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Economic Determinants of Export Diversification in Algeria: An Empirical Analysis through Quantile Rregression

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ABSTRACT

This study aims to identify the key economic determinants of export diversification in Algeria, a rentier state, over the period 1995–2022. Using annual data from various official sources, a quantile regression model is employed to assess the heterogeneous effects of selected variables across different levels of export diversification. The results show that foreign direct investment does not support export diversification, while oil rents and trade openness are factors that hinder the process. Conversely, domestic investment and manufacturing exports contribute positively to a more diversified export structure. The study contributes to the literature by offering new insights into how structural economic factors shape diversification patterns in resource-rich countries, emphasizing the role of targeted investment and industrial development policies in reducing dependence on natural resources.

Keywords: *export diversification, Algeria, Herfindahl-Hirschman Index, quantile regression*

JEL Classification: F43, C54, O1

INTRODUCTION

Export diversification has guided the policies of many countries. Resource-rich nations, including Algeria, seek to reduce their dependence on these resources by diversifying their exports and sources of revenue. The need for export diversification is frequently highlighted by periodic fluctuations or cycles of rising and falling international commodity prices, as evidenced in 2014, as well as during recent global disruptions caused by imbalances between oil supply and demand, particularly during the COVID-19 pandemic in 2020 and the Russia-Ukraine conflict in 2022. The studies by Singer (1950) and Michaely (1958) emphasized the importance of shielding economies from excessive price variations. More recently, research has demonstrated that diversifying trade partners is an effective strategy to reduce vulnerability to external shocks (Jansen et al., 2011). Furthermore, diversification is now recognized as a key element of economic development, particularly in countries highly dependent on natural resources (Agosin, Alvarez, & Bravo-Ortega, 2011).

This study aims to identify the economic determinants of export diversification. By relying on a literature review that highlights the crucial role of local and foreign investments, hydrocarbon and manufacturing exports, as well as trade openness, and by examining their influence on export

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diversification, the study seeks to answer the following question: what is the impact of economic factors at different levels of export diversification during the period 1995–2022 in Algeria?

To address our research question, we have drawn upon relevant literature on the subject, as well as data covering the period from 1995 to 2022, to test the assumed effects of the various studied variables on export diversification. We have adopted a recent econometric approach, which we deem most appropriate for our study. Following the introduction, a relevant literature review is presented. Subsequently, an empirical analysis is conducted, applying the quantile regression model.

LITERATURE REVIEW

In their study on the determinants of export diversification in a large sample of 79 countries between 1962 and 2000, Agosin et al. (2011) highlighted the key factors influencing export diversification. Their findings showed that trade openness promotes specialization, which negatively impacts export diversification. The study underscores the importance of understanding the complex relationships between economic policies and export diversification. Arawomo et al. (2014), in their article examining the impact of foreign direct investment (FDI) on export diversification in Nigeria, found that FDI hinders export diversification in the country. In contrast, domestic investment fosters diversification. Other discouraging factors include exchange rate fluctuations and democratic accountability.

Conversely, another study analysed the determinants of export diversification in Pakistan from 1980 to 2015. The findings indicated that foreign direct investment and global income positively influence export diversification, whereas trade openness encourages export concentration and limits diversification in Pakistan. The study suggests exploring new export markets as a strategy for diversification (Mubeen & Ahmad, 2016)

Regarding the analysis of factors influencing export diversification, Osakwe and Kilolo (2018) demonstrated that the share of manufacturing value-added in GDP is a key determinant of diversification, while dependence on natural resources tends to increase export concentration. Their study also highlights the importance of adequate infrastructure in supporting diversification processes, which is particularly relevant for least developed countries (LDCs) facing specific economic diversification challenges.

A study on the determinants of export diversification in the West African Economic and Monetary Union (WAEMU) countries over the period 1995–2015, using the fully modified ordinary least squares (FMOLS) method, found that trade openness, human and physical capital accumulation, and a competitive real exchange rate significantly favor export diversification. However, abundant natural resource endowment and small economic size are major obstacles to this process. These findings highlight the need to adopt strategies aimed at diversifying exports to strengthen the economic resilience of these countries (Diop, 2019).

In Brazil, an analysis of export diversification over a ten-year period, where the authors employed a dynamic panel methodology, examined the determinants of diversification. The findings by Oliveira et al. (2020) identified education, patents per capita, credit access, and public investment as significant positive determinants of export diversification.

