The Analysis of Exports Performance in Algeria for the Period 1992-2016

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ABSTRACT

The study aims to investigate the export performance in Algeria. For this purpose, the researcher used a descriptive approach to examine how trends in exports, export composition, export concentration, market share, and export volatility have changed in Algeria's plans and reform programs. The study found an improvement in Algeria exports during 1992-2016, but this performance weakened during the more recent years. The export composition showed that consumer products and raw materials represented the bulk of Algeria's total exports with an average share of 91.5%. The share of intermediate and capital goods was low, with a percentage of only 3%. It also showed that the largest part of Algeria's products was exported to Europe and Central Asian and North American countries, with an average share of 86%. The results revealed a lack of diversification in Algeria's exports as the product concentration was on average, 97.2%. The extent of geographic concentration ranged between 61% and 78% in Algeria's exports was also high. The market share of Algeria has improved considerably during the study period as it achieved the highest value in 2011. This expansion is explained by the high integration of Algeria by exporting fuel products in the world market. The extent of export volatility has varied during the study period as it was at its highest level (54.1%) during the period 1992-1995. In contrast, the extent of Algeria's exports was less during 2009-2013 as it was only 19.8%. To improve export performance in Algeria, the government should reduce the concentration in their export products and upgrade the structure of their export basket by including more advanced products (such as intermediate, capital and other manufactured products). Improving the export performance in Algeria can also be achieved by enhancing trade relationships with traditional markets as well as other trading partners. These initiatives can be also helpful in reducing the extent of volatility in Algeria's export earnings.

Keywords: Exports Composition, Exports Concentration, Market Share, Export Volatility
JEL Classifications: F100

1. INTRODUCTION

Foreign trade has received important attention from policymakers as well as economists. It is considered as an engine of growth for the economies of nations (Singh, 2005). It also allows them to sell their domestically produced goods to other countries of the world (Brıka and Mekarssı, 2016). Given the importance of the Algerian economy in the North African region; linking the Mediterranean area to the center of Africa through an Algeria-built highway crossing the Sahara desert, this country adopted trade policies to open the economy to the external world. These policies aimed to

attract foreign capital, develop legislation to approve incentives, acquire modern technology for establishing industries, stimulate economic growth, and develop domestic investment (Elhannanı et al., 2018).

Hydrocarbons have long been the heart of the Algerian economy, they account for almost 30% of GDP, 60% of budget revenues, and approximately 95% of export proceeds. Algeria is the 10th largest country in the world in terms of natural gas reserves. It is also ranked as the 6th largest oil reserves in the world. The export of Hydrocarbons in Algeria has not only enabled this country to

maintain its macroeconomic stability but also accumulated large foreign currency reserves and also maintained low debt in the period of booms in oil prices (Central Intelligence Agency, 2019). The revenues of the Hydrocarbon sector in Algeria have fallen in the last years, leading to a rapid decline in its foreign currency reserves (The World Bank, 2018). After the decline in oil prices in 2014, the foreign reserves in Algeria have decreased by more than half, where the oil stabilization fund has decreased from almost 205 billion at the end of 2013 to nearly 7 billion in 2017. This decline in revenues has resulted from a fall in oil prices, leading the government to reduce spending.

This study covered the period 1992-2016, it aims to analyze exports in Algeria and their related characteristics. In particular, it analyzes trends in Algeria's total exports, export composition (by-products and regions), export concentration (for both products and markets), the market share, and export volatility. The first section discusses some theories that linked export volatility to its determinants such as export composition, export concentration, and market share. The second section reviews some of the empirical studies which analyzed trends in exports, their structure and concentration, and the extent of their volatility. The methodology of the study is presented in the third section. Eventually, the fourth section analyzes trends of Algeria's exports for the period 1992-2016.

1.1. Section 1: Theoretical Background

Given the harmful effect that export volatility has on the economies of underdeveloped countries, many theories have been evolved to distinguish the determinants contributing to export volatility to understand how to design policies to deal with this problem (Wang, 1989).

The composition of exports is seen to be an essential factor in explaining export volatility (Yotopoulos and Nugent, 1976). Countries whose export baskets contain goods widely with variable demand and/or supply curves will be highly exposed to volatility in their export earnings (Massell, 1970). It is widely believed that the degree of export volatility in less developed countries is higher than in developed countries (Heini and Karl, 1985) because most of the less developed countries are dependent on the export of primary goods (including foods, agriculture products, fuels, Minerals, Ores and metals). It is stated that primary goods are susceptible to larger volatility in prices, quantities, and revenues than other manufactured products (Reynolds, 1970). The reason behind this is the low short-run price elasticity of supply and demand for primary goods compared with manufactured goods (Mac Bean, 1966).

Among factors that are suggested to account for export volatility in less developed countries is the concentration on a few exportable products (Erb and Schiavo-Campo, 1971). It is argued that the specialization in exports of one or two products reduces the opportunity of counterbalancing a negative change in exports of particular products by a positive change in exports of other products (Wang, 1989). The export proceeds of a given country will be less unstable if the number of exportable products is large because if the export basket is diversified, the probability of having fluctuations in individual product exports offset by one another

will increase, and the total volatility of export proceeds will be reduced Massell (1970) and (Hanom, 2010).

A line of arguments identical to that linking product concentration to export volatility can be applied to the number of destinations of exports (Tariq and Najeeb, 1995). i.e., when a country trades with one partner or few partners, it will be vulnerable to the business cycles in the importing countries (Mohammed, 1983). The largest part of exports of developing countries is directed to the most powerful economic traders like the European Economic Community, the United States of America (USA), and Japan…etc. These countries are experiencing fluctuations in their economic activities, and for this reason, export earnings in developing countries tend to be volatile (Malanga and Vincent, 1974). Therefore, domestic diversification of markets would make less developed countries less reliant on the fluctuations in the traditional markets (Mohammed, 1983).

The export volatility in a particular country is mainly dependent on the changes in both demand and supply curves. The impact of a shift in supply curve on the volatility of export earnings depends on the foreign demand elasticity. Among the factors that determine the elasticity of demand facing a given country is its market share (Limprapat, 1979). From this statement, one understands that the market share is another important determinant of export volatility. Many papers assume the export volatility to be a decreasing function of the market share of export products in the world trade (Massel, 1970; Hock, 1977; Wisarn, 1980) and (Khaduli, 1993). The reasoning behind this is that if the market share of products increases, the elasticity of export demand curve for a given country will become lower. In contrast, if a given country loses its market share in the world market, its foreign demand curve will become elastic. In this latter case, changes in supply will create high oscillations in export receipts (Khaduli, 1993).

2. LITERATURE REVIEW

Several researchers investigated the export performance in a given country. In their studies, they analyzed the evolution of exports, their commodity and geographical composition, their product and geographic concentration, and their volatility Wang (1989), Belaid (1998), Abadi (2004) and Abu Eideh (2016).

Most of these studies indicated that total exports have increased during the first periods and then started to decrease in the next periods. For example, Wang (1989) stated that the growth rate of exports was 22.1% in the period 1949-1952 and declined to 14.2% during the period 1953-1957. Belaid (1998) argued that nominal exports in Libya represented 64.1% in 1974 and fell to 21.8% in 1993. Similarly, Obeida (2016) observed a decline in the ratio of exports to GDP in Palestine from 12.3% in 1995 to 7% in 2009.

