

Intermediate goods trade liberalization and non-hydrocarbon exports in Algeria

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Abstract:

The aim of this paper is to analyze the impact of inputs liberalization on non oil exports of Algeria. For that we have analyzed two products: « Glass » and « paper and paperboard ». Our results show that exports of these two products have grown a few years after the execution of the association agreement with the European Union. This exports expansion was done in parallel with the increase in intermediate goods imports with exemption from customs duties from European Union, which is in favour of enhancing productivity and exports of firms manufacturing the glass and paper.

Key Words : Intermediate goods, liberalization, exports.

JEL Classification: F10, F13, F14.

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1. Introduction

Intermediate goods (IG's) play a significant role in global trade, accounting for an estimated 50% of total trade (excluding fuels) in the second quarter of 2022 according to the World Trade Organization (WTO, 2023).

IG's called also inputs are not intended to the final consumption but are used to manufacture other goods. We can consider as IG's "*raw materials, processed products and spare parts*" (Fontagné, Freudenberg, & Unal-Kesenci, 1996, p. 146). IG's disappear during the production cycle, whereas capital goods are used multiple times in the production cycle.

The exchange of IG's is the consequence of international production processes fragmentation. Countries tend to specialize in segment of production processes rather than in the entire process. For example, the value chain of German companies are increasingly focusing on downstream activities and tend to neglects segments located upstream, relying more and more on imported inputs (Lallement, 2011). Upstream segments are outsourced to low-wage countries, this is an opportunity for these one to enhance their specialization in products with more added value.

The IG exchanges allow to the developed economies and also to the developing economies to be more efficient. Several studies shown that firms become more productive after using imported IG's (Kasahara & Rodrigue, 2004), (Amiti & Konings, 2007), (Edwards, Sundaram, & Marco, 2020). In addition authors found a positive relationship between the use of imported IG's and exports (Goldberg, Kandelwal, Davcnik, & Topalova, 2009), (Bas & Strauss-Kahn, 2013), (Arif, Jamil, & Chaudhry, 2023). According to these studies, firms using imported IG's enhance their productivity and exports because they have access to lower IG's, to more varieties of IG's and to the technology incorporated in this goods.

Algeria, where the issue of exports diversification is still relevant² can take advantage of IG's trade liberalization to improve its non hydrocarbon exports and shift its specialization towards higher value-added products.

This paper will be structured as follows: First we will conduct a literature review on IG's and their potential impact on exports. Then, we will use a revealed comparative advantage indicator to identify the stage of the production process in which the Algerian economy is specialized. Finally, to analyze the impact of inputs trade liberalization on non-hydrocarbon exports of Algeria, we will focus on the evolution of exports and imports of IG's that are related to two industries: Glass; paperboard and paper.

2. Literature review

Trade of IG's is important, so it is necessary to explain the resulting specific gain at the macroeconomic level and also at the microeconomic level. From this last level, studies have been developed to analyze the gain made by firms through the use of IG's.

2.1 IG's in the international theories

In the traditional theory of international trade, it assumed that only final goods can be traded internationally and we don't find explanations relating to the IG's trade.

The first studies conducted on international trade of IG's where based on principles of the traditional theory, but according to two different logics. The first, considers that every good is

¹According to the National Office of Statistics (ONS), the hydrocarbon sector accounts 92,1% of exports of goods and services in 2004 and 90% in 2022.

both IG and final good and it is therefore irrelevant to distinguish the exchange of final goods and the exchange of IG's (KIM, 1988). The second considers IG's as "pure" meaning that they are intended exclusively for the production of final goods. For Sanyal & Jones (1982), only IG's are traded internationally and final goods are then assembled in each country to satisfy domestic demand. This is made possible by the global fragmentation of the production process³, leading to vertical comparative advantages, which are related to the total of the production process, that is to say from upstream to downstream of this one.

It is the existence of vertical comparative advantages that gives rise to a specific gain linked to the exchanges of IG's compared to of final goods exchange.

However, the analysis of international exchange of the IG's, from the point of view of the traditional theory of international trade, is only inter-industry nature (for example, trade in household appliance components for chemicals components), but the exchange of similar IG's between countries can exist which, as in the case of final goods, is referred to intra-industry trade (for example, trade in household components for household appliance components). In the new theory of international trade, this exchange is justified by the gains made producers as the result of using more varieties of IG's.