Handoyo et al. (2021) conducted a study on the determinants of export diversification in 62 developing countries between 2010 and 2018, using the Poisson pseudo-maximum likelihood (PPML) estimation method. The study emphasized the importance of developing human capital, improving global competitiveness, and optimizing R&D resources to stimulate export diversification in developing economies.

Touati and Keddari (2022) highlighted in their study the importance of a diversification strategy for ensuring sustainable economic growth in Algeria, emphasizing the central role of private sector credit and advocating for structural reforms. Their study found that while trade openness is linked to diversification, its impact is complex and can sometimes reduce export

diversification. However, the study demonstrated the positive impact of private sector credit, underlining the importance of financial access for exporting firms.

The study by Abiola (2024) examined the role of Nigeria's manufacturing sector in export diversification efforts between 1985 and 2022. The findings revealed a weak and negative association between the manufacturing sector and export diversification, indicating that this sector has not significantly contributed to Nigeria's export growth. The study calls for targeted interventions to unlock the sector's potential and enhance Nigeria's export portfolio.

Based on the literature review presented above, we formulate two main hypotheses. First, we posit that foreign direct investment (FDI) has a negative effect on export diversification, a hypothesis supported by the work of Arawomo et al. (2014). Second, we assume that trade openness positively contributes to export diversification, a proposition backed by the research of Diop (2019).

DATA AND METHODOLOGY

In this section, we describe the empirical methodology and the data used to address the research question.

Measurement of Variables and Data Sources

To empirically examine the impact of Foreign Direct Investment (FDI), Oil Exports (HYDRO), Gross Fixed Capital Formation (GFCF), Manufactured Exports (MANU), and Trade Openness (OUV) on export diversification (measured inversely using the Herfindahl-Hirschman Index (HHI) as an indicator of export concentration) in Algeria, the model is specified as follows:

$$HHI_t = f(FDI_t, HYDRO_t, GFCF_t, MANU_t, OUV_t) \quad for\ t = 1995, 1996 \ldots\ldots\ldots\ldots, 2022$$

We utilize data covering the period 1995–2022, sourced from various national and international institutions.

Variables	Description	Source
HHI	Herfindahl-Hirschman Index (measure of export concentration)	UNCTAD (United Nations Conference on Trade and Development)
FDI	Foreign Direct Investment (FDI) as a percentage of GDP	WDI (World Development Indicators) - World Bank
HYDRO	Oil Exports (in millions of dollars)	ONS (National Office of Statistics)
GFCF	Gross Fixed Capital Formation (in millions of dollars)	WDI (World Development Indicators) - World Bank
MANU	Manufactured Exports (in millions of dollars)	WTO (World Trade Organization)
OUV	Trade Openness (as a percentage of GDP)	World Bank, Sherbrooke University - World Perspective

Methodology

The model adopted in this study is inspired by the empirical literature on the subject. Specifically, it is based on the works of Agosin et al. (2011), Arawomo et al. (2014), Osakwe and Kilolo (2018), and Abiola (2024). Unlike previous studies in the literature that have relied on traditional empirical methods, we adopt a new empirical approach that is rarely used in this context, namely, quantile regression, as proposed by Bulut and Yaşar (2023).

Regression analysis is an essential tool for studying the relationship between quantitative variables. Traditional regression methods focus on the mean of the dependent variable, but in

some cases, this method may not capture the full complexity of the relationship between the variables, especially in economics (Cristina & Dominico, 2014). This is because traditional regression is subject to requirements such as homogeneity of variance, normal distribution of the random error, and the absence of outliers, which are rarely met in practice. These constraints can lead to misleading regression results (Koenker & Bassett, 1978). Therefore, new tools have been developed to address these limitations (McMillen, 2013).

Quantile regression (QR), proposed by Koenker and Bassett (1978), is an extension of linear regression used to model conditional quantiles. It allows modelling of the conditional quantiles of the dependent variable, such as the 25th, 50th, or 90th percentiles. Median regression is a particular case of quantile regression when the quantile is equal to 0.50 (Koenker & Bassett, 1978). The fundamental superiority of QR over multivariate regression lies in its ability to analyze data whose conditional distributions are heterogeneous. This type of data has been observed in various fields, such as econometrics, survival analysis, and ecology. QR can illustrate the effect of a variable when a group of percentiles is studied, and it does not assume any distributional hypothesis on the error term in the model (Koenker & Machado, 1999).

