant in natural resources would overcome the capital constraints necessary to pursue a path of industrialisation. However, numerous studies have presented evidence to suggest that natural resource abundance is a 'curse' for developing countries since they under-perform their non-oil exporting counterparts.

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The distortions associated with industrial diversification in rentier economies are more acute. The inadequate growth performance of many oil exporting countries during the 1980's after more than a decade of following a concerted industrialisation strategy substantiated this perspective.

This paper aims to present an exposition of the economic argument pursued in the resource curse literature of the 'Dutch disease' in order to explain the de-industrialisation -that has occurred in Algeria and from which its economy suffers to the present day- by examining industrial efforts made prior the independence until the de-industrialisation has happened. It shall initially answer the following main question:

`To what extent the natural specialisation of Algeria in hydrocarbons would explain the process of de-industrialisation that Algeria has witnessed?`

In order to deal with the previous question, a couple of sub-questions are being introduced:

- What industrial strategies Algeria has followed since the independence?
- Could the Dutch disease model explain the de-industrialisation in Algeria?

In addition, the following hypotheses have been placed in order to answer the problematic:

1- The ISI strategy followed by Algeria has led to a restriction of the manufacturing sector.
2- Considering that Algeria is a rentier state, the problems and difficulties of industrial diversification which has led later to a de-industrialisation can be explained by its specialisation in hydrocarbons known as Dutch disease.

This study is of great importance since it tries to understand the current economic situation of Algeria which was the result of the set of choices made after the independence by analysing the previous industrial efforts.

Eventually, in order to deal with the topic, answer the previous main question and also test the hypotheses, a descriptive analytical approach is designed to show the de-industrialisation occurred and whether the hydrocarbon specialisation has led to this phenomenon. Therefore, the paper has been divided into three parts. It tries to deal firstly, with the hydrocarbon rent and the effort of industrialisation made prior the independence, secondly, the problems that Algeria has faced in order to diversify its economy, and finally, the potential explanation of the de-industrialisation by the hydrocarbon specialisation of the Algerian economy.

1- Hydrocarbon Rent and Industrialisation in Algeria

Before an overview on Algeria's industrialisation efforts is given, the Algerian economy will be first qualified as a rentier economy for a better understanding of its industrial experience.

1-1- The Concept of Rentier State

The term of `rent` that comes from political economy, which backs to classical economic theory in particular Malthus, and Ricardo(1) is primarily used today by political science, specifically in its extensions on the study of rentier states. The main contribution of political science is the notion of `rentier state`, which is usually linked to the exogenous nature of oil and gas revenues, in the sense that they come from sources outside the state(2).

Human history has recorded the largest transfer of wealth that resulted from the release of the resource-rich MENA countries in the second half of the 20th century(3). Therefore, the concept of the rentier state is often mentioned in the context of countries in this region because of their large resource endowments. However, this is not a feature as such of a rentier economy. Quoted in many books and articles and considered among the first contributions of the rentier state theory, which was developed in relation to the economy of Iran pre-revolution in 1970, Hossein Mahdavy`s definition considers rentier economies as(4): 'those countries that receive on a regular basis substantial amount of external rent'. Yates (1996)(5) adds to this definition which he quotes that it is not exclusive to `the Persian Gulf in the Middle East`. Abdulla (1999) claims that Mahdavy focused in his definition on the state without linking it to the economy, which was done later by Al Beblawi and Luciani (1987) who define `rentier economy` instead of `rentier state`(6), considering the former as a subset of the latter, which is according to them an economy largely sustained by the rents returning from outside. Abdulla (1999) said more about the rent and specifies the term `oil rentier economies` to the ones of oil exporting countries(7).

Furthermore, Al Beblawi (1990) propounds four characteristics by which the state and hence the economy can be considered as rentier or not; Firstly, the prevalence of the rate context. Secondly, the rent must be from a foreign origin, i.e. a potent domestic production is not needed. Thirdly, workers are sparsely concerned in creating the rent. The last feature, which appears as the most significant one, is that `government must be the principal recipient of the external rent`(8).

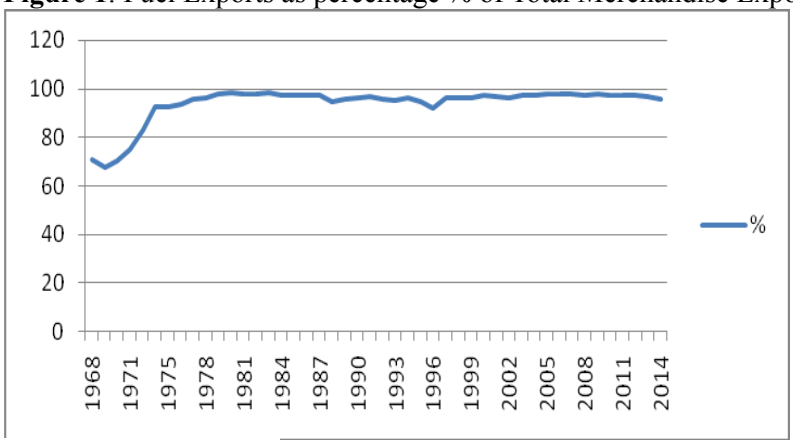
Hence, the exhaustibility of the resource is not a criterion; the rents could also come from activities like the administration of the Suez Canal. Nevertheless, one of the main challenges for a rentier state is often described as the transformation of the rent income into a reproducible wealth, "increasing the overall productive capacity"(9). The "rent" itself is therefore not attributed to the excess income generated by the scarcity of the resource, a so-called

'Hotelling Rent'. It is a Ricardian rent, defined by Gelb (1988) as[10]: "residual component of market price over production cost where all reproducible factors of production are paid at market rates". The transformation of the economy away from a dependency on this type of income is often associated with structural change. One of the driving forces behind structural change is industrial diversification of the economy.