2.2 IG's imports and exports

The increase of the country exports can be the result of trade liberalization because the use of importing IG's by producer's enables productivity gains. Kasahara & Rodrigue (2004), using data of 2066 Chilean factories over the period 1979-1986, find a strong relationship between IG imports and productivity. The productivity gains observed by the authors vary between 3,4% and 22,5%.

Furthermore, IG's allow firms to improve their exports through a number of channels. First, the liberalization of exchanges gives producer's access to low priced import's IG. Competition between world producers is the first mechanism through which the cost of these goods is driven down. The second mechanism is involves developed countries outsourcing production segments to low-wage countries, and then importing the products of these segments in the form of IG's. In this context, Bas & Strauss-Kahn (2013) show that importing IG's from developing countries enable French firms to reduce their costs and increase their exports. The last mechanism refers to the decrease in firm's cost. Amiti & Konings (2007), using the data of the Indonesian manufacturing sector over the period 1991-2001, find that 10% reduction in custom's duties on IG's increased the productivity of the firms importing these goods by 12%. Whereas the reduction in custom tariffs on final goods generated an increase in productivity of only 1% to 6%. This increase in productivity enhances likelihood of firms to sell their products on the international market. Recently Arif, Jamil, & Chaudhry (2023), using the data from 166 countries over the period 2000-2015, show that export performance indicators improve as the costs of imported IG's decrease, this decrease being the result of tariff reductions.

Second, The IG's trade liberalization allows firms to use more varieties of IG's and improve their production possibilities. Goldberg, Kandelwal, Davcnik, & Topalova (2009) show that the trade liberalization in India in 1991 stimulated the import of IG varieties previously unavailable

²The traditional model of international trade is based on the assumption of an integrated production process, meaning that national economies are specialized in « complete manufacturing process ».

on the market, which in turn stimulated the production and export of new products. Edwards, Sanfilippo, & Sundaram (2017) show for the case of South Africa that imports of IG's are associated with firm's productivity growth which they explain by the complementarity that occurs between imported varieties and domestic varieties.

Finally, the productivity growth of firms is enhanced when IG's are imported from developed countries for their superior quality and the technology they incorporate. Edwards, Sanfilippo, & Sundaram (2017) demonstrate for the case of South Africa that firms improve the quality of exported products following the use of more « sophisticated » imported IG's which are sourced from advanced economies in their production process.

3. Methodology and data

An indicator of revealed comparative advantage (RCA) has been used to analyze the development of the trade specialization of Algeria, focusing on three stages of the production process: Primary goods, intermediate goods and final goods (PG, IG, FG). Data on the productions stage are obtained using the classification by broad economics categories (BEC) established by the ONS. This classification was developed by the United States in 1974. Its objective is to convert data from international trade in categories that approximately correspond to the three basic classes used in the System of National Accounts: Capital goods, IG's that include primary goods s and goods that have undergone processing, and consumption goods. In our analysis we will use another classification³ and we distinguish the PG's that are basic inputs from primary sector; IG's which may be processed products or parts and components intended for industry; and FG which may be consumption goods or capital goods.

Then we have selected two industries, "Glass" and "paper and paperboard" to compare the evolution of their exports in relation to their imports of IG's originating from the European Union. For this analysis we used import data from the ONS and IG's import data from the European community (EC, 2023).

4. The development of Algeria's commercial specialization

According to the traditional theory of international trade, countries specialize according to their comparative advantages (costs or factor endowments). These advantages can be measured using the indicator of RCA, which can be calculated by considering exports only or both exports and imports at the same time. In what follows, we will measure the evolution of Algeria's RCA by production stages and by activity sectors.

4.1 RCA's for the three production stages: Primary goods, intermediate goods and final goods (PG, IG, FG)

Algeria's exports are dominated by hydrocarbons, and we expect a strong RCA for primary goods, but our objective here is to analyze the evolution of this indicator to see whether there has been an improvement in Algeria's specialization after the economic openness, especially after the implementation of the Association Agreement with the European Union (AAEU) in 2005 (l'UE, 2005).

³ Our classification of goods is inspired by the work of Fontagné, Freudenberg, & Unal-Kesenci (1996).