Let y be a random variable with a distribution function

$$F(y) = prob(Y \leq y) \quad (1)$$

The τ -th quantile of Y is defined as the inverse function:

$$Q(\tau) = inf\{y: F(y) \geq \tau\} \quad (2)$$

Where $0 < \tau < 1$, we consider the Median as a special case, Q(0.5)Q(0.5)Q(0.5). The equation (2) can also be extended as follows:

$$Qy(\tau)\ (x_1,x_2,...,x_k) = \beta_0(\tau) + \beta_1(\tau)x_1 + ... + \beta_k(\tau)x_k \quad (3)$$

Where: $0 < \tau < 1$, $\beta\ \tau = (\beta_0(\tau), \beta_1(\tau),...,\beta_k(\tau))$ this vector represents the set of parameters that need to be estimated in the model

Let $y_1,y_2,...,y_n$ be a random sample of the variable Y, the sample median is known as the value that minimizes the sum of absolute deviations, defined as:

$$min\xi \in R \sum_{i=1}^{n} |y_i - \xi| \quad (4)$$

The τ-th sample quantile, $\xi(\tau)$, which is the sample analogue of the theoretical quantile function $Q(\tau)$, can be formulated as the solution to the following optimization problem:

$$min\xi \in R \sum_{i=1}^{n} \rho\tau|y_i - \xi| \quad (5)$$

here: $Q\tau(z) = z(\tau - I(z < 0))$, $0 < \tau < 1$, and I (0) is the indicator function (Pauline & Xavier, 2013). This contrasts with the sample mean, which minimizes the sum of squared deviations:

$$\hat{\mu} = argmin\mu \in R \sum_{i=1}^{n} (y_i - \mu)^2 \quad (6)$$

This concept can be extended to the conditional mean, given by the expectation function $E(Y|X = x) = x\beta$, with the estimator defined as:

$$\dot{\beta} = argmin\beta \in R^p \sum_{i=1}^{n} (y_i - x\beta)^2 \quad (7)$$

Similarly, the linear conditional quantile function, defined as Q (Y|X = x) = ẋβ(τ) can be estimated by solving:

$$\dot{\beta}\ (\tau) = argmin\beta \in R^p \sum_{i=1}^{n}\ \rho\tau\ (y_i - x_i\beta) \qquad (8)$$

for any quantile 0 < τ < 1. The estimated parameter vector$\hat{\beta}(\tau)$ is referred to as the τ-th quantile regression, which, for τ = 0.5, corresponds to median regression, minimizing the sum of absolute residuals. The estimated conditional quantile model is expressed as:

$$\hat{Q}\tau(y_i/x_i) = \dot{x_i}\hat{\beta}\tau \qquad (9)$$

The interpretation of the estimated parameters in quantile regression (QR) is similar to that of Ordinary Least Squares (OLS) in terms of rate of change (Koenker & Bassett, 1978). To assess the goodness-of-fit of a simple linear regression model, we typically use the coefficient of determination R^2, or the$\overline{R^2}$ in the multivariate case.

In quantile regression, however, we rely on the pseudo-coefficient of determination or pseudo-R^2, which measures the proportion of the variation in the dependent variable explained by the model at quantile τ (Koenker & Machado, 1999), where:

$$Pseudo\ R^2 = 1 - \frac{ln\ L(\widehat{B})}{ln\ L\ (0)} \qquad (10)$$

where ln $L(\widehat{B})$ is the log-likelihood of the estimated model, and ln L (0)is the loglikelihood of the null model, that is, a model without explanatory variables.

The regression model used in our study is given by the following equation:

$$Q\tau(HHI/X) = \beta_0\ (\tau) + \beta_1\ (\tau)FDI + \beta_2\ (\tau)HYDRO + \beta_3\ (\tau)GFCF + \beta_4\ (\tau)MANU + \beta_5\ (\tau)OUV + \varepsilon\tau$$

Where:
$Q\tau(IHH)$: This is the τ-th quantile of the dependent variable HHI

$\beta 0(\tau)$: This is the intercept of the regression. It depends on the selected quantile τ.

$\beta 1(\tau), \beta 2(\tau), ..., \beta 5(\tau)$: These are the regression coefficients associated with each explanatory variable. They indicate the effect of a one-unit increase in the explanatory variable on the τ-th quantile of HHI. These coefficients may vary depending on the chosen quantile, allowing for the analysis of heterogeneous effects.
$\varepsilon\tau$: This is the error term of the regression. It captures the portion of the variability in HHI that is not explained by the explanatory variables.