1-2- Algeria, a Rentier Economy?

The exploitation of the hydrocarbon in Algeria had started in 1958, only shortly before the independence in 1962. The oil economy was only nationalised in 1971 and is dominated by the 100% state owned company Sonatrach. The national company, created in late 1963 and responsible of all oil activities, is the spine of the Algerian economy[11]. Revenues, therefore, are at the state's disposals deriving more than 60% of its budget revenues from oil and gas receipts[12]. Algeria's oil production peaked in 1978 and has ever since declined[13]. Resources always accounted for at least 80% of its exports[14] and rose from 21% in 1970 to 62% in 1976 of its GDP[15]. As shown in Figure 1, since the mid-1970s, oil and gas have made up more than 90% of Algerian annual exports. They dominate the economy, explaining 98% of the exports during the last few years[16], and consequently, constitute the country's principal source of hard currency.

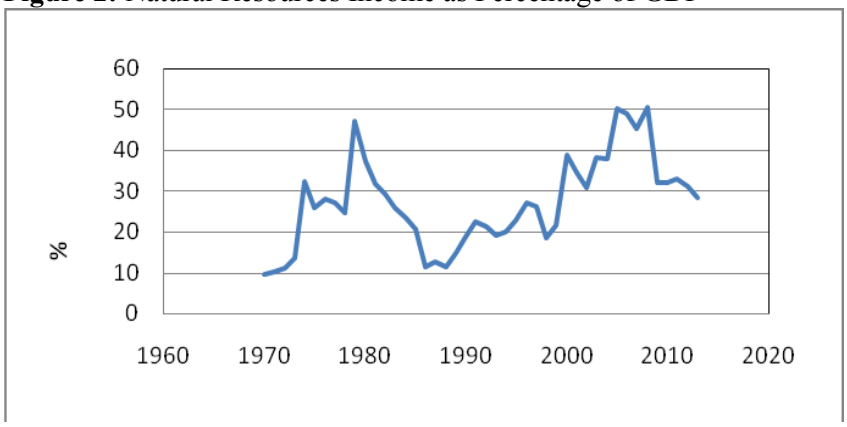
Figure 1: Fuel Exports as percentage % of Total Merchandise Exports



Source: By the author, based on World Bank staff estimates from the Comtrade database maintained by the United Nations Statistics Division.

Whilst the hydrocarbon sector only employs about 3% of the active population[17], it generated on average about one fifth of the economy's total annual output over the last few decades as shown in figure 2. Therefore, with its considerable hydrocarbon resources and relatively low extraction costs, Algeria represents such a rentier economy.

Figure 2: Natural Resources Income as Percentage of GDP



Source: By the author, based on the Global Economy database (from data of World Bank 2015 World Development Indicators)

1-3- Algeria's Industrialisation Strategy

The economic history of Algeria can be divided into three phases; following its independence in 1962, Algeria's economy initially collapsed due to the exodus of the French elite who had vested many key positions in the colonial economy. President Ben Bella's strategy embarked on the promotion of light industry and agrarian reform. Yet, his approach faced major problems with tackling the rural and urban labour surplus. Following a socialist economic system characterised by its highly controlled type as the only way to get rid of remnants of colonialism, a rapid change in power in 1965 also introduced a new economic strategy. The Boumediene administration decided to adopt a radical industrialisation programme whose intellectual origins lay within the writings of the French economists Perroux and Destanne de Bernis[18]. President Boumediene's strategy of industrialisation reflected the integration of the domestic economy by strengthening the linkages between sectors and along the supply chain on the one hand, and the protection of the national industry from foreign influences on the other hand. Heavy producer goods industries, for instance petrochemicals and metals, had to take advantage of the cheap energy input and establish linkages to the rest of the economy as input factors for agricultural modernisation. This concept was known as "industrialising industries"[19], departing from the resources as a base for industrialisation as explained in Auty (1990) work.

The strategy of "industrialising industries" was framed by a socialist state form promoting central planning as well as self-reliance[20]. It was, moreover, based on the idea that the hydrocarbon sector as a "premier industrialising industry" would provide a feedstock for a petrochemical sector, generate a market for capital goods and provide resource rents to finance the import of capital goods

and technology to build a modern industry[21]. This industry was expected to produce intermediate and finished goods, including fertilisers, tractors, and consumer durables[22]. The first major market for the goods produced was supposed to be the agricultural sector.

This hydrocarbon export-led import-substitution strategy began to be implemented as part of the two Four-Year Plans which had taken place intended to finance capital accumulation and increased investment by oil revenues and by "deferring private consumption" to later periods. During the first decade of Boumediene's rule, the share of industrial investment for heavy industry exceeded 50%. It started decreasing in the last years under his rule and later fell below 50%. A large share of the investments flew into capital-intensive industrial sectors, including hydrocarbon exploitation. Investments were first mostly based on resource revenues, aid, and remittances, yet, following the first oil windfall of the 1970s, also to a large extent on foreign borrowings[23].