After analyzing the commodity composition in china, Wang (1989) observed a shift from the production of traditional goods toward other heavy industries. For the case of Libya, Belaid (1998) suggested that the exports of crude oil and its derivatives accounted

for the bulk of total exports with an average of 89.2%. In the study of Abadi (2004), it was found that chemicals and raw material products represented 55.1% of Jordan's total exports. The share of other products such as transport equipment, oils, and animal fats was low with a percentage of only 8.4%.

Different results were obtained after investigating the geographic concentration in a given country. Wang (1989) indicated that more than 60% of China's exports were directed to Western European countries, but their share has decreased after 1959. The study of Abadi (2004) showed that the exports to Arab countries (such as Iraq, Saudi Arabia, and the United Arab Emirates) accounted for almost 50% of Jordan's total exports, followed by India and then the EU countries in the third place. Obeida (2016) suggested that due to the low transport costs among Palestine, Israel, and the Arab Asian countries, a large part of Palestine exports was directed toward these countries.

After analyzing the trend in the extent of product concentration in China, Wang (1989) stated that China had made an effort to diversify its export products as industrialization has taken place and trade partnerships with other countries have been enhanced. Similar results were found in the study of Abadi (2004) for the case of Jordan. Obeida (2016) indicated that the concentration index in Palestinian exports did not exceed 50%. According to him, this reflects the commodity diversification in the country's exports.

The results of the trend analysis of the geographic concentration of exports in the study of Ammar Belaid revealed a lack of geographic diversification of the markets in which Libya exports. Abadi indicated the geographic concentration ratio in Jordan to be higher than 60%, reflecting the difficulty of moving to other markets in case of barriers that prevent Jordan from exporting to its main markets. Similarly, Obeida (2016) observed that the index of geographic concentration ranged between 70% and 93% in Palestine's exports was very high. According to these previous studies, these high percentages in the degree of geographic concentration in exports were explanations of high export volatility in these countries.

3. METHODOLOGY

The study adopted a descriptive approach that is appropriate in describing trends in exports and its characteristics such as the commodity and geographic composition of exports, the product and geographic concentration of exports, the market share and the extent of export volatility. These trends are analyzed for the case of Algeria for the period 1992-2016. The study period was divided into five separate periods to examine how these trends have changed in the plans and reform programs in Algeria.

Our study followed the World Bank classification to arrange Algeria's exports into four groups: capital goods, intermediate goods, raw material goods, and consumer goods.

Based on Annual data on 16 export products, two indicators are used to measure the extent of the product concentration in Algeria's exports. The first one is called the Gini Hirschman coefficient (Ct) which is computed as follows (The World Bank, 2013):

$$C_t = 100 \sqrt{\sum_{i=1}^{n} \frac{X_{it}^2}{X_t}}$$

Where: X_{it} is the value of exports of commodity i in year t. X_t is the total export earnings in that year (Love, 1979). The higher the value of C_t, the greater the concentration, or stated differently, the lower the extent of diversification by product.

The second measure is the Hirschman-Herfindahl index (HHI). It measures the dispersion of trade value across an exporter's products. A county with a large part of trade value concentrated in a very few products will have an index value close to 1. Thus, it is an indicator of the exporter's vulnerability to trade shocks. Measured over time, a fall in the index may be an indication of diversification in the exporter's trade profile. This index can be measured using the following mathematical formula:

$$HHI = \frac{\sum_{k=1}^{ni} \frac{x_{ik}^2}{X_i} - \frac{1}{ni}}{1 - \frac{1}{ni}}$$

Where: X_i is the total value of exports from reporter i, X_{ik} is the value of exports of product k from country i, n is the number of products exported by country i. Examples of studies that used this index are Agosin (2007), Naudé and Rossouw (2008) and Nikolić (2013).

After obtaining data on Algeria's exports directed to 7 regions, these two measures of concentration were also used to measure the extent of geographic concentration in Algeria's exports.

Based on Data on the share of 16 commodities in the world trade and the share of these commodities in Algeria's total export, the market share of Algeria in the world trade is calculated for the period 1992-2016. This indicator measures the extent to which a county's j exports tend to be larger in the markets. It is calculated using the following formulas:

$$Z_j = \sum_{i}^{n} \gamma_{ij} \sigma_{ij}$$

Where: γ_{ij} is county's j share of commodity i in the world trade. σ_0: Is commodity i as the percentage of county's j exports (Khaduli, 1993). The Share of fuels, chemical, metals, and other products in Algeria's total market share is also calculated for the period 1992-2016.

For measuring the extent of export volatility in Algeria, the index of export instability is computed for the period 1992-2016. This index measures the absolute deviation of the actual value of exports from their estimated value. It is calculated as follows:

$$I_E = \left| \frac{X_t - \hat{X}_t}{\hat{X}_t} \right| * 100$$

Where: X_t is the actual value of total exports in year t. $\hat{X}_t$: Refers to the estimated value of total exports in year t. It can be measured as follows:

$$\hat{X}_t = \alpha_0 + \alpha_1 t$$

Where: t is the time period (Neena Malhotra and Pinky, 2012).

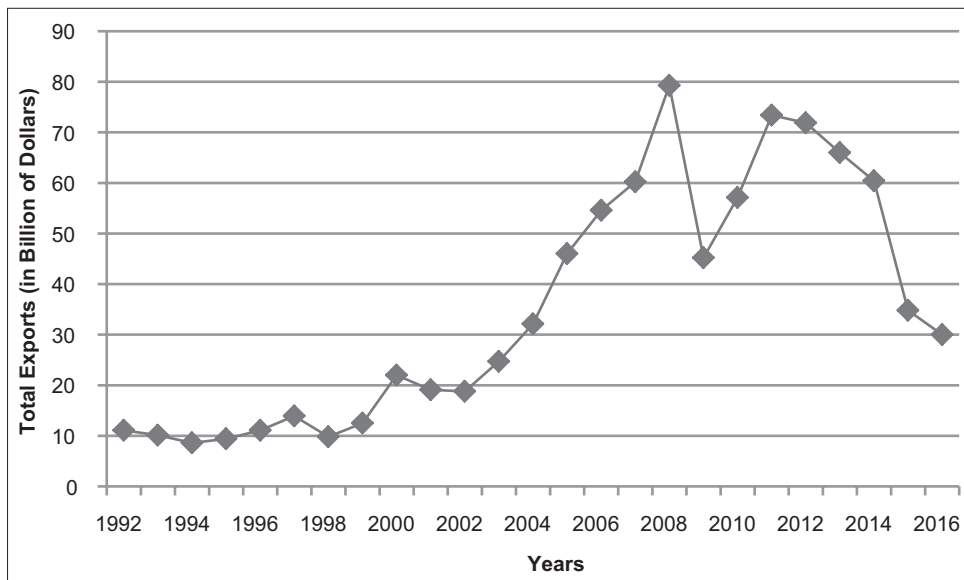# 4. ANALYSIS OF TRENDS IN ALGERIA'S EXPORTS