RESULTS AND DISCUSSION

An Overview of Export Diversification in Algeria

Oil plays a crucial role in the Algerian economy, supporting numerous development projects since independence. However, this abundance of natural resources can hinder economic growth—a phenomenon known as the 'natural resource curse' (Mansour, 2015). The 2020 health crisis, marked by a decline in oil prices (Chellai, 2024), illustrated this impact, leading to a drop in hydrocarbon revenues.

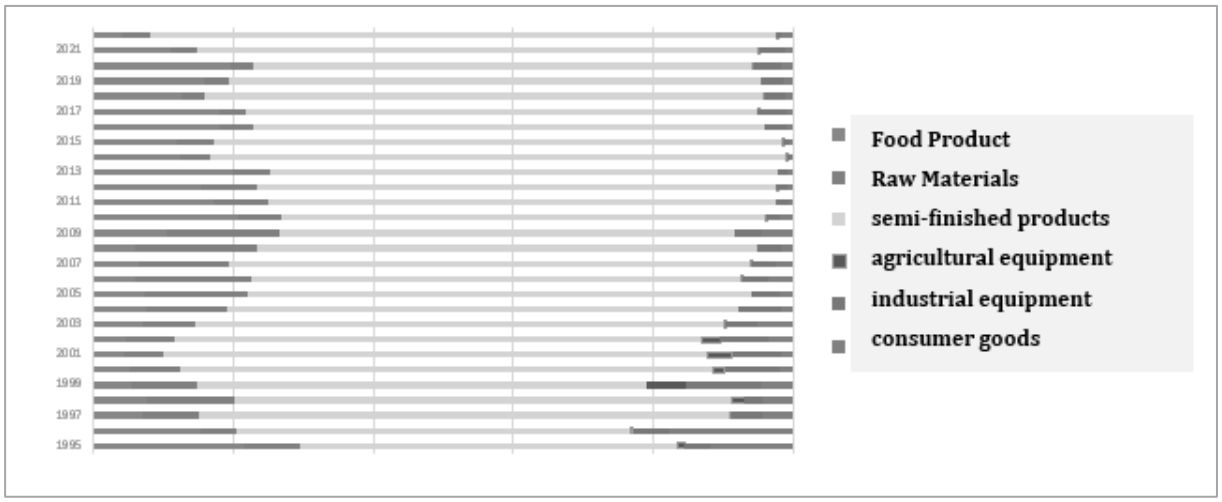

Figure 1. Evolution of the Structure of Algerian Non-Hydrocarbon Exports

Source: (UNCTAD, 2024)

In 2022, non-hydrocarbon exports accounted for only 10.40% of Algeria's total exports, which remain dominated—over 90%—by hydrocarbons. The main non-hydrocarbon export products include semi-finished goods (such as fertilizers, solvents, and ammonia) and dates. Algeria continues to rely on imports for essential goods such as wheat and barley.

Measurement Of Export Diversification

In 2022, Algerian exports reached approximately 63 billion USD (National Institute of Statistics, 2025). The analysis of exports is not limited to their value but also includes indicators such as the concentration index and the diversification index, which are essential for assessing export specialization and diversification (Canada Statistics, 2018).

Export Concentration Index

The Herfindahl-Hirschman Index (HHI) measures export concentration, which is the inverse of diversification (Cadot et al., 2011; Christophe & Nicole, 2012). Ranging between 0 and 1 (UNCTAD, 2019), it indicates a diversified export basket when HHI < 0.15, moderate concentration when 0.15 ≤ HHI ≤ 0.25, and high concentration when HHI > 0.25 (Djaha, 2021). In Algeria, the HHI is closely tied to hydrocarbon exports (see Figure 2), decreasing when these exports fall and increasing when they rise. The index reached its lowest level in 2020 (0.44), due to the drop in oil exports linked to the COVID-19 pandemic, and its highest level in 2006 (0.6), driven by a sharp rise in exports. The average value of 0.52 over the period 1995–2022 reflects.