In order to favour the import of capital goods, the nominal exchange rate was kept fixed over a sustained period of time and capital controls were imposed. Internally, all prices were administratively determined, which means that they did not necessarily have a market clearing function. On the other hand, the agricultural sector was put under self-administration as part of a large scale agrarian reform and received very little investment with only an estimated 8.3 and 4.8% of public investment during the first and second plan respectively. The economy changed fundamentally under the rule of Chadli, who took power in 1978. Facing a price decrease of oil, he stressed the development of consumer goods industries and a liberalisation of the price system. This structural programme was financed by increasing foreign debt. It was accompanied by the breaking up of the large state enterprises into smaller entities. This moderate liberalisation of the economy included reduced protection of the previously installed industries. While during the 2000`s, industrial structure (dominated by the heavy industry of steel, metal, mechanical, electronic and chemistry industries) which accounted for 54% of the industry in the early years of the programme represents only 32% of the industry in 2004 which was dominated by consumer goods[24].

2- Problems of Industrial Diversification in Algeria

Algeria counts among the resource-rich countries in the MENA region that financially greatly benefited from an inherited hydrocarbon specialisaion. Classified as a 'less developed country' at the time of its independence in 1962, Algeria implemented an ambitious industrialisation programme that was fueled by its hydrocarbon receipts. Basic economic theory and common sense suggest that, with its resource wealth allowing for an accelerated capital accumulation, the country's economy should have developed rapidly. Yet the programme's outcome has been extremely disappointing to date, given the secondary sector's

relatively small contribution to national output and little diversification.
An increasingly common criticism of the resource curse literature is that it tends to be
reductionist in its approach[25]. The tendency to trace all the problems within an economy back to its resource abundance indeed suggests a certain "intellectual laziness"[26]. Instead of asking how natural resources caused Algeria's present day industrial development problems, one could also ask what political and social factors prevented Algeria from utilising its hydrocarbon wealth to promote development.

2-1- Algeria's Difficulties in Industrial Diversification

Despite the efforts, the results of Algeria`s industrial diversification programme have been rather disappointing. The growth rate between 1960 and 1980 was sustained above 4%, but this can partly be explained by an increase in oil production and in oil prices. But in the following decade it fell to 2.6%[27]. Throughout 1970-92 the share of the industrial sector of the GDP had increased modestly from 41% to 47%, but the share of the manufacturing sector had decreased slightly from 15% to 10%. These were not the desired result for nation which had expected its oil resources to run out by 1995[28].

Algeria was one of the few countries in the MENA region that adopted and adhered to a "socialist" development path of rapid industrialisation that could break free from the international division of labour that imposed a state of dependency. Thus the development plan formulated in 1966-67 under the auspices of the Boumedienne regime (1965-1978) attempted to transform its comparative advantage by following an import substitution industrialisation. The pioneering work by Hirschman (1958) and particularly Destanne de Bernis influenced the strategy at the centre was what was called 'industrialising industries', which implies that by concentrating investment on specific industries that have stimulating capacities particularly power producing sectors thus giving rise to backward and forward linkages that will result in the entire economy being stimulated. Thus investment was concentrated on heavy industries.

Algeria focused on two basic priorities that of capital accumulation over consumption and industrialisation over agriculture. This is confirmed by the data, gross investment ratio to GDP increased dramatically from 1967-9 from 22.3% to 39.0% during the second four-year plan 1974-77 while private and government consumption declined steadily[29]. Therefore Algeria by rationing private consumption successfully controlled the inflationary pressure arising from spending oil windfalls domestically, which DD model assumed would appreciate the real exchange rate. Furthermore according Gelb (1988) Algeria in the Boumedienne period was a "fix price" economy, which means that prices are not the determining factor for clearing markets. Relative prices do not increase and the real exchange rate is stable, data from the IMF

international financial statistics confirms this, between 1959 and 1984 the exchange rate is kept below 5% this is remarkable considering other oil exporters had double-digit exchange rates. Thus DD 'cannot operate in a fix price economy'[30]. Furthermore Gelb asserts that Algeria's remarkable investment ratio was achieved due to its high import intensity. This followed the sectoral distribution of investment consider table 1 below. The heavy industrialising industries required imported capital goods, which constituted two thirds of total investments and close to half in 1978. This in turn relieved pressure on the domestic economy and kept the exchange rate stable.

During the two 'four year' development periods 1970-73 and 1974-77 Algeria experienced high population growth rates around 3%[31] this further exacerbated the high unemployment and underemployment problem in the country. This undermines the central assumption of DD model of full employment, which leads to a resource shift. Lawless (1984) asserts that although there was a dramatic decline in employment from the agricultural sector from 918.000 to 692.000 between 1966-77[32], this however did not cause the decline in agricultural production since underemployment in this sector was over a million workers who work part time.

The slow growth of agriculture was due to the unbalanced growth strategy. Investment increased dramatically during the first and especially the second four-year plan aided by the increasing oil windfalls changed the composition of GDP. The vast majority of investment was allocated to the manufacturing sector. Table 1 illustrates the investment percentage among the different sectors:

Table 1: Investment percentage among the different sectors 1967-1977

	1967-69	1970-73	1974-77
Hydrocarbons, capital and intermediate goods	50.9%	47.1%	48.6%
Total industry	55.3%	57%	62%
Agriculture	16.4%	13%	4.7%
Consumer goods	8.5%	6.7%	6.9%
Infrastructure	28.3%	30%	33.3%

Source: Lawless R. (1984), Op Cit., p. 165.

