



How trade openness and commercial risk impact Algeria's non-hydrocarbon exports

Youcef Hadj Hamdri ¹, Souria Hammache²

¹ Mouloud Mammeri University of Tizi-Ouzou (Algeria),

youvefhadjhamdri@ummto.dz

² Mouloud Mammeri University of Tizi-Ouzou (Algeria),

souria.hammache@ummto.dz

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Abstract:

This study aims to analyze the interactions between economic openness, trade risk, and non-hydrocarbon exports in Algeria. We applied the regression method for the period from 1995 to 2024. The results clearly suggest that economic openness exacerbates trade risk in Algeria and negatively influences non-hydrocarbon exports in the country. The study also suggests that structural competitiveness improves the performance of non-oil exports and that a consistent devaluation policy stimulates exports.

Keywords : Non-oil exports, trade risk, trade openness, Algeria, OLS method

JEL Classification Codes: F10- F11-F14

Corresponding author: Full name, e-mail:
souria.hammache@ummto.dz

1. INTRODUCTION

The Algerian economy is currently at a decisive crossroads in its contemporary history. Since independence in 1962, the country has built its development model around the exploitation and export of

hydrocarbon resources, making the oil and gas sector the central pillar of its national economy. This strategy, which has long enabled the financing of public spending and ensured relative macroeconomic stability, is now revealing its structural limitations in the face of the contemporary challenges of globalization and volatile fluctuations in energy commodity prices. Excessive dependence on hydrocarbons, which account for more than 95% of export revenues and around 60% of budget revenues, exposes Algeria to chronic vulnerability to external shocks (Bank of Algeria, 2024).

In this complex context, Algeria's international trade policy has undergone contradictory developments. On the one hand, the country has embarked on a process of gradual trade liberalization, notably through the association agreement with the European Union signed in 2002 and its negotiations for accession to the World Trade Organization (WTO) begun in 1987. These initiatives demonstrate an official desire to become more integrated into the global economy and to benefit from the theoretical advantages of trade liberalization: access to foreign technologies, improved productivity through competition, and the development of new export sectors.

Paradoxically, this liberal orientation coexists with a rise in protectionism, which has become particularly pronounced since the 2014 oil crisis. Faced with a deteriorating trade balance and dwindling foreign exchange reserves, Algeria has adopted a series of protectionist measures: import restrictions, import licenses, additional customs duties, and quotas on certain products. This protectionist approach, justified by the need to preserve foreign exchange and protect nascent industry, conflicts with the stated objectives of economic diversification and improved competitiveness.

This ambivalence in Algerian trade policy raises fundamental questions about the effectiveness of the strategies implemented to develop non-hydrocarbon exports.

Despite decades of declared commitment to economic diversification and explicit trade liberalization policies, including the EU Association Agreement (2002) and ongoing WTO accession negotiations, Algeria's non-hydrocarbon exports have remained stubbornly stagnant at 3-5% of total exports. This persistent failure

occurs paradoxically in a context where the country has simultaneously pursued trade opening measures and implemented protectionist policies, particularly since 2014.

The fundamental research problem lies in the unresolved contradiction between theoretical expectations and empirical reality. Conventional trade theory posits that trade liberalization should stimulate export diversification through enhanced competitiveness, technology transfer, and market access. However, in Algeria's case, neither the liberalization initiatives nor the subsequent protectionist measures have succeeded in developing a viable non-hydrocarbon export base. This raises a critical but under-explored question in the literature on resource-dependent economies: Can trade openness itself constitute a source of commercial risk that paradoxically undermines the very export diversification it is theoretically meant to promote? This question converges on a central knowledge gap: We lack a comprehensive understanding of how trade openness operates as a double-edged mechanism in resource-dependent developing economies, simultaneously offering opportunities for diversification while potentially generating commercial risks that disproportionately harm nascent export sectors unable to compete with established international producers.