There are several indicators that can be used to measure country's comparative advantage for a given product. In that comes next, we will use the Lafay index (Lafay, 1990). The calculation formula is as follows:
$$\left[(X_j - M_j) - (X - M) \left(\frac{X_j + M_j}{X + M} \right) \left(\frac{1000}{Y} \right) \right]$$

As can be seen in the formula, first an actual balance for the product "j" is calculated ($A = X_j - M_j$) and compared to the theoretical balance ($B = (X - M) \left(\frac{X_j + M_j}{X + M} \right)$), which correspond to an absence of specialization. There is an advantage for the product "j", when the difference between the two balances ($A - B$) is positive and disadvantage in the opposite case. Second, the gap is related to the country's gross domestic product (GDP) to take in to consideration the fluctuations in economic activity.

In the following, we will calculate the RCA for the three production stages (PG, IG, FG) using the formula provided above. Table 1 presents the actual balance observed for each stage of production and theoretical balance indicating the contribution of each stage of production to the overall balance. Then the gap between the two balances is related to the GDP of Algeria to calculate the final result of the RCA, as shown in table 2.

Table 1. Actual balance and theoretical balance for PG, IG and FG.

Value in million of Dinars (DA).

	P=X+M/TX+TM		A=X-M Actual balance		B = P (TX-TM) Theoretical balance	
	2004	2022	2004	2022	2004	2022
PG	0,5	0,41	1 518 588,50	3 503 682,50	511 524	1 251 522,70
IG	0,34	0,49	69 035,90	837 117,50	347 836,32	1 495 722,30
FG	0,16	0,1	-564 576,40	-1 288 305,60	163 687,68	305 294,44
Total	1	1			1 023 048	3 052 539,44

Source: Authors based on ONS data (ONS, 2004), (ONS, 2015), (ONS, 2022).

X: exports, **M:** imports, **TX:** Total exports, **TM:** Total imports (see appendix 1 for the value of exports and imports).

Table 2. The RCA for the three balances

	ACR= (A-B/Y*) 1000	
	2004	2022
BP	152	62
BI	-42	-20
BF	-109	-50

Source: Authors based on table 1.

Y* is the Algeria's GDP in millions of Dinars: 6 623 355 in 2004 and 32 028 423 in 2022. (ONS, 2023)

The results for the two years show that Algeria has a strong advantage in primary products (The actual balance is higher than the theoretical balance). Crude oil exports account for a very large proportion of exports in this category of products (99% in 2004 and also in 2022)⁴. However, disadvantage in IG and FG has narrowed considerably between 2004 and 2022. The following table presents the share of the three balances in total exports.

Table 3. The share of the three balances in total exports

	2004	2022
PG	71,44	54,01
IG	28,39	45,60
FG	0,17	0,39
Total	100,00	100,00

Source: Authors based on appendix 1.

The share of IG exports increased between 2004 and 2022, rising from 28, 39% to 45, 60%. The share of the IG's related to the oil sector is significant for both years, but it decreased from 94,9% in 2004 to 78,4% in 2022. The reduction in the comparative disadvantage for IG and FG between 2004 and 2022 can be attributed one hand, to the increase of the share of fuels and lubricants that have undergone processing and on other hand, to the emergence of new export products such as: can sugar, glass, cement, iron or steel bars, etc. See the appendix 2 that indicate the mean non hydrocarbon products exported in 2022.

4.2 RCA's by activity sectors (excluding hydrocarbons)

Let's now look at RCA's by sector of activity, excluding the oil and gas sector and using the same indicator to see which sector have contributed to reducing the disadvantage for IG and FG.

Table 4. RCA indicator by sector of activity (excluding the oil and gas sector)

	RCA	
	2004	2022
Agriculture, fishing, hunting	-1,32	-9,04
Water & Energy	0	0
Mines and quarries	0,43	-0,18
Steel industry.	-4,91	-7,42
Building materials, ceramics, glass	-0,23	3,35
Building and public works	-0,06	0,0
Chemicals, rubber, plastics	7,47	22,711

⁴ This percentage and the following percentages' in this paragraph are calculated from the BEC classification of exports. In this classification hydrocarbons are designated under the heading Fuels and Lubricants, which distinguishes between basic products (PG) and products that have undergone processing (IG).