From this we can clearly identify that the manufacturing sector was subsidised accounting for over 50% of the investment ratio this undermines the assumptions made by the DD model of a resource shift that will lead to a stagnation of this sector. Table 2 illustrates the rate of growth of GDP by sector between 1967 and 1978.

Table 2: Growth of GDP by sector between 1967 and 1978

Sectors:	1967-73	1973-77	1977-78	1967-78
Hydrocarbons	6.9%	1.5%	9.3%	5.2%
Industry (excluding hydrocarbons)	9.7%	7.5%	20.8%	8.8%
Agriculture	1.2%	2.3%	9.8%	2.4%
Other	8.2%	8.0%	3.8%	7.2%
Total	7.5%	6.6%	8.2%	7.2%

Source: Lawless R. (1984), Op Cit., p. 165.

Agriculture constituted a low investment ratio, which in turn is reflected in the low growth rate averaging only 2.4%. However table 2 also illustrates the high growth performance of non-hydrocarbon industry averaging 8.8% this is the highest growth rate among the six countries sampled by Gelb. The growth performance strongly follows the oil windfall; the period between 1977 and 1978 there is a dramatic increase in both the hydrocarbon and manufacturing sectors; however both sectors declined sharply in periods when oil revenues declined, in 1985 non-oil industry accounted for only 8.3% of GDP growth. This would entail a reversal of DD assumptions since the decline were cyclical dependent on oil revenue.

Nevertheless it is necessary to emphasise that Algeria did suffer from important structural distortions exacerbated by oil windfalls. The huge investment ratio averaging 40% of GDP did not great sustainable growth(33).

The average annual growth rate had been even higher prior to the first oil boom 7.8% in 1970-73 compared to 6.3% 1974-77. This was primarily because of the low efficiency with which capital was employed as well as the low productivity. The increase in output did not match that in capital investment resulting in high incremental capital output ratio (ICOR). Gelb maintains that in Algeria the gross ICOR was high 6.8 in 1973-77, 4.4 in 1978-79, and 10.1 in 1980-82. In the non-oil manufacturing and energy sector the ICOR was 8.5. The reason why the ICOR was particularly high was because there existed both demand and supply constraints, which was associated with the existence of unutilised capacity. In 1976 Algeria's cement factory was operating at 56% of capacity, the metal frame industry at 52% and the ceramic tile industry at 17%(34). Algeria was unable to take advantage of scale economies because domestic demand for the output was insufficient. Following a strictly ISI strategy meant that it did not promote exports, therefore the manufacturing sector was constrained by the size of the domestic market, which increased inefficiency. In contrast Taiwan followed both ISI and exports promotion strategy, it simultaneously protected infant industries and exposed them gradually to international competition this increased efficiency by taking

advantage of scale economies and imposing market discipline made them internationally competitive. Taiwan was able to move away from 'static efficiency', the outcome of capital investment to 'dynamic efficiency', the outcome of innovation and creativity. It also imposed capital discipline on industries by setting export quotas thereby those who did not meet these quotas were excluded from future state funds. The lack of internationally competition meant Algerian costs were often double European or Japanese competitors.

A further problem that decreased productivity in manufacturing was the insufficient supply of skilled workers. Although the supply of labour was elastic this was predominantly unskilled labour. The reported illiteracy rate after the revolution was 81% thus this provided an important constraint for capital-intensive manufacturing. 'With the exception of hydrocarbons, all sectors are short of technicians and skilled workers…in many cases the quality of the training provided is unsatisfactory and poorly adapted to Algeria's needs'. Thus an argument supporting the DD can be formulated in that the insufficient supply of skilled labour clearly decreased productivity in manufacturing. The general secretary of regional development confirms this in 1979[35]: 'in some cases we found that firms were running well below their capacity, partly as a result of the lack of industrial discipline and skills'.

2-2- Industrial Policy and Weak Institutions

The unbalanced growth strategy did not invigorate the entire economy as presumed; rather it created an economy that increasingly became dependent on the hydrocarbon sector in 1970 95% of exports came from this sector alone and it made up 60% of government revenue. The first oil windfall encouraged the state to be optimistic about future prices thus Algeria borrowed heavily to continue its high investment in heavy industries. However when the price of oil collapsed in 1986 Algeria had debt accounting for 60% of GDP in 1993 and the cost of servicing the debt was $9.4 billion or 86% of export earnings[36]. This however does not necessary mean that it was the oil sector that created this problem other non-mineral exporting countries also had debt problems during the 1980's rather it is failed policy implementation that is the cause. The importance of strong and mature institutions explains why some resource rich countries were more successful than others. They distinguish between 'developmental' and 'predatory' states the former is presumed to have good institutions that work for the benefit of all and the later has bad institutions, which benefits the few. According to Rosser (2006) studies of this nature provide a weak analysis because it lacks a dynamic element, they do not trace political, social and historical processes through which these different types of states were formed.

Algerian institutions were relatively powerful during the Boumedienne period black markets i.e. market distortions existed but according to Gelb (1988) these were minimal. Furthermore the bureaucratic system was

comparatively free from corruption, which is endemic in many petro-states. This may be more to do with the historical development of Algerian society rather than static rentier state theory. Algeria like Tunisia was subjected to French rule but both countries experience was very different. Colonial rule in Algeria did not sustain and develop a strong independent bourgeois, which existed in Tunisia, the relatively small number, a proportion of them remained loyal to French interests. The ministry of finance and the secretariat of state for planning were under the influence of pro-French elements, which attempted to derail the industrialisation strategy. Thus, Boumedienne adopted autonomous governance that minimised rent seeking behaviour and also curtailed corruption. However through this very process Algeria lacked institutionalised ties to the private sector. It had few mechanisms to impose price incentives, and competition. The excessive autonomy severely reduced its knowledge of the market unable to identify what was working and what wasn't.