4.1. Analysis of Trends in Algeria's Total Exports

Figure 1 presents the aggregate exports of Algeria for 25 years. Overall, during the period 1992-2016, the total export of Algeria was turbulent with a lot of ups and downs. Following the economic reforms and development plans of the Algerian economy, the growth rates of export can be analyzed in five stages (Figure 2). During the period 1992-1995, Algeria registered negative growth rates in its

exports with an average of −5.1%. This downturn in the records of exports was a result of the decline in oil prices (they decreased from 38.94$ in 1990 to 22.9$ in 1994 (Boudjema, 2011). In contrast, the period 1996-2001 has shown an important improvement in Algeria's exports with average growth rates of 17.5%. This positive growth rate is explained by the recovery in oil price and also in the volume of non-oil exports (Brıka and Mekarssı, 2016).
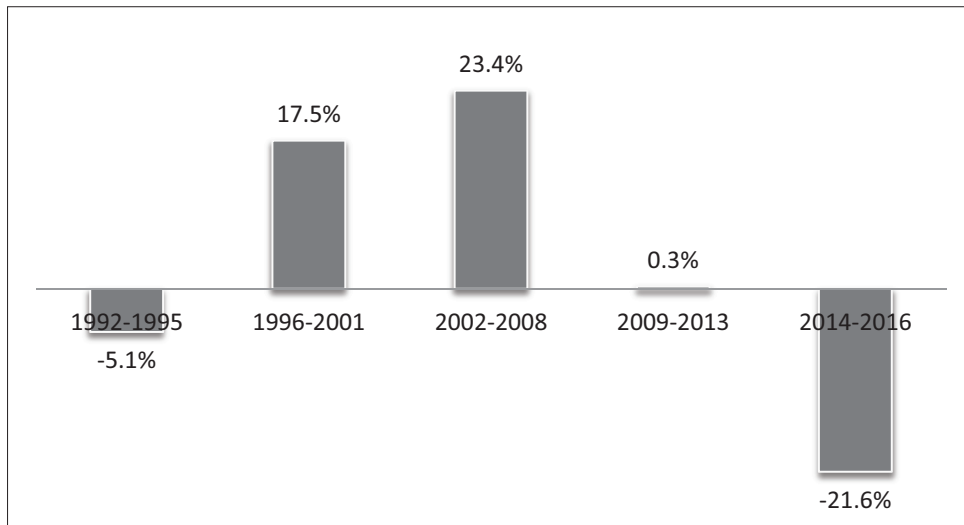
During this period, Algeria has signed an agreement with the IMF to create a useful framework for free market-economy and the liberalization of foreign trade and prices. An example of the measures included in this agreement was: the liberalization of exports of all goods and services and the devaluation of the dinar against the US dollar (Boudjema, 2011). The highest growth rates in Algeria's total exports were seen in the period 2002-2008 with an average of 23%; total exports increased from 18.8 billion dollars in 2002 to

Figure 1: Algeria's total exports in 1992-2016

Source: The World Bank database (The World Integrated Trade Solutions statistics, https://wits.worldbank.org/CountryProfile/en/Country/DZA/Year/2017/TradeFlow/Export/Partner/all/Product/Total)

Figure 2: The growth rates of Algeria's total exports over the period 1992-2016

Source: Based on the Study Calculations (using Data in Figure 1)

79.3 billion dollars in 2008 (almost four times higher than 2002). This acceleration in the growth rate of exports was due to the sharp increases in oil prices recorded in 2004, 2005 and 2008. The opposite occurred during the two next periods as the growth rate of exports fell to 0.3% in the period 2009-2013 and −21.6% during the period 2014-2016. The decrease in the global demand for oil products explains this slowdown in the growth of Algeria's total exports.

4.2. Analysis of the Export Composition in Algeria
4.2.1. Algeria's exports by stage of processing
The Bar chart illustrated in Figure 3 provides information about the export composition in Algeria over the period 1992-2016. Overall, all the categories of exports in Algeria have shown some fluctuations. Also, the structure of the Algerian export basket has not changed over the period 1992-2016. Exports of consumer products accounted for the largest part of total export, while capital goods represented the smallest portion. Exports of raw material products were ranked second in total export followed by intermediate goods in the third place.
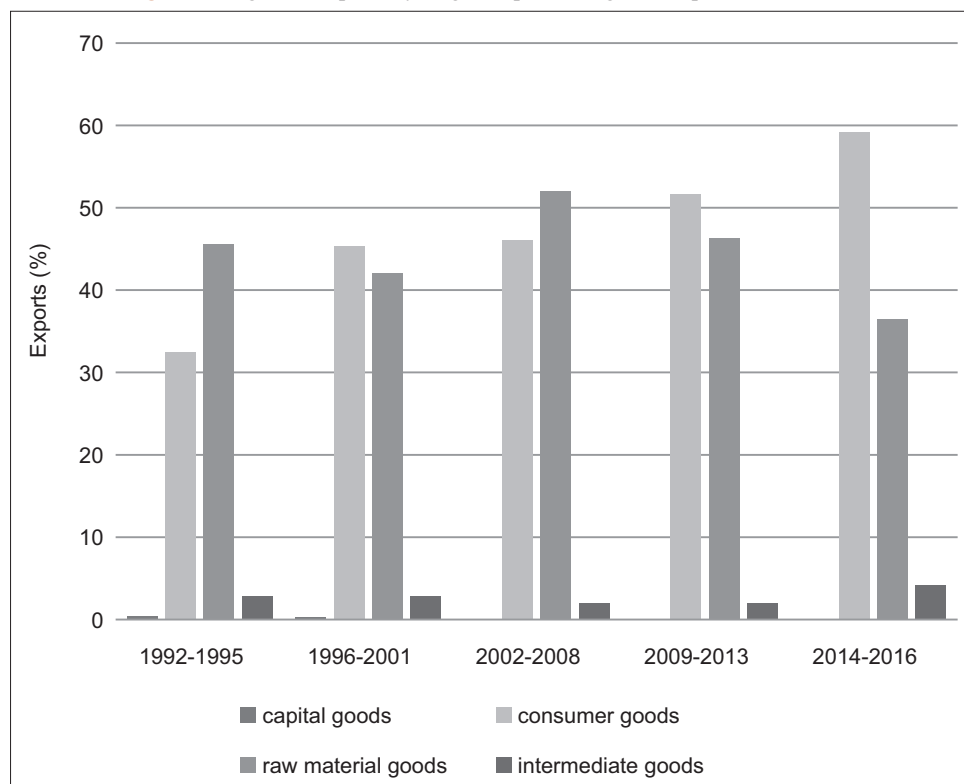
The share of consumer products in Algeria's total export has shown an increasing trend during the period 1992-2016. It accounted for almost 32.5% of total exports in the period 1992-1995 and 45.5% in the next period. In the period 2002-2008, this share increased by 0.7% and then started to expand during the last three periods. It grew to 51% in the period 2009-2013 and reached a peak of 59.2% in 20014-2016. The opposite scenario occurred for the share of raw material products in Algeria's exports. It was 45.6% in 1992-1995 and decreased to 42.1% in the next period. Over the period 2002-2008,

the share of raw material products achieved the highest record with a percentage of 52% and then started to shrink during the last periods. It declined to 46.3% before reaching its lowest point in the previous period with only 36.5% of total exports. The intermediate products (as the third contributor in Algeria's exports earnings) have shown an upward trend during the study period. It accounted for almost 3% of total exports during the period 1992-1995 and 1996-2001. This percentage declined to 2% during the two next periods before reaching a peak of 4.2% in 2014-2016. This was the highest share during the study period. The proportion of capital goods in Algeria's total exports was much smaller than the other groups of exports with only 0.4% in the first period. This percentage has shown a slight decrease during the next two periods and become negligible in the period 2009-2013 and 2014-2016. This situation reflects the reduced importance of capital goods in Algeria's total exports over time.