Food industries, tobacco, matches	-1,01	-6,12
Textile industries, hosiery, clothing	-0,13	-1,08
Leather and footwear Industries	0,24	-0,15
Wood, cork, paper, leather and footwear	-0,27	-1,54
Various industries	-0,27	-0,52

Source: Authors based ONS foreign trade statistics by sector of activity (ONS, 2004), (ONS, 2015), (ONS, 2022).

The trade balance excluding hydrocarbons shows a deficit for both years (-1 246 608 60 in 2004 and -4 529 398,20 in 2022). There are three sectors with a positive comparative advantage, namely:

- The chemicals, rubber and plastics industry (for both years) represents the largest share of non-hydrocarbon exports, the majority of which consist of petroleum derivatives such as: fertilizers, anhydrous ammonia and naphtha solvent's (see appendix 2 the main non hydrocarbon exports in 2022).
- The leather and footwear industries in 2004.
- The building materials, ceramics and glass sector has experienced a significant rise in exports in recent years, particularly in the case of glass.

5. Imports of IG's and non-hydrocarbon exports

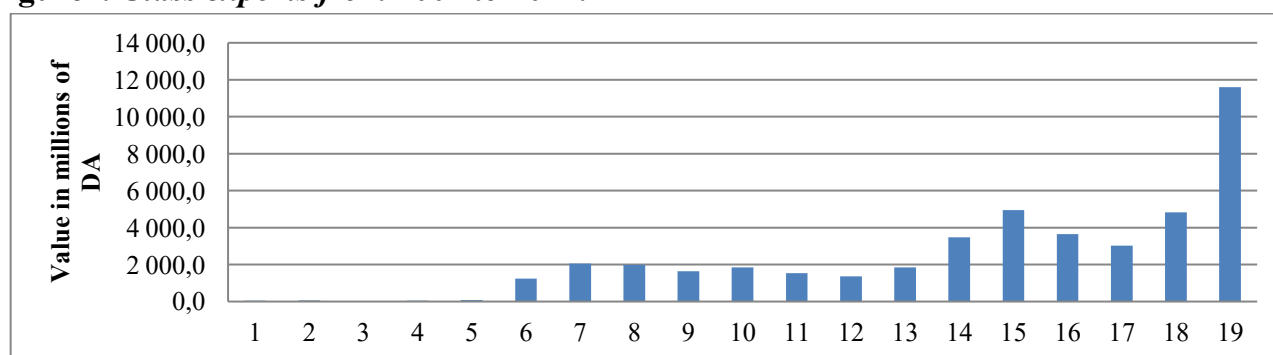
Reducing customs duties on IG imports is one of the mechanisms that can boost exports by improving the productivity of exporting companies.

For Algeria, the AAEU which includes the establishment of a free trade area represents a pivotal opportunity for companies to access to inputs at lower prices thanks to the abolition of customs duties. Notably, import tariffs on industrial products covered by article 9, paragraph 1 of the agreement were entirely eliminated immediately upon its entry in to force in September 2005 (l'UE, 2005).

5.1 The glass industry

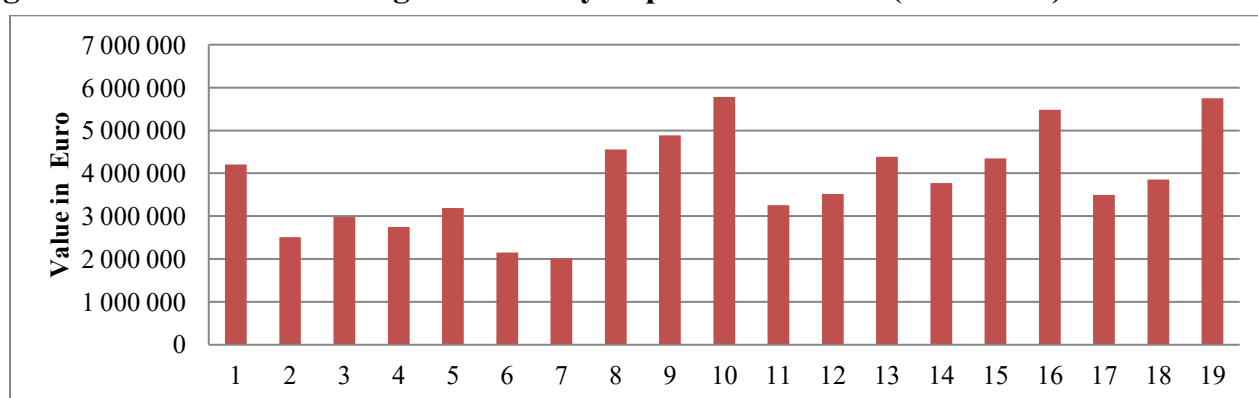
Glass has been on the list of the main products exported outside hydrocarbons since 2018, in particular glass corresponding to Harmonized System (HS) code "7005": sheet or plate glass. Figure 1 shows the evolution of total exports from the glass industry and figure 2 shows the evolution of imports of certain IG's relating to this industry which have been fully exempt from customs duties since September 2005. The SH code of IG's considered in figure 2 are: 7001, 700210, 700220, 700231, 7000232, 700239, 700312, 700319, 700320, 700330, 700339, 700490, 700510, 700521, 700529, 799530.