2.Literature review

Several studies consider economic openness to be a major asset that contributes to the expansion of exports. However, the positive effects are not evident for certain countries, particularly single-product countries and some developing countries. Developing countries face challenges in diversifying exports, frequently remaining reliant on primary commodities or a narrow range of products. The structural dependence on such commodities increases vulnerability to global price volatility and commercial risks such as exchange rate fluctuations, tariff barriers, and competitive pressures from low-cost imports. Institutional weaknesses, governance issues, and limited access to finance further exacerbate commercial risks, impeding the stable environment necessary for expanding export sectors beyond traditional goods. Gnanngnon, S.K (2016), investigate how trade openness affects the structural vulnerability of developing countries.

The author employs fixed-effects regressions supplemented by instrumental variables technique based on the two-step generalized methods of moments approach. The author performed the analysis on two samples: developing countries and developed countries. The author finds empirical evidence that although trade policy liberalization reduces the structural vulnerability on the entire sample; no statistically significant effect of such liberalization is obtained on developing countries. In the Algerian context the results remain mixed some studies claim that trade openness harms non- oil exports, while others confirm the opposite. According to Elhannan, F.E, and al (2018), Algeria faces significant commercial risks related to its export and import structure, including dependence on hydrocarbons, volatility in oil revenues, and competition from low-cost imports such as Chinese products, which challenge domestic production. Belhadi A, Sidi Mohammed, A, Zenasni S (2021), have studied the relationship between trade openness and the diversification of national exports beyond the hydrocarbons sector. The research employs a Vector Error Correction Model (VECM) to analyze the case of Algeria over the period from 1990 to 2016. The findings reveal that trade liberalization policies exert a positive long-term impact on Algeria's export diversification outside the hydrocarbons industry. Belghit, H and ait-yahia, S, (2024), studied the impact of trade openness, commercial risk on non-oil exports, the results highlight that trade openness positively impacts non-oil export growth and economic growth, but the relationship is nuanced and influenced by commercial risks and institutional factors.

3.Research methodology

3.1. Variables and data sources

Our analysis is based on a theoretical model of the determinants of non-hydrocarbon exports. We adopt an approach that combines international trade theories with the specificities of rentier economies. The conceptual model assumes that non-hydrocarbon exports depend on factors such as competitiveness, trade risk and macroeconomic control variables. In this study, we assume that trade risk is widely related to trade openness.

We applied multiple regression techniques to identify the relationship between non-hydrocarbon exports and commercial risk, for the period 1995 to 2024.

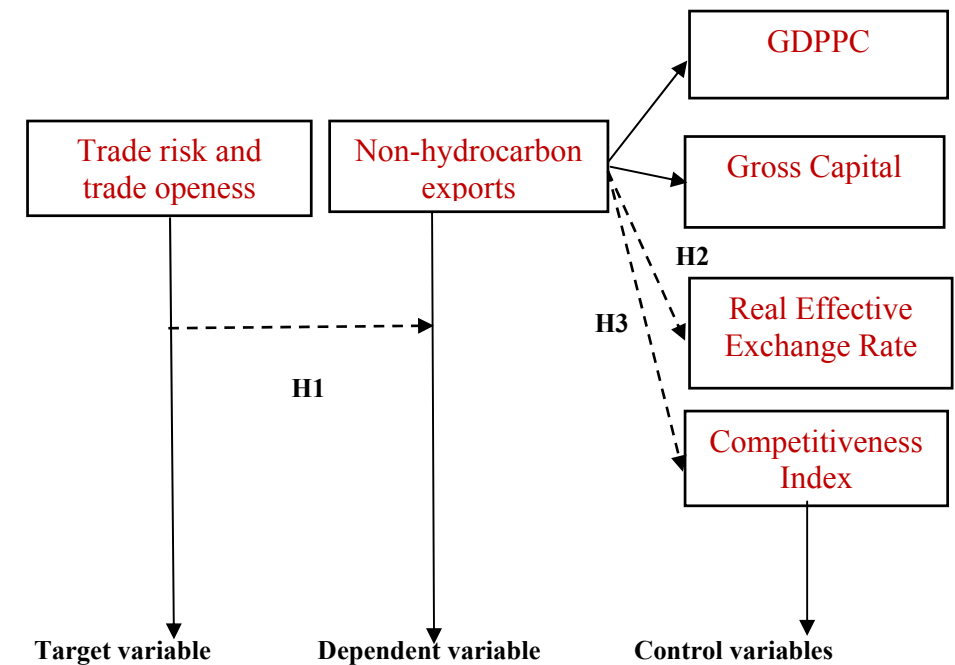
The equation to estimate in the model is:

$$NHEXP = f(GDPPC, GCF, COMPI, REER, COMRISK) \dots \dots \dots (1)$$

After logarithmic transformation, the equation to estimate become:

$$\text{LogNHXP} = \beta_0 + \beta_1 \log GDPPC + \beta_2 \log GCF + \beta_3 \log COMPI + \beta_4 \log REER + \beta_5 \text{COMPIRISK} \dots \dots \dots (2)$$

Figure 1: Theoretical framework



The following table highlights the model's variables and the data sources

Table 1 : Définition and Variables sources

Variables	Definition	Source
NHEXP	Non-hydrocarbons exports on millions of dollars	Bank of Algeria

GDPPC	GDP per capita on dollars	World Bank
GCF	Gross capital formation on % of GDP	World Bank
COMPI	Competitiveness Index	World Economic Forum
REER	Real effective exchange rate	World Bank
COMRISK	Trade risk (trade openness): Imports + Exports/ GDP	World Bank

3.1. Research hypothesis

In this study, we estimate the following hypothesis:

H₁: trade openness leads the country to be exposed to a high trade risk that discourages the development of non-hydrocarbon exports: We expect to find a negative correlation between trade risk and non-oil exports in Algeria. According to literature review, some developing countries tend not to take advantage from trade openness.

H₂: Depreciation improve competitiveness of Algerian non-oil exports: depreciation makes Algerian non-oil goods cheaper relative to foreign competitors, improving their price competitiveness in international markets and boosting export volumes.

H₃: Improving structural competitiveness impact positively the non-hydrocarbon exports: The hypothesis suggests that as Algeria improves its structural competitiveness, non-hydrocarbon exports should increase through several channels. Better infrastructure reduces transaction costs and improves logistics efficiency, making exports more competitive

3.2. Descriptive statistics

These data reveal distinct characteristics for each variable studied on a sample of 30 observations. The NHEXP variable shows the highest variability, with a standard deviation of 1869.419 and

values ranging from 150 to 7000. This wide dispersion is confirmed by a high skewness coefficient (1. and a kurtosis of 4.59, suggesting a highly asymmetric distribution with extreme values. Conversely, COMPI shows a more concentrated distribution around its mean (3.64), with a moderate standard deviation of 0.44. The Jarque-Bera test reveals very low p-values for NHEXP (0.0005) and COMPI (0.075), indicating non-normal distributions. For a better estimate, a logarithmic transformation was.

Table 2: Descriptive statistics

	NHEXP	GDPPC	GCF	COMI	REER	COMRISK
Mean	1987.24	3836.512	31.8066	3.64000	105.2351	55.73498
Median	1613.00	4243.555	31.2551	3.80000	102.0140	54.86033
Max	7000.00	6164.645	43.3866	4.10000	135.4545	71.02849
Min	150.000	1466.545	20.6772	2.80000	86.80314	40.38976
Std.Dev	1869.419	1582.99	6.68207	0.437548	12.03248	7.730263
Jarque-Bera	15.10304	2.406334	2.148561	5.186800	4.423742	0.920640
Probability	0.000525	0.300242	0.341543	0.074765	0.109496	0.631082
Obs	30	30	30	30	30	30

Source: Eviews outcomes

3.3. Stationarity analysis

The stationarity results indicates that all variables are stationary at first difference.