Regardless of the existence of a link between resource abundance and institutional quality, weak government institutions likely had an impact on the disappointing outcome of Algeria's attempts to develop a large industrial sector. At the same time, Algeria's resource-wealth allowed the government to pursue a flawed strategy for longer than it would have been possible otherwise.

Whilst other late industrialisers, such as South Korea, adopted at some point an export-oriented industrialisation strategy, Algeria tried to create an industry that only catered to domestic markets. These domestic markets, however, were either too small or only existed in theory. Benakli (1990)[37], for instance, points out that the reform of the agricultural sector and the low investment levels never gave rise to a socioeconomic reality that would have resulted in a demand for the goods produced for it.

Economic introversion was further reinforced by the fixed exchange rate, which resulted in the currency's overvaluation. This rendered locally produced products uncompetitive on world markets. An outright hostility to foreign capital, moreover, discouraged the transfer of know-how via joint ventures, which would have reduced implementation risks[38].

Another deficiency was that it failed to make industry investment productive, as it did not effectively deploy hydrocarbon windfalls. In order to avoid distortions in the non-hydrocarbon sectors by overly rapid absorption, windfalls need to be sterilised. Sterilisation can, for example, be accomplished through the accumulation of overseas reserves. However, the Algerian government only created a sovereign wealth fund in 2000[39].

3- The Effect of Hydrocarbon Specialisation on the Algerian Industrial Development

When we deal with de-industrialisation of Algeria, we should unavoidably explain and use the Dutch disease theory, which gives an interesting explanation of the phenomenon.

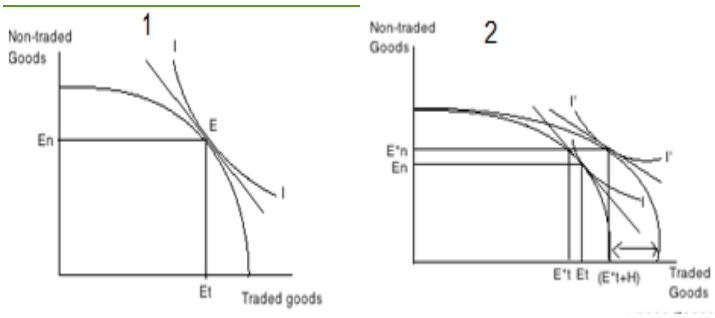
3-1- Resource Endowments and Industrial Diversification

Natural resources has traditionally been considered as beneficial for countries usually described as `bless`. However, nowadays they are seen as resources which have bad effects or `curse` for both developed and developing countries if they induce Dutch disease, which originated to Netherlands after finding significant sources of natural gas in the North Sea in the 1960s. These natural resources when they dominate an economy taking the form of `rent` might have worse effects on that economy and more specifically on its industry.

3-1-1- The Dutch Disease Model

Corden and Neary (1982) provide an extensive analysis of the DD therefore treatment here is more concise. This model is assumed to apply not only to resource rich countries but also to any economy that receives a large external income. The economy is split into two 'traded goods' (manufacturing, agriculture) and 'non-traded' goods (services, construction). The two central assumptions of the model are full employment and constant technology. The key-equilibrating factor in the model is the adjustment of the real exchange rate, since the price of traded goods is set internationally and the price of non-traded goods is set according to domestic supply and demand. Let us assume that demand for non-traded goods increase due to an unexpected increase in natural resource exports and the domestic supply is constrained due to insufficient productive capacity then the rise in the relative price of non-traded goods to traded goods will raise inflation and lead the real exchange rate to appreciate. This will make exporting non-hydrocarbon goods more difficult as they become less competitive internationally because the price of inputs will increase (wages, materials) this is called the 'spending effect'. Simultaneously this will have a 'resource movement effect', which entails domestic resources such as labour and capital to shift from the lagging traded sector into the booming non-traded sector thus further squeezing the traded sector. A graphical presentation taken from Sachs and Warner (2007) will further clarify the DD model.

Figure 3: The Geometry of Dutch Disease



Source: Sachs, J., and Warner, A. (2007). *How to Handle the Macroeconomics of Oil Wealth*, in "*Escaping the Resource Curse*" by Humphrey, M. et al. (eds.), New York: Columbia University Press, p. 196.

Part 1 of Figure 3 illustrates the economy before the oil boom, the equilibrium point E is tangent to the PPF. The slope of the PPF at E is equal to the real exchange rate. The steeper the curve the more appreciated is the exchange rate. Now consider Part 2, an unexpected windfall from hydrocarbon exports raises the output of traded goods equal to the sum of non-traded goods plus the oil sector. The PPF will shift to the right by the amount of the oil boom as shown by the arrows. The new equilibrium point is E*, non-traded goods production has increased to E*n, the total traded goods sector has increased by E*t+H, however, more importantly the non-oil traded sector has decreased from Et to E*t. The real exchange rate has increased since the slope at E* is less steep than E.

The shift of the economic structure is particularly important since the traded sector is assumed to embody long-term growth prospects through the acquisition of new technology and human capital formation. Thus it provides both backwards and forward linkages with other sectors unlike the enclaved oil sector. Therefore this will have an adverse effect on growth, which Sachs and Warner study (2007) allude to.