4.2.2. Geographic structure of Algeria's exports
The evolution of Algeria's exports by seven regions over the period 1992-2016 is presented in Figure 4. In general, the geographical structure of Algeria's exports has not changed between 1992 and 2016. The European and central Asian countries occupied the largest part in Algeria's total export (with a share of 65.5 %), while the southern Asian and Sub-Saharan countries remained the least important destinations for Algeria's export (with a share of 1.2 %). On average, the Latin American and Caribbean countries represented the 3rd best destinations for the Algerian exports (with a share of 5.4 % of total export). The Eastern Asian & pacific countries were in the fourth place (with a share of 4.1 % of total exports) followed by the Middle East & North African countries in the fifth place (with a share of 3.4 % of total export).

Figure 3: Algeria's exports by stages of processing for the period 1992-2016

Source: The World Bank (the World Integrated Trade Solution Statistics, https://wits.worldbank.org/CountryProfile/en/Country/DZA/Year/1992/TradeFlow/Export/Partner/WLD/Product/all-groups

Figure 4: Algeria's exports by partners over the period 1992-2016

Source: The World Bank (the World Integrated Trade Solution Statistics, https://wits.worldbank.org/CountryProfile/en/Country/DZA/Year/1992/TradeFlow/Export
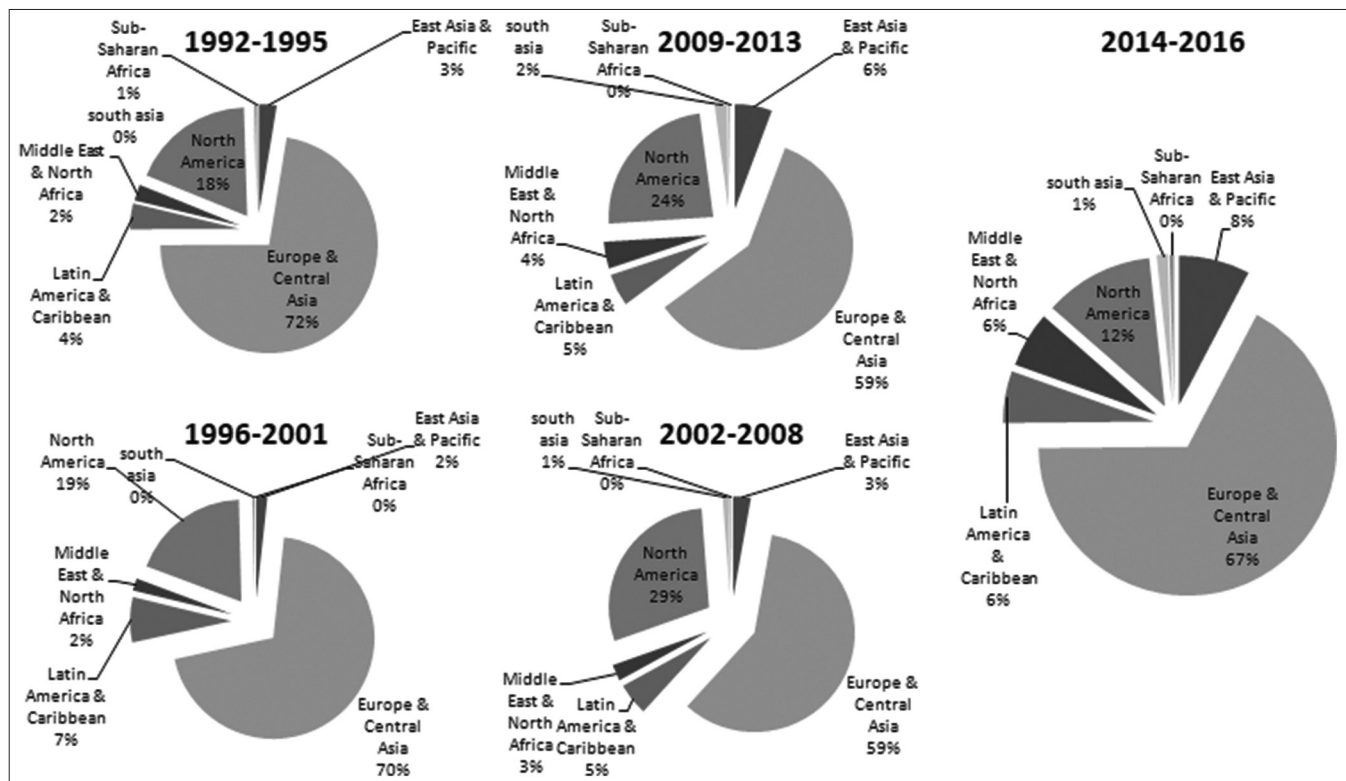
As shown in Figure 4, Europe and central Asian countries absorbed almost 72.5% of Algeria's total export in the period 1992-1995. This part fell to 70% and 59% during the next two periods. In 2014-2016, the share of these markets in Algeria's total exports had gone up to 67%. This situation reflects the increased trade partnerships with the European and central Asian countries. The European Union (EU) countries are the most important trading partners for Algeria. This partnership is based on energy, mainly exports of oil and gas. The exports of these products to the European commission represented almost 94% of the EU imports in 2016. China is also an important trade partner for Algeria. This country was considered as the second-best market for the Algerian exports after the EU countries with a share of 10.2 % of total foreign trade in 2016. The North American markets occupied the second largest part of Algeria's total exports. Their share was about 18.4% in the period 1992-1995 and increased to 19% and 29% during the period 1996-2001 and 2002-2008 respectively. In contrast, this share has shown a decreasing trend during 2009-2013 and 2014-2016 as it declined to 23.9% and 12 percent respectively. Among the North American countries, the USA is one of the major trading partners for Algeria. Main Algeria's exports to the USA are exports of crude oil (U.S. Embassy in Algiers, 2017). In 2017, Algeria exports of crude oil products to the USA represented 1% of USA purchases from foreign markets (Workman, 2018). The East Asian and Pacific markets were ranked third in Algeria's total exports. Their share did not surpass 3% for the prolonged period from 1992 to 2008. During the period 2009-2013, the percentage of Algeria's exports to these countries doubled to 6%, being 1% higher than the share of Latin America and the Caribbean. This gap has widened by 1%

over the last period as the markets from the East Asian and Pacific countries occupied almost 8 % of Algeria's total export compared to 6 % for the markets of Latin American and Caribbean countries.

Following the East Asian and Pacific markets, the Middle East and North African markets accounted for only 2.4% of Algeria's total exports over the period 1992-1995. This proportion has shown a small decrease in 1996-2001 and then started to increase slightly during the next periods. It was 4.1% in the period 2009-2013 and achieved a high point of 6% in the period 2014-2016 (being 0.4% higher than the share of Latin America and Caribbean markets). Despite the location of Algeria in the center of the Maghreb, linking Tunisia and Morocco through a highway over almost 1200 km, the regional trade between Algeria and these two countries remains small. These low trade relations with the Arab Maghreb Union countries reflects the political tensions between Algeria and Morocco on different issues like the border disputes that ended up by short war between the two countries in 1963 and Morocco's annexation of Western Sahara which was not approved by Algeria (Cornock, 2017). Over the study period, Algeria's partnerships with South Asian and Sub-Saharan countries were absent. This is reflected in the very low share of these markets in Algeria's total export. Algeria is working on reinforcing more stable economic links with its neighbor countries from sub-Saharan Africa, considering them as important markets for various activities, especially agriculture and manufacturing (Cornock, 2017). But despite the efforts to encourage the economic relations between Algeria and sub-Saharan African countries, trade partnerships between them remain very limited.