Table 3: Stationarity ADF test

	At level		At first difference		Result
	S-statistic	Prob	S-statistic	Prob	
NHEXP	0.855239	0.9929	-4.665101	0.0012	I(1)
GDPPC	-1.310268	0.6111	-4.0742681	0.0007	I(1)
GCF	-1.256201	0.6358	-4.523679	0.0013	I(1)
COMPI	-2.062947	0.2602	-5.761928	0.0001	I(1)
REER	-1.367011	0.5843	-4.488679	0.0014	I(1)
COMRISK	-1.413480	0.5619	-5.592910	0.0001	I(1)

Source: Eviews outcomes

Results and discussion

3.4. Correlation matrix

The table shows the correlation matrix, and as we can see, the relationship between GDPPC and non-hydrocarbon exports is positively correlated at 59.27%, which is very appreciable. The moderate positive correlation between non-hydrocarbon exports and gross fixed capital formation indicates that countries diversifying their exports invest more in their productive capacity. This logical relationship reflects the fact that developing non-oil sectors requires substantial investment in infrastructure, equipment and technology. The strong positive correlation revealed between NHEXP and COMI indicates that export diversification goes hand in hand with improved global competitiveness. Countries that succeed in exporting generally become more competitive. The strong negative relationship between NHEXP and REER indicates that depreciation stimulates exports.

Tableau 4 : Correlation Matrix

	NHEXP	GDPPC	GCF	COMPI	REER	COMRISK
NHEXP	1.00					
GDPPC	0.5927	1.00				
GCF	0.3697	0.6787	1.00			
COMPI	0.5289	0.5536	0.1493	1.00		
REER	-0.5708	-0.3695	- 0.6875	-0.6297	1.00	
COMRISK	-0.4068	0.1018	- 0.3208	0.3234	- 0.0257	1.00

Source: Eviews outcomes

These relationships reveal a virtuous circle: countries that diversify their exports invest more in their productive capacity, improve their global competitiveness, and maintain favorable price

competitiveness via their real exchange rate. This configuration is typical of economies making a successful post-oil transition.

3.5. Regression results and discussion

The model has excellent explanatory power, with an R^2 of 0.963, meaning that 96.3% of the variance in non-hydrocarbon exports is explained by the variables included. The adjusted R^2 (0.955) confirms the robustness of the model, even taking into account the number of variables. The F statistic (124.6) with a p-value < 0.001 attests to the overall significance of the model.

Table 5: Regression results

Variable	Coefficient	Std.Error	t-statistics	Prob
C	15.61526	4.895396	3.189785	0.0039
LOGGDPPC	1.512731	0.186160	8.125988	0.0000
LOGGCF	-1.213359	0.405138	-2.994924	0.0063
LOGCOMPI	2.716270	0.522993	5.193702	0.0000
LOGREER	-1.552932	0.738277	-2.994924	0.0461
LOGCOMRISK	-3.209166	0.344562	-9.313746	0.0000

Source: Eviews outcomes

General economic development, measured by GDP per capita, is a fundamental pillar, with a coefficient of 1.513, confirming that a country's enrichment naturally facilitates the diversification of its exports into non-oil sectors. The competitiveness index stands out as the most decisive factor (coefficient of 2.716), underlining that improving structural competitiveness - including the quality of institutions, innovation and market efficiency - considerably amplifies diversified export capacities. We confirmed our third hypothesis. Several variables show significant negative effects that merit attention. The real effective exchange rate (-1.553) confirms the crucial importance of price competitiveness: an overvalued currency directly penalizes non-oil exports. Then, the second hypothesis is

confirmed. More surprisingly, gross fixed capital formation (-1.213) and trade risk (trade openness) (-3.209) have negative effects. In the case of investment, this may be explained by a temporary substitution effect, whereby resources mobilized for investment are not immediately available for export. With regard to trade risk, the negative effect could reflect increased international competition, which puts emerging non-hydrocarbon sectors at a disadvantage, or persistent specialization in imports rather than diversified exports. The first hypothesis is also confirmed.

