

Financial Factors Behind Export Diversification in Algeria

Soufi Karima ^{1*}, Lalali Rachid ², Touati Karima ³

¹ University of Bejaia (Algeria), Laboratory Research in Management and Quantitative Techniques (RMTQ), karima.soufi@univ-bejaia.dz

² University of Bejaia (Algeria), Economics and development Laboratory (LED), rachid.lalali@univ-bejaia.dz

³ University of Bejaia (Algeria), Economics and development Laboratory (LED), karima.touati@univ-bejaia.dz

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Abstract :

The objective of this study is to explore the financial factors that explain export diversification in Algeria, for the period (1995-2022), by applying an econometric model based on the Ordinary Least Squares (OLS) method. The results show that domestic credit provided to the private sector (CSP) and financial freedom (LIBF) positively affect export diversification, while the variables money supply % GDP (MAS) and GDP per capita (PIBH) have no effect on the concentration index. Our results support the important role of the banking sector for export diversification.

Keywords : Export diversification; financial development; financial determinant; concentration index; Algeria.

Jel Classification Codes : F13, C54, O24.

1. INTRODUCTION

The question of the determinants of export diversification has been widely studied, particularly in developing countries. The work of (Imbs & Wacziarg, 2003) represents the seminal studies in the empirical analyses of these determinants, however determining the actual factors that explain diversification is a complex task, given the non-existence of a comprehensive empirical and theoretical framework, integrating all possible indicators (Noureen & Mahmood, 2016).

Recent literature increasingly highlights the links between financial development and export diversification, underlining the importance of the financial dimension for the achievement of this objective, which mainly calls for investments in order to enter new markets and therefore leaves diversification attached to greater profitability, through the cooperation of resources and growth potential (Shakib, Sohag, Hassan, & Vasilyeva, 2023). This is consistent with findings that view diversification as a response to excess resources, as in (Hamdad & Gheddache, 2022), who argue that financial resources were a key driver of diversification for CEVITAL, an Algerian company specializing in the agri-food industry.

(Berthelemy, 2005) sees export diversification as an important issue for developing countries. Algeria, like these countries, has undertaken a number of structural reforms since the 1990, including the liberalization of foreign trade, although the results continue to show large shares of hydrocarbon exports and negligible shares of non-hydrocarbon exports.

The sharp fall in oil prices since 2014 and the damaging consequences of the Covid 19 health crisis have amplified the weakness of the Algerian economy and revealed aspects of its vulnerability, reaffirming the imperative need to diversify the national economy in order to generate alternative resources.

The objective of our research is to contribute to the existing literature by empirically exploring the effects that finance can have on the diversification of exports in Algeria, paying particular attention to credits granted to the private sector. The main question to be answered is as follows:

What are the main financial determinants of export diversification in Algeria?

It is assumed in this work that credit granted to the private sector has an impact on export diversification.

The methodology adopted for our study consists of presenting an empirical study based on a multiple regression model using Eviews, carried out on the basis of annual quantitative data drawn from the UNCTAD, World Bank and Heritage Foundation databases for the period 1995-2022.

To address our theme, the framework of our work consists of two axes, the first will be dedicated to the presentation of a review of the literature on the subject and the second axis will be devoted to the empirical study, using an econometric model based on the method of ordinary least squares (OLS), carried out in Eviews which will allow us to highlight the financial factors likely to impact the level of diversification of exports in Algeria.

2. Literature Review

The literature review of the financial determinants of export diversification is both complex and contextual, highlighting several interacting mechanisms, including the crucial importance of financial development for the allocation of resources to productive sectors, thereby promoting a structural transformation of the economy. In what follows, we attempt to support the part of the literature, which has highlighted the crucial importance of financial development measured by domestic credit provided to the private sector, for export diversification.

(Chaney, 2016) proposes a model of international trade with liquidity constraints. Suggests that domestic credit should reduce credit constraints, which will facilitate export diversification. In the same vein, the results of the study by (Diop, 2019), exploring the explanatory factors of export diversification of countries in the UEMOA region, over the period 1995-2015, corroborate that credit granted to the private sector has a significant and positive impact on manufacturing exports in the region and the deepening of the financial market is favorable to the export diversification dynamic.

The study by (Shakib, Sohag, Hassan, & Vasilyeva, 2023) conducted on panel time series data from 2009 to 2019, explores the effect of financial development on export concentration in a regional context, The authors used the method of moment quantile regression (MMQR) and confirm that bank

credit provision as an indicator of financial development stimulates export diversification, this supports (Beck, 2003) arguing that trade patterns depend on levels of financial development.