Figure1. Glass exports from 2004 to 2022.



Source: Authors based on ONS data (ONS, 2004), (ONS, 2015), (ONS, 2022).

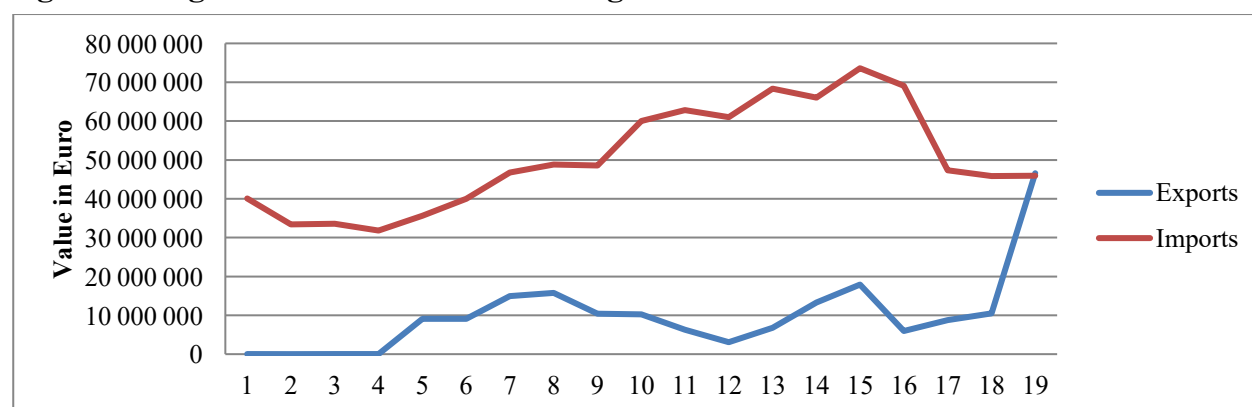
Figure 2: IG's related to the glass industry imported from EU (2004-2022)



Source: Authors based on European Union trade statistics (EC, 2023)

Glass exports began to grow four years after the AAEU came in to force; it is to say in 2009. Even before the implementation of the agreement, imports of glass IG's from the EU were substantial, growing considerably in 2011, 2012 and 2013, but the exports remained almost at their 2009 level. Over the whole period (2004-2022), exports grew faster than imports: the average growth rate for exports was **36,74%** compared with **1,74%** for imports. Glass exports to the EU also increase after the implementation of the agreement and even exceeded imports in 2022, as shown in the graph below.

Figure 3. Algeria's trade with the EU in glass⁵ from 2004 to 2022.