3-1-2- Dutch Disease and De-industrialisation

One strand of theories considers the appreciation of the real exchange rate as the key to the failure in structural change in resource rich economies. A well-known example of this is the Dutch disease theory. It describes the contraction of tradable sectors other than the resource exporting sector following a resource discovery. This contraction is caused by two different effects.

As a consequence of an oil or gas discovery, the large potential income in this sector makes it more profitable for other input factors. According to Corden (1982), this leads to a "resource movement" of input factors of production into the booming sector, causing a contraction of the remaining sectors. Corden (1982) calls this an effect of direct de-industrialisation. A second effect originates on the demand side, the so-called "spending effect". A generally higher real income leads to an additional spending in the service sector, which raises the price of services and causes a further contraction of the non resource related traded sector. Thus, an indirect de-industrialisation takes place (Corden 1982). Gelb (1988) emphasizes the role of the exchange rate particularly for the spending effect. The additional income through resource exports leads - in the case of positive income elasticity of the demand for services – to an excess demand of services, and since the prices of the traded sector are given through supply and demand in the world economy, this induces

an increase in prices only in the service sector. This is equivalent to an appreciation of the real exchange rate. Production in this sector becomes more attractive, while consumption shifts towards imports. The spending effect often prevails if the booming sector needs only small amounts of domestic inputs such as labour, as in the case of natural resources, or if labour and technology are no longer a constraint(40). The Dutch disease occurs in case of the existence of a booming and declining sub-sectors within the traded goods sector of the economy. According to the theory, the boom which can be triggered by different causes such as technological improvement, price shock or a discovery of new resources may lead to a major structural changes within the economy caused by resource movement and spending effects of the boom and furthermore may cause both direct and indirect de-industrialisation.

In order to have a more complete understanding of the boom impact on the economy and industrialisation, the theory consider several models with different variables and different results, the core model is the one composed of three sectors B, L and N in which B is the booming sector when L is the declining one and N is the non-tradable sector. The effects of the boom in this model are discussed basing on certain assumptions: full employment, a constantly balanced trade, the boom is caused by a technological improvement, only one production factor which is labour is mobile between the three sectors and all the factors are internationally immobile(41).

To start with, the boom has two initial consequences on the booming sector's employed factors: a higher demand for labours and higher income. The higher demand for labour which is a mobile factor between the three sectors results in draining out resources from the other sectors and thus causes a fall of both employment and output of the sectors, resulting in a direct de-industrialisation and that is the resource movement effect. On the other hand and if we put in consideration the rate exchange and the real appreciation mechanism then higher income leads to a higher expenditure on the non-traded goods sector and the prices shall rise in order to absorb the excess demand causing further structural changes, this situation leads to another resource movement by moving out labour from the declining traded goods sector to the non-traded goods sector caused by higher demand for labour and as a result employment and output of the traded goods sector shall fall even more causing the indirect de-industrialisation, and that is the spending effect of the boom(42).

But as it was mentioned before, other circumstances lead to different results and not necessarily unfavourable ones. For example, if we consider the capital as another mobile production factor between the non-booming sectors and we keep labour as a mobile factor between the three sectors, then the resource movement effect of the boom can be beneficial for the other traded sector if it tends to be a capital demanding one and the non-traded sector is more labour demanding, and in the contrary spending effect will have negative

consequences. What we need to note is that economies having a booming traded sector within it, shall witness some structural changes caused by the impact of the boom on the other sectors through resource movement and the spending effects, and these structural change may have serious consequences on the industry. Thus, this phenomenon is used as a reference by many economists as well as the World Bank and the IMF in order to explain the de-industrialisation in both developed and developing countries which have experiences of external shocks.

Overall, the Dutch disease model offers an explanation for how tradable sectors can be negatively affected by a boom in another sector, which can be triggered by a once-for-all exogenous technological improvement, the discovery of new resources, or a rise in world market prices of the product produced within it. The core model, according to Corden (1984), consists of three sectors: a booming sector (B), a lagging sector (L) and a non-tradable sector (N). B and L produce tradable goods whose pricing is determined by the world market, whilst sector N's prices are set locally. Two critical assumptions are made in the model, namely, that the labour force is fully employed and technology in tradable and non-tradable goods sectors is given. The model proposes two effects: On the demand side, the "spending effect" describes the outflow of resources from B and L into N. This is caused by some part of the additional income from B being spent. Assuming that the income elasticity of demand for N is positive, prices of N relative to tradable prices must rise causing the real exchange rate to appreciate. On the supply side, the "resource movement effect" reflects the idea that the demand of labour in B rises, inducing a movement of labour out of L and out of N. Under full employment, this makes a fall in employment inevitable[43].

3-2- Has Algeria Experienced the Dutch Disease?

The economic history is not particular to Algeria, it is that of almost all countries rich in natural resources that have begun to industrialise. This is a striking fact of economic history: the rich countries have experienced natural resources of economic performance, compared to poorer countries that are less endowed. The idea is prevalent today that there is a direct, significant and negative relationship between growth and abundant resources, ideas often made in reference to the theory of Dutch disease.