4.3. The Market Share of Algeria in the World Trade

The market share of Algeria in the world trade for the period 1992-2016 is presented in Figure 5. In general, this share has shown an increasing trend from 1992 to 2012 and a decreasing one in the next period. The lowest value was registered in 1998 with 531.4 points, while the market share recorded its highest value in 2011 at 1573.5 points.

Figure 6 presents how the market share has changed over five different periods. Over the period 1992-1995, the market share of Algeria was on average, 634 points. It showed a modest increase in the next period. After the period 1996-2001, there was a remarkable improvement in the market share of Algeria. It climbed to almost 1010 points in the period 2002-2008 and achieved a peak of 1453.4 points in 2009-2013. The opposite occurred during the last period when the market share plummeted to 1029.8 points.

Figure 7 presents the proportion of Algerian products in Algeria's market share between 1992 and 2016. As shown in this figure, the exports of fuel products were the major contributor to Algeria's market share with a share of 95.3% in 1992-1995, followed by the chemical products (1.3%) and metals in the third place (1%). The share of the other products (such as machinery and electricity, vegetables, food, mineral, etc.) accounted for only 2.3% of the total market share during 1992-1995. During the period 1996-2001, the share of fuel products in overall market share expanded to 96.4 %, which was at the expense of the share of metals and the other products that declined to 0.7% and 1.4% respectively. The share of chemical products in total market share did not change during that period. Over the period 2002-2008, there was a continuous improvement in the contribution of fuel products (98.5%) and a remarkable decrease in the participation of metal, chemical, and other products, their share was 1.4%. The same scenario occurred in the period 2009-2013 when the share of fuel products became larger (99.3%), and the share of non-fuels products became smaller (0.7%) in comparison to the last period.
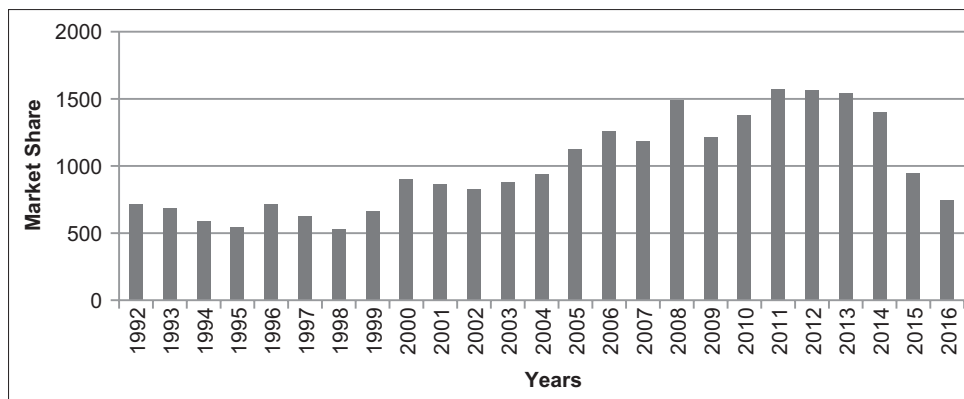
The opposite occurred over the last period. The contribution of chemical and other products improved considerably as they increased to 2.6% and 0.7% respectively. This expansion is probably due to the reduced importance of fuel products in the market share of Algeria in that period, where their share fell to 96.7%.

4.4. Analysis of Trends in Algeria Export Concentration
4.4.1. The degree of product concentration in Algeria's exports
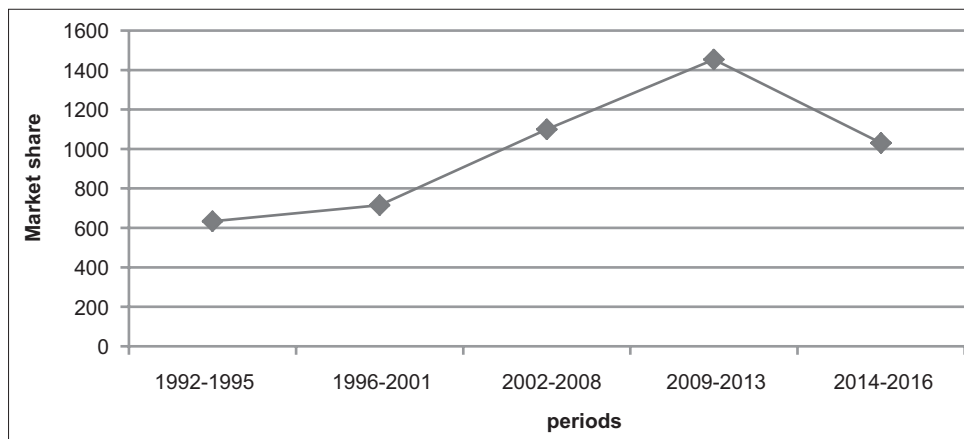The trend on the extent of product concentration in Algeria is presented in Figure 8. As we can see, the degree of export concentration in Algeria has stayed very high during the period

Figure 5: Algeria's market share over the period 1992-2016

Source: Based on the study calculations, using data on the share of 16 commodities in the world trade (https://wits.worldbank.org/CountryProfile/en/Country/WLD/Year/1992/TradeFlow/EXPIMP/Partner/WLD/Product/All-Groups)) and the share of these commodities in Algeria's total export (https://wits.worldbank.org/CountryProfile/en/Country/DZA/Year/1992/TradeFlow/Export/Partner/WLD/Product/all-groups)

Figure 6: Algeria's market share over the period 1992-2016

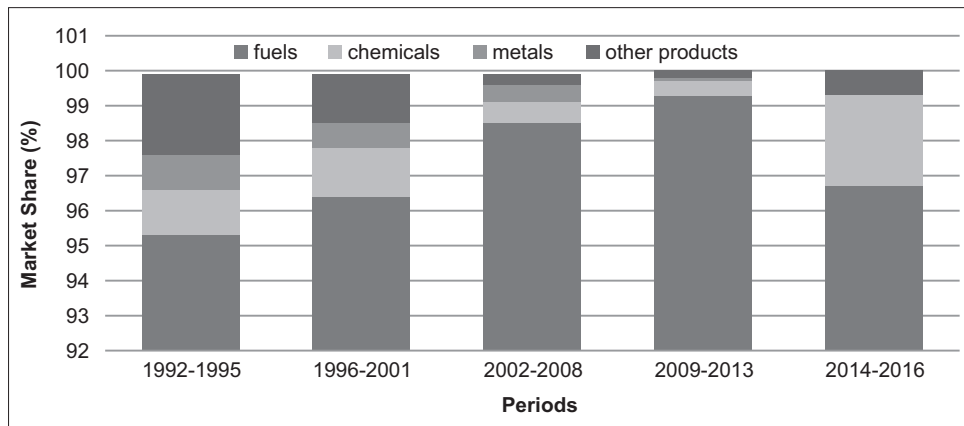Source: Based on the study calculations from the data of Figure 5

1992-2016. In general, the degree of export concentration in Algeria has shown an increasing trend during that period. The lowest record was 93 % in 1996, while the highest one was 98.4 % in 2005, 2007 and 2012.