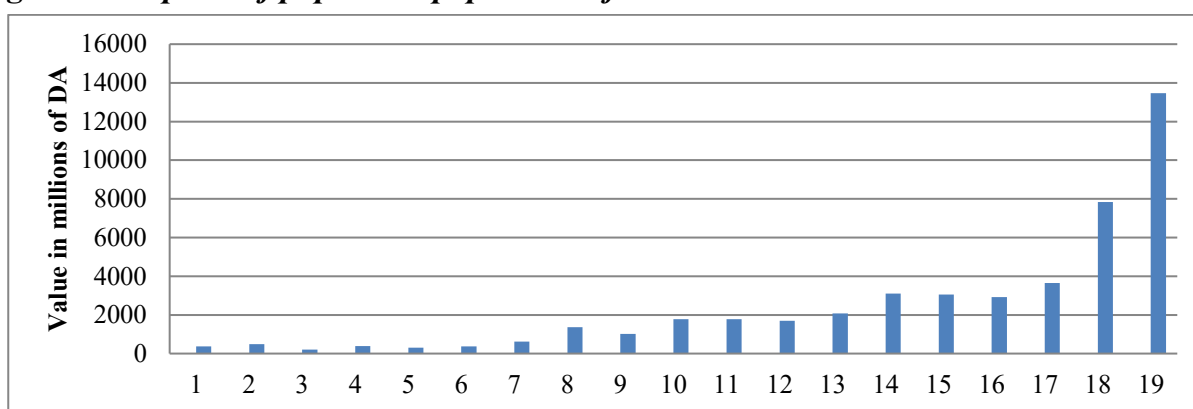
Source: Authors based on European Union trade statistics (EC, 2023)

⁵ We consider here all categories of glass that is products relating to the SH code 70.

5.2. Paper and paperboard industry

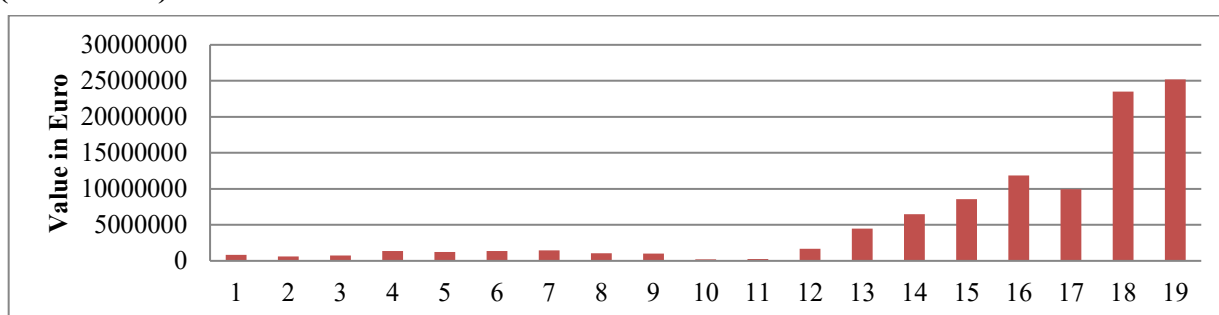
Figure 4 below represents the evolution of total exports of the paper and paperboard industry and figure 5 represents the evolution of imports of all IG's relating to this industry that have benefited from a total exemption from custom duties since September 2005.

Figure 4. Exports of paper and paperboard from 2004 to 2022.



Source: Authors based on ONS data (ONS, 2004), (ONS, 2015), (ONS, 2022).

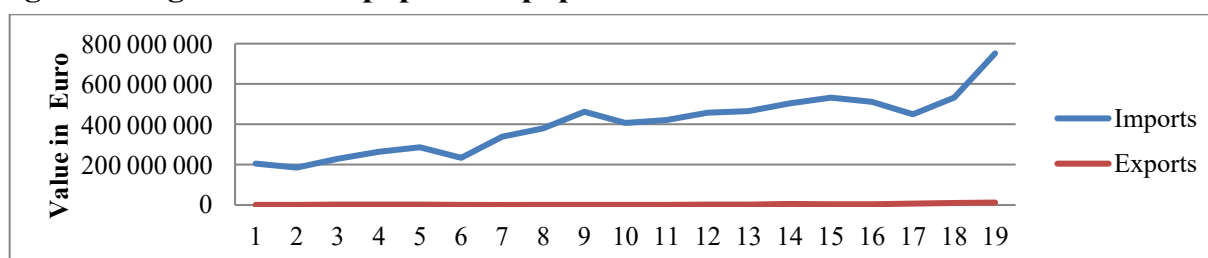
Figure 5. IG's related to the "paper and paperboard" industry imported from the EU (2004-2022)



Source: Authors based on European Union trade statistics (EC, 2023).