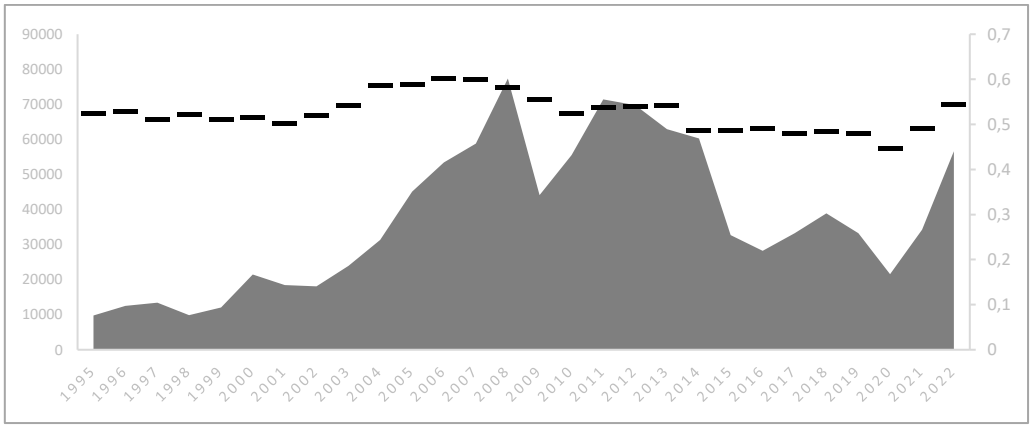

Figure 2. Evolution of the Herfindahl-Hirschman Index in Algeria

Source: (UNCTAD, 2024)

Export Diversification by Product

With 63.1 billion USD in exports in 2022, Algeria, the 55th largest exporter in the world, recorded a growth of 60.77% between 2021 and 2022, driven by the economic recovery. Its main exports include nitrogen fertilizers (2.3 billion USD), chemical products (1.6 billion USD), ferrous materials (1.61 billion USD), and cement (0.8 billion USD). However, these low-complexity products reflect a limited use of modern technologies. Since 2006, six new products have generated 18 USD per capita in 2022.

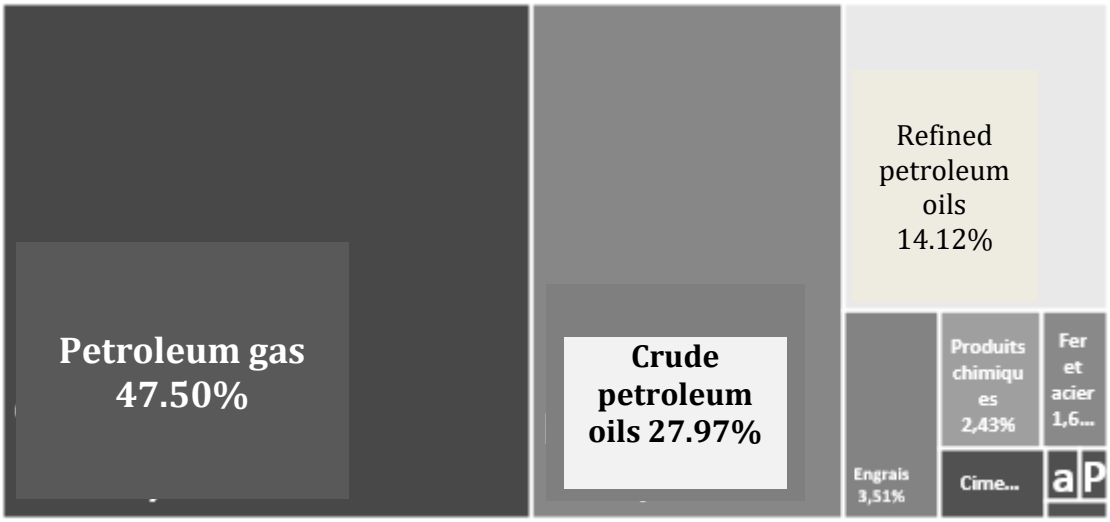

Figure 3. Algeria's Export Basket in 2022

Source: (UNCTAD, 2024)

Geographical Diversification

Algeria's foreign trade, focused on raw materials, is dominated by exports to Europe, mainly Italy, France, and Spain, due to geographical proximity and economic agreements. In 2023, 53% of Algerian exports were directed to the European Union and the OECD. Trade with Africa remains limited due to the low energy and industrial demand from these countries.