Figure 9 presents how the product concentration of Algeria's exports has changed over five different periods. In the period 1992-1995, the product concentration index was 96.2 %. This percentage has shown a small increase during the next period with a percentage

of 0.5 %. After this period, there was a continuous increase in the degree of export concentration. The index of product concentration moved up to 98 % in 2002-2008 and reached a peak of 98.3 % in the period 2009-2013. This was the highest record over the study period. In the last period, the degree of export concentration returned to the same level (96.2 %) recorded in the first period.
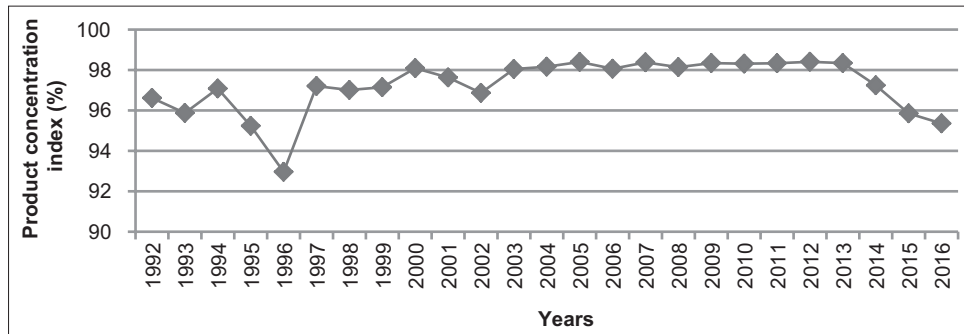
The annual time series on the second measure of product concentration is presented in Figure 10. As shown in this figure,

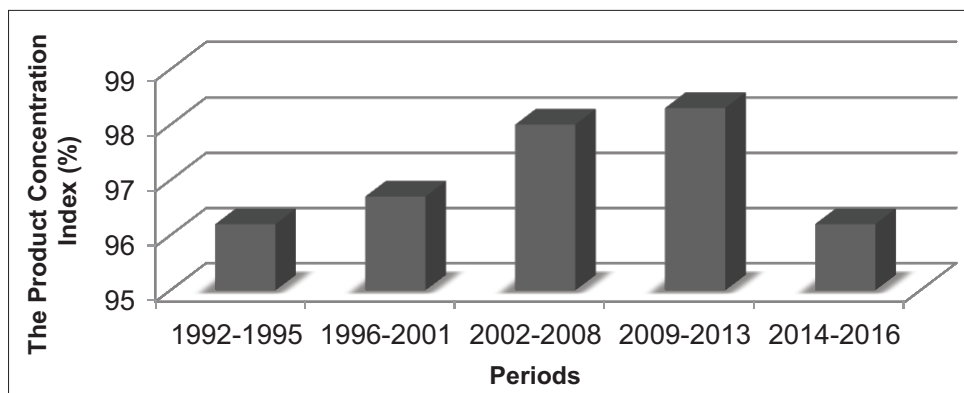**Figure 7:** The contribution of Algeria's products in the market share

Source: Based on the study calculations, using data on the share of 16 commodities in the world trade (https://wits.worldbank.org/CountryProfile/en/Country/WLD/Year/1992/TradeFlow/EXPIMP/Partner/WLD/Product/All-Groups) and the share of these commodities in Algeria's total export (https://wits.worldbank.org/CountryProfile/en/Country/DZA/Year/1992/TradeFlow/Export/Partner/WLD/Product/all-groups)

Figure 8: The product concentration in Algeria's exports during the period 1992-2016

Source: Based on the study calculations (we used data on Algerian exportable products, https://wits.worldbank.org/CountryProfile/en/Country/DZA/Year/1992/TradeFlow/Export/Partner/WLD/Product/all-groups)

Figure 9: The product concentration in Algeria over the period 1992-2016

Source: Based on the study calculations using the data in Figure 8

the HHI of concentration has remained very high from 1992 to 2016. This index has shown an upward trend during that period. In general, the trend of this index was similar to the first measure of product concentration (the Hirschman Gini Coefficient). The lowest value was 0.85 in 1996, while the highest one was 0.97 in 2005, 2009 and the four next years.
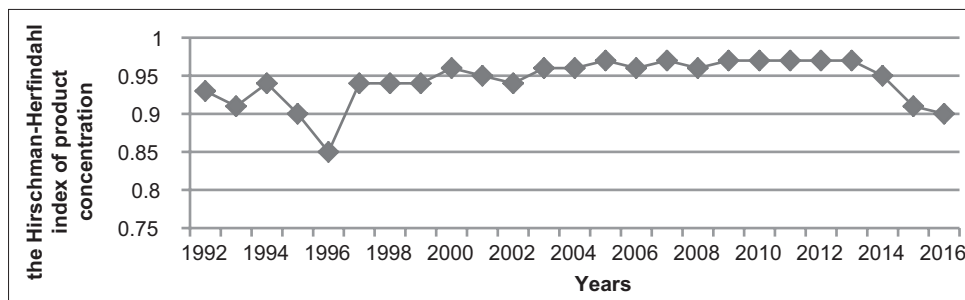
Figure 11 presents how the product concentration in Algeria's exports has changed over the period 1992-2016. As shown in this figure, this measure of product concentration has shown a similar pattern to the Gini Hirschman coefficient. It was about 0.92 in the period 1992-1995 and increased to 0.93 in the next period. This

level increased to 0.96 in the period 2002-2008 before achieving its highest level (1.03) in the period 2009-2013. In the last period, this measure of product concentration declined by 10.7%. This level is equal to that of the first period.

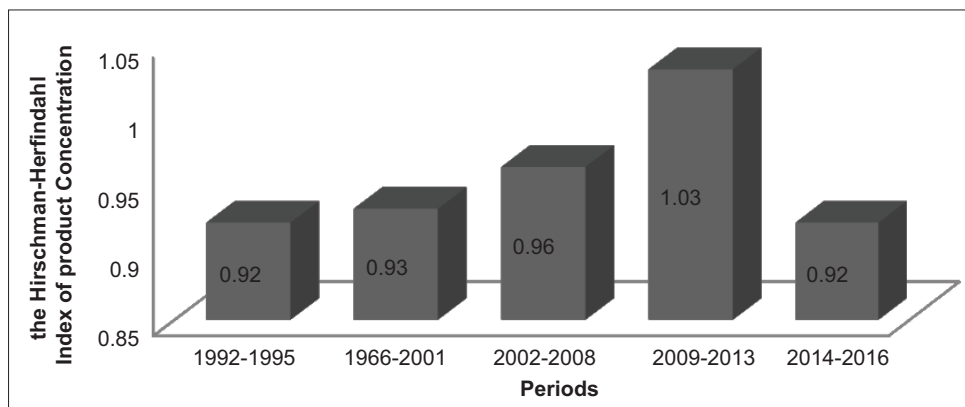### 4.4.2. The degree of geographic concentration in Algeria's exports

Data on the Gini Hirschman coefficient of geographic concentration in Algeria's exports for the period 1992-2016 is presented in Figure 12. As shown in this figure, the geographic concentration of the Algerian exports was very high during that period. It was ranged between 60% and 78%. However, on average, its magnitude was lower and less unstable than that of the product concentration.