The graphs above indicate that overall, exports of the paper and paperboard are following a similar trend to imports of IG's from the EU. Throughout the entire period (2004-2022), exports experienced an average growth rate of **22,06%**, while imports of IG's grew at an average rate of **14,08%**. However, it is important to highlight that Algeria's requirements for these products are mainly imported, and exports to the EU are insignificant compared with the volumes imported from this region, as shown in the graph below.

Figure 6. Algeria's trade paper and paperboard⁶ with the EU from 2004 to 2022.



Source: Authors based on European Union trade statistics (EC, 2023).

⁶ We have examined two categories of paper related to SH code 47 and 48.

Imports exceeded exports, for example in 2022 imports will equal 751 962 072 Euro and exports 12 259 582 Euro. However, exports have experienced consistent growth between 2020 and 2022.

6. Conclusion

Trade in IG's plays a crucial role in global trade. Instead of specializing in complete production processes, countries focus on specific stage, creating vertical comparative advantages. This explains the specific advantages linked to trade in IG's.

Analysis of Algeria's specialization by calculating the comparative advantage indicator for the three stages of the production process: PG, IG and FG, shows that it specializes in primary goods, most of which are hydrocarbons. Algeria has a disadvantage in IG's for the two years studied, 2004 and 2022. However, this disadvantage is reduced following the export of higher value of processed hydrocarbons and export new non-hydrocarbons products. This analysis highlights the Algerian economy's reliance on hydrocarbons and underscores the need for economic diversification. For this purpose, trade liberalization offers companies the opportunity to access IG's at lower prices, with a greater variety and higher quality, which will enable them to improve their productivity and exports.

The AAEU is an important step in the process of liberalizing the Algerian economy, as the EU is a major trading partner for Algeria. The section relating to trade in the agreement emphasizes the exchange of IG's, granting Algeria full exemption from custom duties on imports of an extensive list of these goods. Our analysis, which focused on two products, "glass" and "paper and paperboard" shows that exports of these two products grew a few years after the agreement came in to force, at the same time as imports of IG's used in the manufacture of these products increased. It should be remembered that these IG's have been imported duty-free from the EU since 2005, which helps to improve the productivity and exports of companies manufacturing these two products.

However, the growth in non-hydrocarbons exports to the EU remains insignificant in comparison to imports. This is what we have seen in the case of paper and paperboard were imports far exceeded exports, and it is also the finding of some studies evaluating the AAEU. Some studies conclude that the implementation of the agreement has not brought about any significant change in the structure of exports (Belkacem Kasmi & Herizi, 2017) and tariff dismantling has no positive effects on the diversification of the Algerian economy (Boulenouar & Diafi, 2023).

The situation is quite different for glass, where exports to the EU exceeded imports in 2022. A large proportion of these exports came from the CEVITAL group via its subsidiary M.F.G, which exported a value of 137 million Dollars between 2020 and 2022(presse, 2023). This leads us to look at the characteristics of companies, in addition to external factors such as trade liberalization, in determining their export performance. Business surveys can also be conducted to determine the effect of association agreements and trade liberalization on

companies and see whether they are really taking advantage of the measures contained in these agreements.

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6. Appendices

Appendix 1. Exports and imports in 2004 and 2022.

	X : Exports		M : Imports	
	2004	2022	2004	2022
PG	1 669 873,80	4 640 785,40	151 285,30	1 137 102,90
IG	663 713	3 917 816,90	594 677,10	3 080 699,4
FG	3 861	33 569,80	568 437	1 321 875,4
Total	2 337 447,80	8 592 172,10	1 314 399,80	5 539 677,70

.Source: Authors based on ONS data (ONS, 2004), (ONS, 2015), (ONS, 2022).

Appendix2. Main non-oil products exported in 2022

Value in millions of Dinars

Products exported	Value
Mineral or Chemical nitrogen fertilizers	267 879
Anhydrous ammonia	192 842
Naphtha solvents; other uses	109 886
Iron bars in steels	77 797
Non-pulverized cement known as “clinker”	60 219
Semi-finished products in iron or non-alloy steel	31 448
Natural calcium phosphates	28 363
Benzene, cyclic hydrocarbons	17 217
Wire rode in other alloy steel	17 103
Can sugar	12 578
Hydrogen	11 129
Degletenour dates	9 366
Slab or sheet ice	9 034
Iron or non-alloy steel wire rode	8 013

Source: (ONS, 2022).