3-2-1- The Potential Effects of Dutch Disease on Algerian Economy: Empirical Evidence

Gelb (1988)[44] examines the effect of the Dutch disease with respect to Algeria. According to the theory, the resource movement effect in Algeria should not be important for two reasons: first, the booming oil and gas sector is rather capital than labour intensive and therefore does not draw a significant amount of labour from the traded sector. Second, unemployment was constantly high in Algeria, therefore relaxing the labour constraint. However,

numbers suggest that something similar to a resource movement effect has taken place: The labour force employed in agriculture halved from 1967 to 1985, while labour in the industrial sector increased - though not entirely compensating for the loss in agricultural labour. There are three reasons to explain this phenomenon: First, the agricultural sector suffered from the breakdown of its most profitable parts due to the exodus of French agricultural producers during the independence war. Second, the industrialisation policy of the Algerian state considered the farmers mainly as customers and neglected the modernization of this sector. As a consequence, the input prices in the agricultural sector increased while the output prices were maintained low by the state. Third, the rural migration to the cities was in a majority heading into the construction sector, whose labour force increased by 13% over this period of time. This sector offered more and better employment opportunities as a consequence of the investment programs financed through the oil rents. The apparent resource movement effect in Algeria was therefore only partially and rather indirectly induced by market mechanisms responding to relative scarcity as in the Dutch disease(45).

The impacts of the boom of the construction sector should also be considered in the context of the spending effect. Algeria at that time was literally a "fix price"(46) economy; hence price mechanisms did not determine the clearing of the markets, putting at stance the Dutch disease theory. Nevertheless one can observe an expansion of the non-tradable sector, notably in construction and in the public sector, sectors which benefitted mainly from the initial oil income. Contrary to the prediction of the Dutch disease theory, The real effective exchange rate in Algeria depreciated throughout the 70s and then appreciated only slowly afterwards. This suggests that the spending effect was not actuated by an appreciation in the exchange rate and a subsequent relative increase in the service sector. It were rather two other reasons that led to a relative increase in imports in the traded sector. First, the overvalued nominal exchange rate which was constantly kept above 0.2$ between 1960 and 1986 increased purchasing power abroad and decreased the competitiveness of export goods. Second, imports were increased as a policy to get hold of the necessary technology in order to embark on the concept of industrialising industries.

One can therefore draw the conclusion that Algeria did not suffer from the Dutch disease as outlined by the model. However, Gelb (1988) finds a Dutch disease effect prior to 1974 in a calculation of the Dutch disease Index, but he himself attributes this rather to the largely skewed initial structure of Algeria's economy. The above analysis also indicates that a spending effect as such has not notably squeezed the manufacturing sector. Yet, a relative expansion in certain non-tradable sectors can be observed, but the reasons are rather to be found in policy measures by the state than in the mechanisms of the

markets[47].

In the context of Algeria's "controlled economy" the political economy explanations framed by the linkage theory yield more explanation for the failed efforts for industrialisation.

Schliephake (1977) notes that the pretension of the Algerian industrialisation programme was to remove the oil sector from its isolation benefiting from cheap energy as input factor. Yet, Benakli (1992) argues that the integration of the domestic economy had not been successful in establishing production linkages. He states that the promoted industries were not coordinated from a macroeconomic point of view. For instance, input factors were not produced in the country but had to be imported, the economy did therefore not benefit from economics of agglomeration. From the 1970s onward, the Algerians got even less involved in the implementation process of new technologies and limited themselves to the act of planning and buying, thereby foregoing the benefits from any "learning-by-doing effects". Benakli (1992) further argues that concerning the choice of industries, Algeria rather focused on its comparative advantage from cheap capital than from its cheap labour. Schliephake (1977) adds that the nature of the oil and gas sector itself might prevent its integration with other parts of the domestic economy. This is – amongst other reasons- due to the marginal setting of the production locations and to the fact that even related sectors, like the transport of oil and gas, are also labour extensive. With the limited size of the national market Benakli (1992) mentions missing consumption linkages; demand for the output from heavy industry could have come from a healthy agricultural sector. As mentioned above, the Algerian agricultural sector had shrunk after the war and was affected by the Algerian price policy and policy of delayed consumption. In terms of sequencing policies, there is another reason for the difficult development of non-hydrocarbon industries in Algeria. The attempt of some kind of import substitution industrialisation under Boumediene was accompanied by the protection of the new industries. Yet, after only ten years, probably not enough for these industries to establish, Chadli halted investment and removed protection from these industries, thereby putting at stake the preceding efforts[48].

Another empirical study made by Fardmanesh (1991) on the impact of the oil boom caused by a price shock by an analysis of five countries including Algeria from the period 1966-1986, based on the Dutch disease theory. The interesting observation made is the expenditure of the manufactured traded goods which is supposed to decline as consequence of the two effects of the boom, and on the other hand the agricultural traded goods sector was contracted. This results are explained by making some adjustments to the Dutch disease core model and by generating new assumption; First, by assuming that the oil sector does not use domestic production factors then the

resource movement effect of the boom is cancelled and that is the case of oil boom countries, but still the spending effect is supposed to contract the non-oil traded goods sectors. Next, by relaxing the free trade assumption and considering manufacture as a semi non-traded good sector, the expansion of the manufactured goods sector can be explained by a rise of the world price of manufactured goods relative to agricultural goods, caused by the oil increasing price which raises production costs of the non-oil countries exporting manufactured goods and also increases oil-countries demand of manufactured goods. This price rise is called the world price effect and results in a profitability raise of the semi non-traded manufactured goods sector at the expense of the agricultural sector which explains the empirical results of the oil boom, thus in this model we have two effects: the spending and the world price effects which are both beneficial for the semi non-traded manufactured goods sector. On the other hand, several studies, including Edwards (1985), showed that the real exchange rate is highly dependent on fluctuations in oil prices and economic activity is affected primarily by the real exchange rate. The appreciation of the real exchange rate seems the most interesting symptom of the analysis of the Dutch disease since most of the studies have invested in the behaviour of real exchange rate as the main mechanism of transmission of booming sector for rest of the economy. In the case of Algeria, the appreciation in the real exchange rate seems to be less than expected by Dutch disease theory(49).