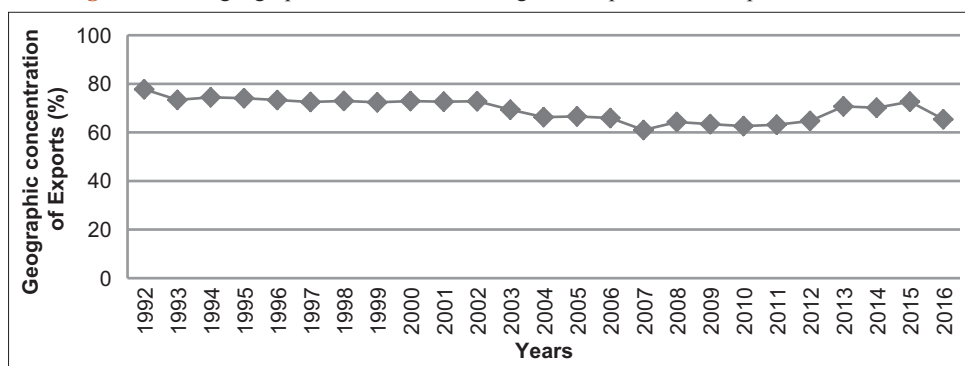**Figure 10:** The product concentration in the exports of Algeria over the period 1992-2016

Source: Based on the study calculations (we used data on Algerian exportable products, https://wits.worldbank.org/CountryProfile/en/Country/DZA/Year/1992/TradeFlow/Export/Partner/WLD/Product/all-groups)

Figure 11: The changes in the product concentration of Algeria's exports over the period 1992-2016

Source: Based on the study calculations from the data in Figure 11

Figure 12: The geographic concentration in Algeria's exports over the period 1992-2016

Source: Based on the study calculations. Data on Algeria's exports to 7 regions can be found on https://wits.worldbank.org/CountryProfile/en/Country/DZA/Year/1992/TradeFlow/Export

Figure 13 presents the evolution of the extent of geographic concentration in Algeria's exports during the period 1992-2016.

As shown in this figure, this degree has shown a decreasing trend with an average of 75 % in the period 1992-1995. During that period, the index of geographic concentration in Algerian exports was at its highest value, with a percentage of 77.7 % in 1992. After the period 1992-1995, this measure started to decline gradually as it decreased by 2.1 % in the next period. For the prolonged period from 1996 until 2013, Algeria has worked on diversifying its geographic structure in its exports; as a result, the extent of Geographical concentration in Algeria's exports has shown a continuous fall. It decreased to 66.6 % in the period 2002-2008 and fell to 64.9 % in the last second period. Over that period, the geographic concentration in the Algerian exports was at its lowest value as it reached a low point of 64.9 %. In the last period, this measure of export concentration jumped to 69.4 %, which is 5.5 % lower in comparison to the first period.

Time series on the second index of geographic concentration in the Algerian exports are presented in Figure 14.

As shown in this figure, the extent of geographic concentration in Algeria's exports was not high during the period 1992-2016.

Overall, the HHI of market concentration has shown a downward trend in the period under investigation. The highest value was almost 0.54 in 1992, while the lowest one was 0.27 in 2007. In Figure 15 shown below (that compares the average values of this index among five different periods), one can observe that the extent of geographic concentration in Algeria's exports was at its highest value (0.49) during the period 1992-1995. After this period, this extent has shown a continuous fall as it decreased to 0.45 in the next period and 0.33 in 2009-2013. Over the last period, the Hirschman-Herfindahl coefficient registered higher values than the previous period. It passed from 0.33 in 2009-2013 to 0.4 in 2014-2016, which is almost 18 % lower than the first period. Overall, this index of market concentration has shown a similar path to the first measure of geographic concentration of exports, indicating that the exports of Algeria were concentrated on few destinations in the past years and became more diversified geographically in the more recent years.

4.5. Analysis of the Extent of Export Volatility in Algeria
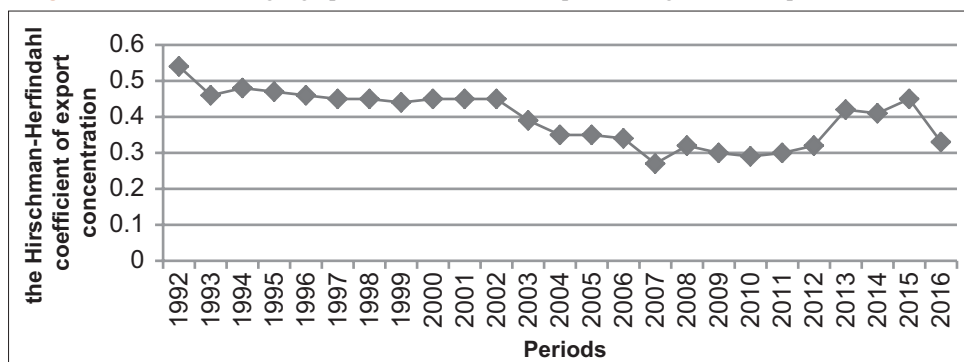
Annual time series on the extent of export volatility in Algeria for the period 1992-2016 are presented in Figure 16. As shown, the index of export instability varied remarkably during the period

Figure 13: Changes in the degree of the geographic concentration in Algeria's exports over the period 1992-2016
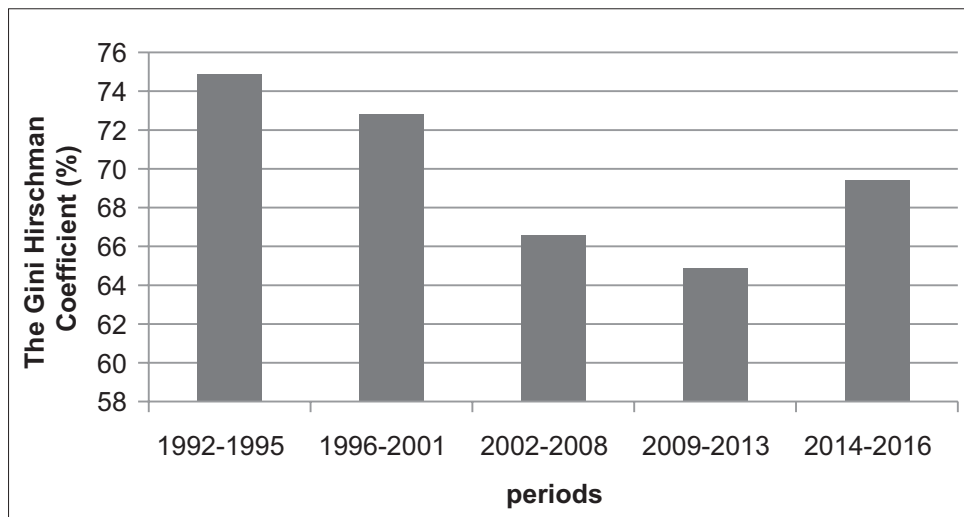
Source: Based on the study calculations using the data of Figure 12

**Figure 14:** Trend on the geographic concentration of exports in Algeria for the period 1992-2016

Source: Based on the study calculations. Data on Algeria's exports to 7 regions can be found on https://wits.worldbank.org/CountryProfile/en/Country/DZA/Year/1992/TradeFlow/Export

1992-2016. The lowest value was 0.7% in 2014, while the highest one was 140.3% in 1992.