3.6. Interpretation of the negative relationship between non-hydrocarbons exports and trade risk

It seems that the relationship between non-hydrocarbons exports and trade risk follow a specific mechanism when it considering the Algerian case. Several factors tend to explain this result:

- **Massive substitution effect**

Trade openness (Trade risk) has facilitated access to foreign manufactured goods, then, Algerian consumers substituted imports for local products. Local production, already limited, concentrated on the domestic market, this generates a little surplus available for export

**Opening ↑ → Imports ↑ → Local demand for domestic products ↓
→ Residual export capacity ↓**

- **Precocious deindustrialization**

Algerian companies unable to compete with imports, this is due to the absence of compensatory industrial policies. As a consequence, manufacturing units started to gradually close (In agriculture sector, textile and pharmaceuticals sector). This situation leads to a reduction in non-hydrocarbon exportable supply.

**Opening + Oil rent → unfair competition → Closure of companies
→ Reduction of non- hydrocarbons export base**

- **Risk tolerance threshold**

Algerian companies have a low-risk absorption capacity, because of the informational asymmetry and the limited knowledge of international markets.

Opening ↑ → Risk Exposure ↑ → non- hydrocarbons export ↓

Companies in Algeria are highly exposure to international markets

Commercial risk ↑ → Transaction costs ↑ + Uncertainty ↑

→ Export profitability ↓ → Export disinvestment → Export HH ↓

The channels for transmitting commercial risks are, export insurance costs with high premiums to cover risks. Guarantee requirements with capital tied up for export operations, payment delays with longer cash flow cycles, and administrative complexity discouraging bureaucracy. The results confirm that the Algerian economy remains trapped in its dependence on hydrocarbons. Trade liberalization, rather than facilitating diversification, seems to have reinforced this dependence by limiting the development of non-oil sectors. This situation illustrates the risks of uncontrolled trade liberalization in a context of low industrial competitiveness.

The results obtained call for an integrated strategy aimed at stimulating the diversification of non-hydrocarbon exports. Strengthening structural competitiveness through institutional reforms, innovation, and market efficiency must be a major priority. At the same time, controlling the real effective exchange rate is essential to preserving the price competitiveness of exported products. Investments, while necessary, must be directed toward projects with high export potential in order to reduce the gap between resource

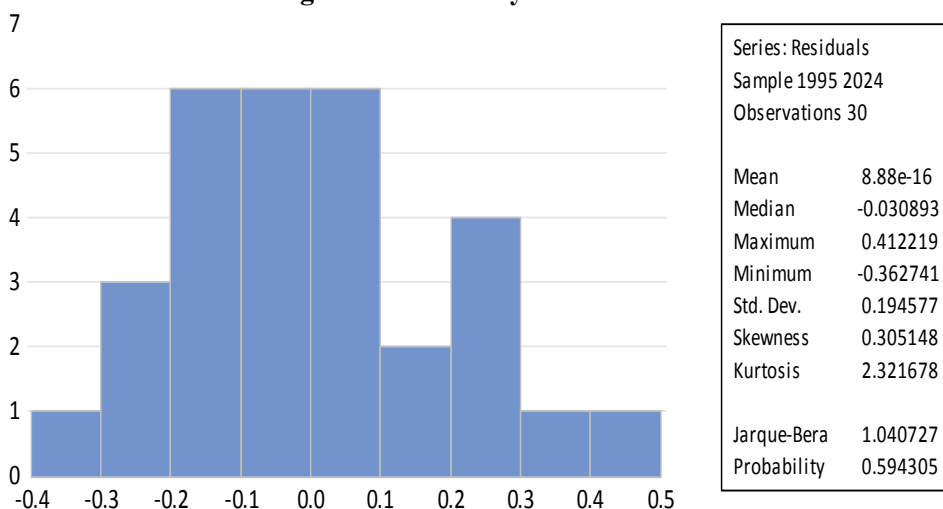
mobilization and commercial returns. Trade liberalization must be accompanied by measures to support nascent industries and commercial risk management instruments, such as credit insurance and stable agreements, in order to limit the negative effects of foreign competition, (Handley.K,2014). Finally, consistency between monetary, industrial, and trade policies appears essential to maximize the combined impact of these levers on export diversification and resilience.