3-2-2- Dutch Disease Model and the Algerian Economy

In order to determine whether any of the developments predicted by the Dutch disease model actually occurred in the Algerian economy, we have to examine indicators relating to sectoral output and labour movements. To this end, we first look at the value added by the booming (hydrocarbon), lagging (agriculture and manufacturing), and non-tradable (services) sector.

Benabdallah (2006) estimates that, over the period 1974-1985, during which two positive oil shocks took place yielding significant windfalls, the value added by the hydrocarbon sector (booming sector) only grew by on average 0.7% and was even less from 1968-1973. This implies that the growth in export revenues is only the result of a boom, but not that of an expansion of the sector(50).

The value added by the services sector equaled on average -3% between 1968 and 1973. It increased to 21% over the period 1974-1979 and then decreased to 5% between 1980 and 1985. The value added by the agricultural and manufacturing (tradable) sector on average grew in the first period by 12 and 2, in the second by 8 and 12, and in the third by 8 and 5% respectively. This means that, over the three periods, the tradable sector added value was at a slightly larger rate than the services sector. The sectoral performance does, therefore, not seem to reflect the model's prediction that tradable goods would

be adversely affected by the booming sector.

The second indicator to take into account is the inter-sectoral movement of labour, as the Dutch disease model foresees a movement away from the tradable sector. Indeed, the agricultural labour force declined in the 1970s and 80s from 50% in 1967 to 25.8% of the total labour force in 1985. This seems considerable, but 30% of about 1,000,000 agricultural workers in 1966 were underemployment. The decline to around 700,000 by the end of the 1970s thus does not seem that drastic. Employment in the manufacturing sector, on the other hand, actually increased from 7% in 1967 to 13.3% of the total labour force in 1985[(51)]. Neither development, therefore, really appears to support the model's predictions.

There are several possible reasons for the discrepancy between the model's predictions and the actual outcome. Firstly, given the government's large investments providing imported technologies to the manufacturing sector, only a relatively small proportion of the rents went into consumption, which generally dampens the impact of Dutch disease, as Sachs and Warner (2007)[(52)] observes. Secondly, given the large degree of isolation from the world economy and a fixed price system, products, which were only sold on the internal market, could not become less competitive due to an exchange rate appreciation since there were no outside substitutes available. Finally, Algeria's high level of unemployment, which remained on average above 20% between 1969 and 1985[(53)], undermines the model's key assumption of full employment, which makes a resource movement effect unlikely.

4- Concluding Remarks

For a long time natural resources are seen as a vector of development for a country. However, the experiences of some countries especially oil rentier ones have shown that the abundance of natural resources can have the opposite effect which is known as Dutch disease, and can be subsequently a source of many difficulties especially industrial ones. Algeria's resource-based strategy of "industrialising industries", favouring investment over consumption and the industrial over the agricultural sector, has yielded poor results. Algerian industrial diversification has made so little progress that the World Bank still ranks Algeria among the 9 countries that are most exposed to terms-of-trade volatility due to extreme dependence on hydrocarbon exports.

4-1- Hypotheses Testing

The problems of industrial diversification do not fit into one analytical framework. The Dutch disease theory helps to analyse the actual structural change, but since its explanations are market based it does not provide sufficient explanation for a controlled economy like Algeria. Generally, it can be observed that Algerian industrial policy did not tackle the problem of abundant labour and instead focused on capital intensive industries, thereby foregoing chances to integrate the production to the economy. It also ignored

the limited domestic consumption capacities.Moreover, the policy applications that utilised oil revenue caused the problems associated with industrial diversification, Algeria became uncompetitive, unproductive, and inefficient but these problems developed by following ISI strategy which confirms the first hypothesis.

The Dutch disease model does not take account of the political economic circumstances that shape economic policies, which differentiate between successful and unsuccessful countries. Petro-states are often poor not because of their oil wealth but because they have not successfully diversified their economies. Yet, it has become apparent that the disappointing outcome cannot be attributed to any Dutch disease effect which underlines the lack of validity of the second hypothesis.

The mechanisms leading to a de-industrialisation proposed by this type of models do not seem to apply to the Algerian case. It is likely, however, that, if oil and gas revenues had any negative impact at all, it operated through political channels. A flawed industrialisation strategy characterised by deliberate economic introversion was paralleled by a poor management of the resource wealth.

4-2- Recommendations

A couple of recommendations can be suggested as follows:

- The measures taken by the Algerian policymakers should be framed by an export promotion strategy (instead of the ISI strategy) which would address the cost of trade and cover the quality and supply chains policies.
- While the stated objective by the Algerian government is to diversify industries out of oil by having more open economy, any process to open an oil economy may result in a double process of de-industrialisation.

4-3- Further Research

One of the aspects of this topic is that the State`s control of the resources in Algeria was object of major conflicts, but it could never be reduced by the group of power. The resulting conflicts and inefficiencies from corruption could be an important aspect to focus on in further research.

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