In analyzing the trend on this index, one may distinguish among five different periods, as shown in Figure 17. Over the period
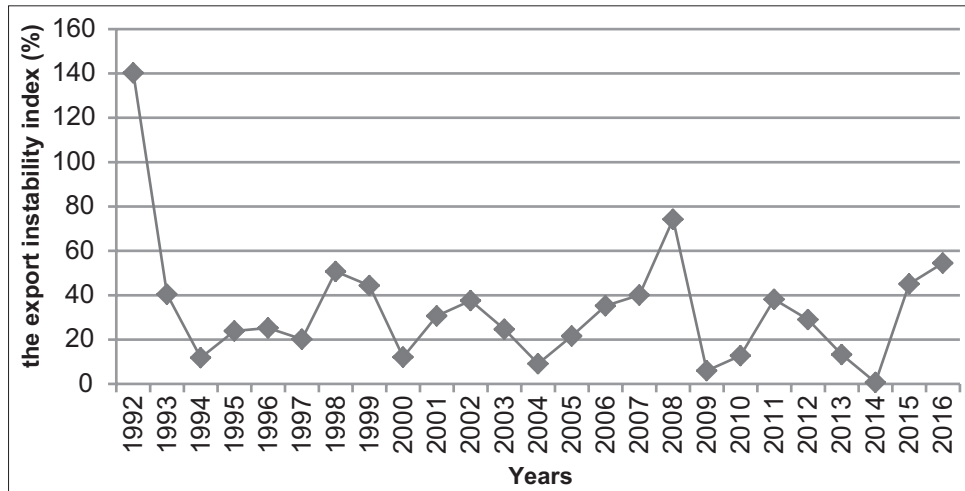
1992-1995, the extent of export volatility was at its highest level (140.3%) in 1992. On average, the export volatility of Algeria was high during that period, with a percentage of almost 54.1%. In the period 1996-2001, Algeria's exports became less volatile as the average index of export volatility was 30.6%. From this period to

Figure 15: The extent of geographic concentration in Algeria's exports during the period 1992-2016
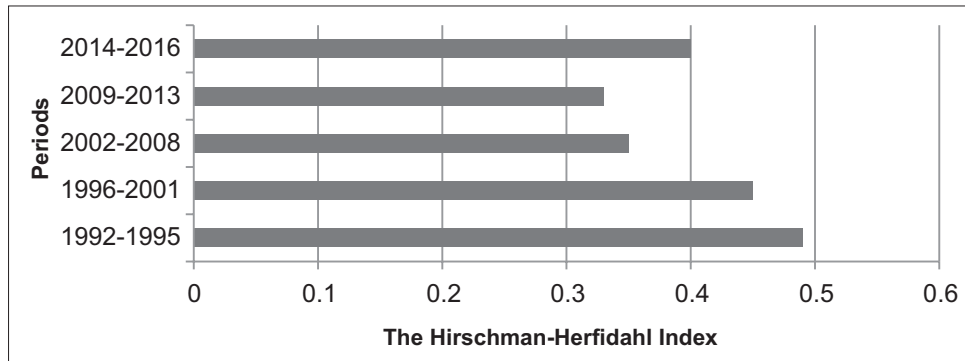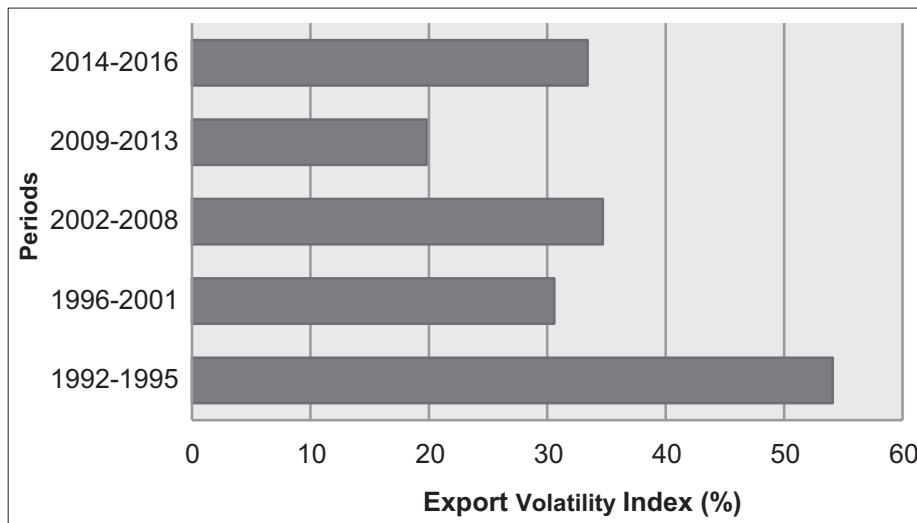

Source: Based on the study calculations using the data in Figure 14

Figure 16: The degree of export volatility in Algeria for the period 1992-2016

Source: Based on our calculations using the data in Figure 1

Figure 17: The extent of export volatility in Algeria during the period 1992-2016

Source: Based on the study calculations using the data in Figure 16

2002-2008, there was a slight increase of 4.1% in the degree of export volatility of Algeria. The second dip in the index of export volatility occurred in the period 2009-2013 as it slumped down to 19.8%. The fluctuations in Algeria's exports that occurred in the last period (2014-2016) were higher than the previous one. The degree of export volatility was, on average 33.4% during that period, which is 20.7% less than the first period.

5. CONCLUSION

After analyzing data on total exports and other characteristics related to the international trade of Algeria, we concluded to the following results:

First: The export performance of Algeria has improved during 1992-2016. Algeria's total exports were almost 11.1 billion dollars in 1992 and moved up to 60.4 billion dollars in 2014. This growth rate in total exports has decreased in more recent years. This decline is because of the continuous fall in the price of fuels and the decrease in the world demand for oil products.

Second: The export structure in Algeria has not changed over the study period. The consumer products accounted for the bulk of Algeria's total exports, followed by the raw material products in the second place. These products represented almost 91.5% of total exports. In contrast, the contributions of other products such as capital and intermediate goods were very low with a share of only 3% in Algeria's total exports. After breaking Algeria's exports according to their destinations, the study found that the Europe and central Asian and North American countries were the largest recipients for Algeria's exports with a share of almost 86%. Other countries' markets in East Asia & Pacific, Latin America & Caribbean, and the Middle East and North Africa also contributed to Algeria's total exports with an average share of 12.9 % over the period 1992-2016. South Asian and Sub-Saharan African countries remained the least important importers of Algeria's products. These countries received only 1.2 % of Algeria's exports.

Third: The product concentration in Algeria's exports was very high, with an average of 97.2% during the period 1992-2016. This reflects the lack of diversification in Algeria's export sector. In contrast, Algeria's exports were less concentrated geographically as the geographic concentration index (the Gini Hirschman coefficient) was on average 69.4%.

Fifth: The market share of Algeria has varied over the period under investigation. This share increased during the period 1992-2012. This upward trend in the market share was driven mainly by the increase in the exports of Fuels and chemical products. In the post period of 1992-2012, Algeria's market share has shown a decreasing trend as it was almost 1561 points in 2012 and fell to 741 in 2016.

Sixth: After estimating the extent of export volatility in Algeria for the period 1992-2016, we observed that this extent has shown a downward trend as it was 54.1% in the period 1992-1995 and declined to 34.7% and 33.4% in the period 2002-2008 and 2014-

2016 respectively. This decrease in the extent of export volatility in Algeria is probably due to the increasing efforts by Algeria's government to reduce its dependence on the exports of fuel products which are experiencing high volatility in their prices in the world markets.

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