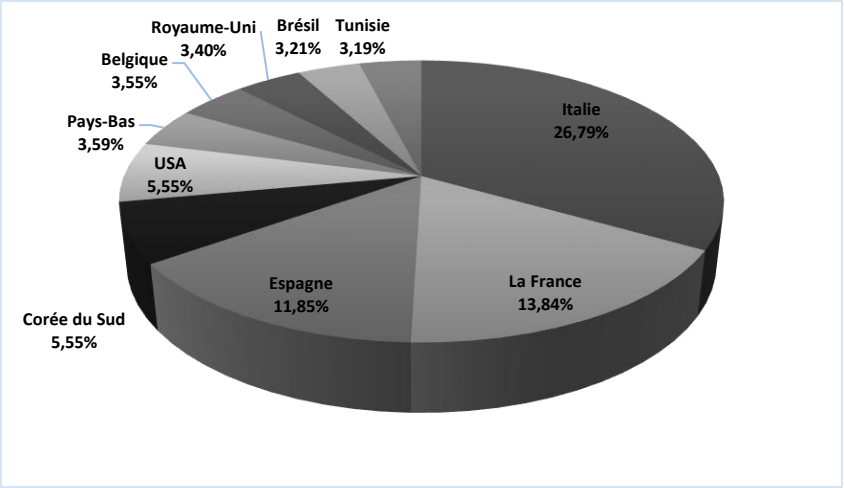

Figure 4. Main Clients of Algeria in 2023

Source: (TRADE MAP, 2024)

Empirical Results

Preliminary Analysis

In econometric traditions, we must carry out a set of preliminary tests (pre-tests) before conducting any study (Campêlo, 2023). These tests provide an in-depth analysis of the data, in other words, a visualization of the data.

Analysis of Outliers

Statisticians have developed a graphical technique called the 'box plot,' also known as the 'box-and-whisker plot' in English, which provides a clear indication of extreme values (Tukey, 1977). According to the graph below, it appears that none of the study variables exhibit extreme values, except for the variable MANU.

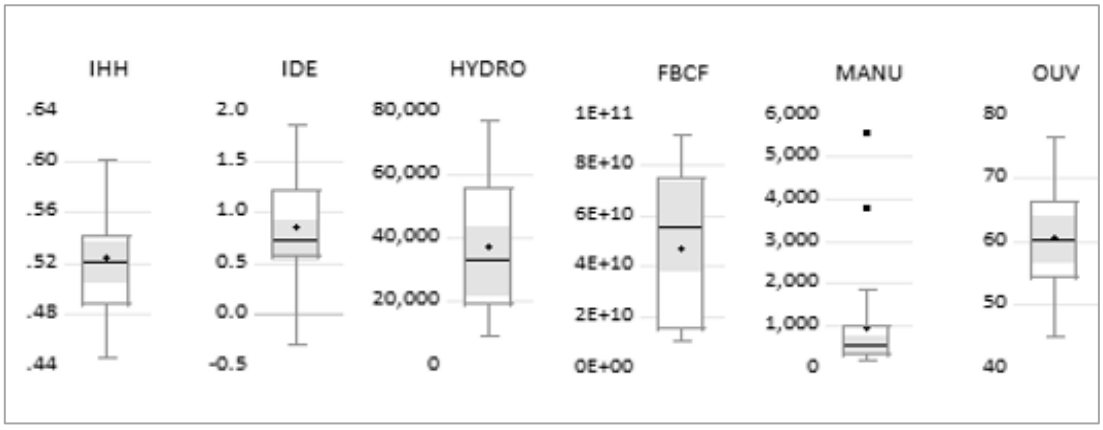

Figure 5. Box-and-Whisker Plots of the Study Variables

Source: prepared based on the output of Eviews 13

Linearity Test

The BDS test is one of the most popular linearity tests used in the context of time series (Brock, Dechert, & Scheinkman, 1996). The test yields the following results:

BDS Test for RESID
Date: 07/31/24 Time: 18:19
Sample: 1995 2022
Included observations: 28

Dimension	BDS Statistic	Std. Error	z-Statistic	Prob.
2	-0.021704	0.010555	-2.056254	0.0398
3	-0.038720	0.017272	-2.241748	0.0250
4	-0.053814	0.021183	-2.540468	0.0111

Figure 6. Results of the BDS Test

Source: prepared based on the output of Eviews 13

The results show that the residuals of the model exhibit some form of non-linear structure in the three dimensions (p-value < 0.05) at the 5% significance level. Therefore, we reject the null hypothesis of no non-linear dependence between the residuals. Given that the data contain outliers and exhibit a non-linear relationship, our choice to opt for quantile regression is therefore relevant (Rousseeuw & Leroy, 1987), and we will proceed to estimate the model parameters.

Estimation of the Model Parameters

Using EViews 13 and SPSS V26, we will estimate the impact of the explanatory variables on the three quartiles (levels) Q1 (25%), Q2 (50%), and Q3 (75%) of the conditional distribution of export diversification.