The empirical study conducted by (Altowaim, 2018) , analyzing the effect of financial development on export diversification in resource-dependent countries during the period from 1995 to 2013. The author used two methods: fixed-effect panel estimates and panel cointegration. The results of the first method used suggest that financial development has no significant impact on export concentration and on the other hand the results of the second method adopted indicate that financial development has a positive impact on export concentration. In the same vein, the empirical study by (Noureen & Mahmood, 2016) exploring the determinants of export diversification in the ASEAN and SAARC region, support that export product diversification is significantly and positively influenced by financial sector development, real depreciation of the domestic currency, foreign direct investment and domestic investment.

The available literature on the case of Algeria is mainly devoted to studying the effects of financial development on economic growth. Nevertheless, we can cite the study carried out by (Dermechi & Zakane, 2017), devoted to the analysis of fiscal and financial factors that promote export diversification in Algeria. The authors suggest that stock market deepening has a negative effect on diversification, but once associated with public spending it becomes positive. This is explained by the role of spending in encouraging the expansion of investment in real goods. Similarly, credit to the private sector has a negative impact on export diversification.

3. Econometric Study of the Financial Determinants of Export Diversification in Algeria (1995-2022)

3.1. Methodology and data of the study

Obtaining a conclusive empirical measure of financial development is considered to be a major constraint in econometric analyses of the effects of financial development on a given economic variable. However, credit to the private sector as a percentage of GDP is the ratio most widely used in the literature to measure the level of financial development. The number of financial variables used varies from one study to another. Ang and Mc

Kibbin, (2007), used three financial variables, namely: money supply (M2) as a percentage of GDP, credit granted to the private sector as a percentage of GDP and finally the ratio of assets issued by commercial banks divided over the same assets while adding assets issued by the central bank (Lo & Ramde, 2019).

Our study aims to recover the time series of export diversification represented by the Herfindahl-Hirschman (HH) index and highlights the financial determinants, for the period spanning 1995 to 2022. This index is considered to be the most appropriate measure for empirical analysis and the most widely used in the literature on export diversification.

The Herfindahl-Hirschman index (HHI) does not represent an index of diversification but rather of export concentration, and can take a value between 0 and 100. An index value close to 100 indicates that exports are highly concentrated on a few products, while a value close to 0 indicates a high level of export diversification.

In order to explore the effect of financial variables on export diversification in Algeria, our research method will consist of constructing an econometric model using Ordinary Least Squares (OLS). The estimation of equation (1) is based on annual data from 1995 to 2022, with a total of twenty-eight (28) observations for each variable.

Among the indicators identified in the empirical literature, four (04) quantitative variables were selected, namely:

- *Domestic credit provided to the private sector % GDP (CSP)*: It indicates the level of financing by financial companies for the private sector. It is the most used ratio assessing the level of financial development;
- *Money supply % GDP (MAS)*: This is an indicator of the depth of the financial system estimating the rate of liquidity in the economy and the degree of development of financial intermediation;
- *Financial freedom (LIBF)*: A degree close to 100 indicates that governments intervene little in the financial field, reflecting a high level of bank independence;
- *GDP/Capita (PIBH)*: This remains the most widely used indicator for assessing the economic performance of different countries.

We consider that the indicators we have selected are appropriate due to the fact that the Algerian financial system is a "bank-based" system in which banks dominate the financing of the economy.

GDP per capita (PIBH) is included in the equation as a control variable.