3.7. Robustness Check

In order to rely on the results of the study, it is important to analyze the robustness of the model. The model's goodness-of-fit results confirm the validity of all the required conditions.

The normality test indicate the normality of the residuals with Jarque –Bera probabilité superior than 0.59%. The first condition is valid.

Figure 2: Normality test



Source: Eviews outcomes

The second important condition that we must check is the residual auto-correlation. The LM serial correlation indicates a probability superior to 5%. This highlights the absence of residual auto-correlation.

Table 6 : LM serial correlation test

Breusch-Godfrey Serial Correlation LM Test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.582073	Prob. F(2,22)	0.5671
Obs*R-squared	1.507691	Prob. Chi-Square(2)	0.4706

Source: Eviews outcomes

Figure 3: Correlograme residual

Date: 09/21/24 Time: 17:17

Sample: 1995 2024

Included observations: 30

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob	
		1	0.114	0.114	0.4291	0.512
		2	-0.159	-0.174	1.2930	0.524
		3	-0.098	-0.059	1.6343	0.652
		4	-0.294	-0.316	4.8323	0.305
		5	-0.290	-0.289	8.0615	0.153
		6	0.097	0.017	8.4357	0.208
		7	0.255	0.114	11.140	0.133
		8	0.227	0.141	13.390	0.099
		9	-0.003	-0.121	13.390	0.146
		10	-0.017	0.033	13.404	0.202
		11	-0.237	-0.144	16.237	0.133
		12	-0.255	-0.084	19.702	0.073
		13	0.006	-0.001	19.704	0.103
		14	0.089	-0.070	20.180	0.125
		15	0.085	-0.063	20.641	0.149
		16	0.217	0.056	23.867	0.092

Source: Eviews outcomes

Analysis of the correlogram reveals an absence of significant autocorrelation in the model's residuals, which is a very favorable result for the validity of the regression. The Ljung-Box Q statistic progresses gradually from 0.43 (lag 1) to 23.37 (lag 16), but the corresponding p-values remain systematically high (0.092 to 0.652),

indicating an absence of significant collective autocorrelation in the residuals. This absence of autocorrelation confirms that the model correctly captures the temporal dynamics of non-hydrocarbon exports. The residuals behave like white noise, validating the linear regression assumptions and reinforcing the reliability of the statistical inferences. This property guarantees that the standard errors of the coefficients are not underestimated and that the significance tests are valid, thus consolidating the robustness of previous conclusions on the determinants of non-hydrocarbon exports.

Table 7: Heteroscedasticity test

Heteroskedasticity Test: Breusch-Pagan-Godfrey

Null hypothesis: Homoskedasticity

F-statistic	1.509913	Prob. F(5,24)	0.2240
Obs*R-squared	7.178765	Prob. Chi-Square(5)	0.2077
Scaled explained SS	3.036165	Prob. Chi-Square(5)	0.6944

Source: Eviews outcomes

The third condition that needs validation is the heteroscedasticity hypothesis. The probability value of Breusch-Pagan Godfrey is superior to 5%, so we accept the null hypothesis which claim that residual are homoskedastic. All conditions are confirmed. The model is then good fitted.

4. Conclusion

This research demonstrates that economic openness can indeed constitute a significant trade risk for developing economies, Algeria in particular. The mechanisms identified - asymmetric competitive threat, vulnerability of small producers, and premature

deindustrialization - reveal the complexity of the effects of trade liberalization.

The implications for economic policy are significant: trade openness should not be seen as a universal panacea, but as a process requiring careful management and appropriate accompanying policies. Developing countries need to develop their productive capacities and competitiveness before embarking on extensive trade liberalization.

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