Table 1. Regression Coefficients

EXOGENOUS VARIABLES	**OLS**	**Q_1 25%**	**Q_2 50%**	**Q_3 75%**
		Low Diversification	**moderate Diversification**	**High Diversification**
C	0.407**	0.441**	0.430**	0.409**
FDI	-0.020*	-0.003**	-0.007*	−0.016*
HYDRO	-1.16**	-1.15**	−1.36**	−1.60**
GFCF	1.11***	1.19**	1.19*	1.23*
MANU	2.69**	1.07**	3.93**	4.47***
OUV	−0.002*	−0.005**	−0.002*	−0.001**
N	28	28	28	28

A statistically significant coefficient at the 5% or 1% level under a two-tailed test is indicated with (*) or (**), respectively.

Source: prepared based on the output of Eviews 13

The table above represents the coefficients and their statistical significance for the model estimated for the three quartiles (Q1, Q2, Q3). The constant is significant and almost the same across all levels of diversification. Secondly, it can be noted that the relationship between export diversification and the variable (FDI) is inverse; it is statistically significant for all quartiles of the variable of interest, and as we move towards higher quantiles (high diversification), its coefficient increases. For Algeria, the value is (-0.016). We can conclude that the lower the diversification, the greater the negative impact on FDI. It can be said that foreign investments have been focused on the hydrocarbons sector in Algeria, contributing to the country's continued reliance on this sector, which hinders the export diversification process.

Regarding petroleum exports, which measure dependence on natural resources, a negative impact is observed, meaning that as oil exports increase, the level of export diversification decreases, and the country becomes more concentrated on a specific activity. It is noted that the country becomes less diversified (Q1) when the impact of this variable is stronger (-1.15). This

result is typical of rentier economies, where dependence on natural resources, especially petroleum products, limits and hinders export diversification.

On the other hand, local investments, represented by gross fixed capital formation (GFCF) in our study, have a positive and significant impact on export diversification, meaning that the more we invest locally, the more we increase export diversification (Q3), as seen in Algeria. The impact of GFCF is larger (1.23), indicating that local investments promote export diversification.

Manufactured product exports have a positive impact on diversification, and the more diversified the country is, the larger this impact (4.47). This highlights the role of the industrial sector in combating dependence on natural resources, creating a more robust and dynamic manufacturing ecosystem, and subsequently diversifying exports and building a more diversified export structure.

Trade openness is significantly negative, and the less diversified the export basket, the greater the effect (-0.005). In other words, it has a negative impact on diversification in countries like Algeria, where the degree of concentration is high. This is due to the fact that trade liberalization can lead to greater specialization in the hydrocarbons sector rather than in the production of other new products.

Model Validation

Goodness of Fit

We observe that the pseudo R^2 determination coefficient exceeds 0.6 for all three levels of export diversification (Table 2), reflecting the good explanatory power of the model, from high export diversification (Q3) to low diversification, which is typically the case for economies characterized by monopolistic exports. In other words, 60% of the changes in export diversification are explained by the estimated model, with this percentage decreasing as diversification decreases. In other words, the greater the diversification of the export basket, the greater the impact of the explanatory variables included in the model. It can also be said that the explanatory power of the model in the case of measuring the average effect through Ordinary Least Squares (OLS) is good (R^2 = 0.82), but it does not provide a clearer picture of the effect at different levels of the response variable distribution.

Table 2. Model Quality

	OLS	**Quantile Regression**		
		$\boldsymbol{Q_{75\%}}$	$Q_{50\%}$	$Q_{25\%}$
R^2	0.820			
Pseudo R^2		0.655	0.640	0.605

Source: prepared based on the output of Eviews 13

Model Specification Issue

In order to ensure that the specified model is correct, we need to conduct a series of tests on the model parameters and residuals (White, 1982).

Table 3. Diagnostic Tests

Tests	Statistic Test	p-value	H_0
Quasi LR Test (Likelihood Ratio)	31.31	0.008	The parameters are equal to zero across the entire distribution of the variable of interest
Ramsey RESET Test	2.24	0.324	The model is correctly specified

Source: prepared based on the output of Eviews 13

The first test (Table 4) is the test of equality of parameters (Quasi LR). The p-value of the test is below the 5% significance threshold, so we reject H_0. The effect of the explanatory variables on the dependent variable changes significantly depending on the quantiles of the conditional distribution of the variable of interest. The second test concerns specification errors, particularly the functional form (Eboulet & Matei, 2013). The results of this test show that H_0 is accepted (p-value = 0.324 > 0.05), indicating that the model appears to be correctly specified (Ramsey, 1969).

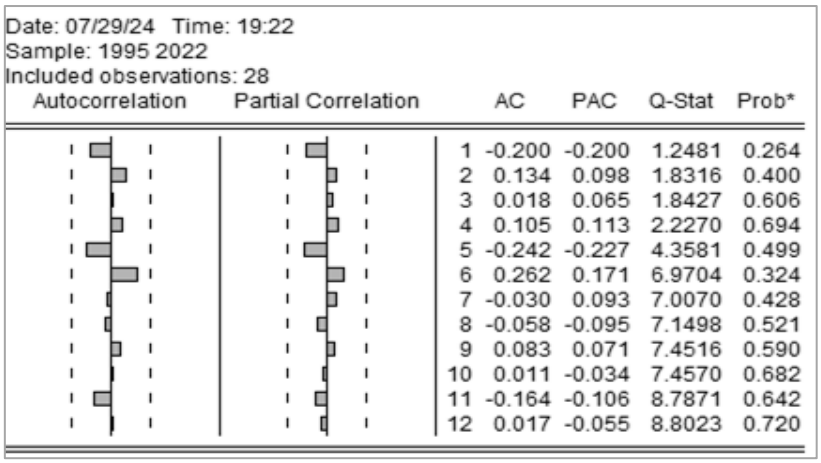

Figure 7. Heteroscedasticity Test

Source: prepared based on the output of Eviews 13

The heteroscedasticity test shows that the p-values for the different lags are all greater than 0.05. This means that at the 5% significance level, we accept the null hypothesis, confirming that the errors of the model are homoscedastic. Finally, the model is accepted both statistically and empirically.

DISCUSSIONS

The results of our quantile regression (QR) highlight the effects of Foreign Direct Investments (FDI), Oil Exports (HYDRO), Gross Fixed Capital Formation (GFCF), Manufactured Exports (MANU), and Trade Openness (OPEN) on export diversification in Algeria between 1995 and 2022. We observe a growing negative impact of FDI on the HHI across the distribution quantiles. It can be said that foreign investments have been concentrated in the hydrocarbons sector in Algeria, contributing to the country's continued focus on this sector, which hinders the export diversification process. These results align with those found by Arawomo et al. (2014). Oil exports, for their part, also have a negative impact, meaning that as oil exports decrease, the level of export diversification increases. This is reflected in the natural resource curse phenomenon, which paralyzes specialization in the production of other products, and these results are similar to those of Osakwe and Kilolo (2018). Gross Fixed Capital Formation has a positive impact, indicating that local investments promote export diversification (Arawomo et al., 2014). The manufacturing

sector positively influences the creation of a more diversified export structure (Abiola, 2024). Trade openness has a significantly negative effect, as shown by Agosin et al. (2011). This is because trade liberalization can lead to greater specialization in the hydrocarbons sector rather than in the production of other new products. However, our results regarding trade openness contradict those of Arawomo et al. (2014), who assert that openness guarantees diversification. This difference could be explained by the more sensitive methodology we employed. These conclusions highlight the complexity of export diversification, with links that depend on geographical and temporal realities. Our analysis suggests that national specifics must be considered to optimize their impact on the diversification of the export basket.

CONCLUSION

This study provides innovative perspectives on Algeria's foreign trade by utilizing quantile regression (QR) to assess the impacts of Foreign Direct Investments (FDI), Oil Exports (HYDRO), Gross Fixed Capital Formation (GFCF), Manufactured Exports (MANU), and Trade Openness (OPEN) on export diversification in Algeria from 1995 to 2022. The QR analysis deepens our understanding of the relationships between these variables. Our results highlight the growing sensitivity of local investments and manufactured exports across the distribution quantiles, reinforcing the importance of industrial orientation as a lever for export development. Additionally, we have confirmed that trade openness, foreign investments, and oil resources negatively impact export diversification, contrary to some findings in the existing literature. These findings contribute to advancing the academic discourse on the interrelationships of foreign trade and provide policymakers with insights to design more targeted interventions that capitalize on Algeria's comparative advantages. Our methodology and the Algerian case study offer new perspectives for research on export diversification. Future studies could involve comparing QR estimates across different countries or exploring sectoral heterogeneities.

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