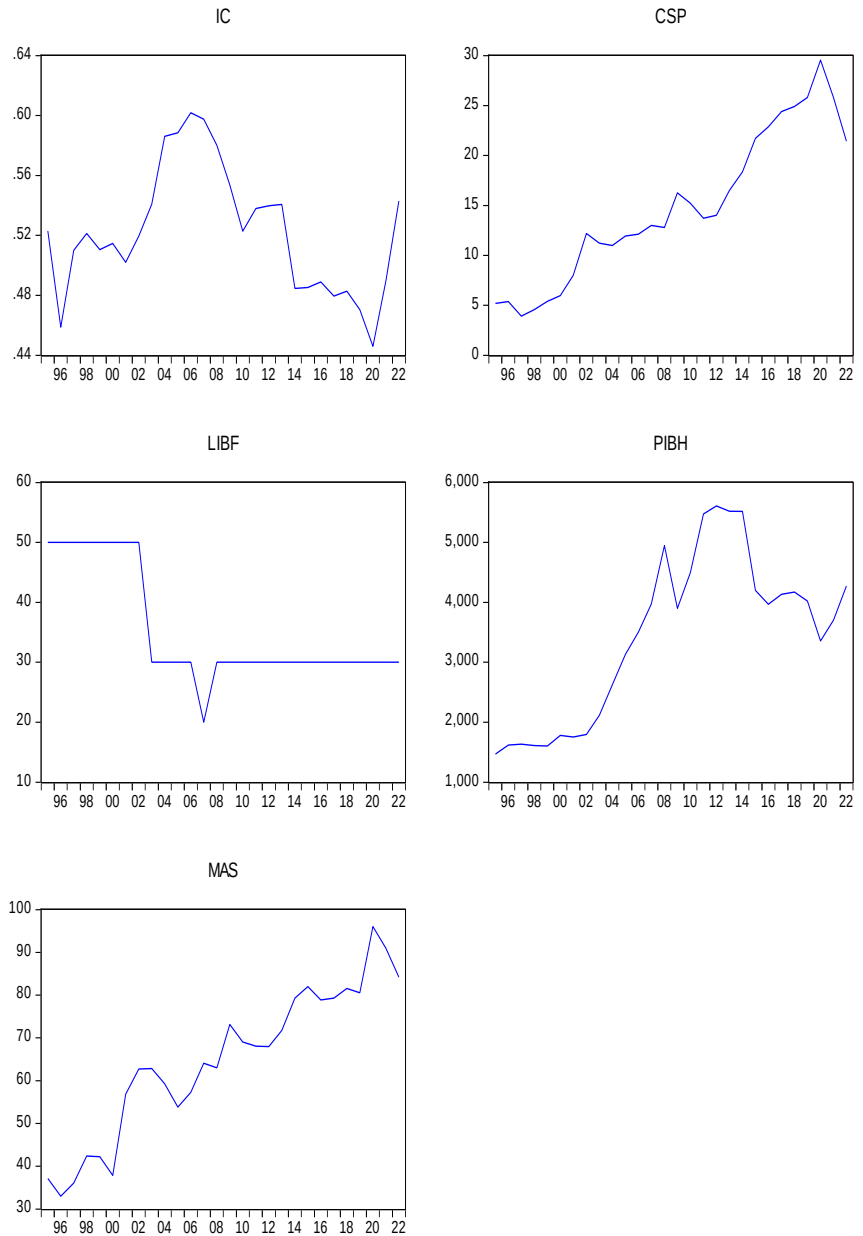
The formula for our model adopts the variable to be explained and a set of variables likely to influence it. On the one hand, we have the concentration index (IC) which represents the variable to be explained and, on the other hand, four exogenous variables, namely: CSP, MAS, LIBF, PIBH.

The data of the different exogenous variables come from the databases: statistical Financial Structure and Economic Development database of the (World Bank, 2023), and from (Heritage foundation, 2022), as for the data related to the values of the concentration index, these are extracted from the database of the (UNCTAD, 2023).

Before beginning the econometric study of the series of variables, it is essential to carry out a graphical analysis of the evolution of the different variables.

The graphical presentation of the different variables in our study is given in Fig.1.

Fig.1. Graphical evolution of time series



Source: Eviews 9 software output

- *Concentration index (IC):* The overall trend of the curve supports that the value of the concentration index (IC) was constantly above 0.5 for the period (1997-2013) with the recording of a peak in 2006 (0.60) which can

be justified by the increase in oil prices during these years with a dominant share of hydrocarbons in Algeria's total exports, which gave rise to an index very close to 100. Between 2014 and 2018 the index recorded a decline, following the 2014 oil counter-shock and stabilized at a value close to 0.48 from (2017- 2022) and diversification improved slightly.

- *Domestic credit to the private sector (CSP)*: We note that the rates of credit granted to the private sector are low throughout the period (1995-2022), which means that the financial sector is shallow. From the year 2012 until 2020, the ratio recorded a maintained increase but access to credit for small and medium enterprises remains limited.

- *Index of Financial Freedom (LIBF)*: The direction of the curve reveals that state intervention in the supply of financial services is significant. The index was fixed at 50 from 1995 to 2002, after which it fell during the period (2003-2006) from 50% to 30%, which may be linked to excessive state control over financial institutions and the supply of credit. Finally, for the rest of the period (2008-2022), the index stabilized at 30.

- *GDP per capita (PIBH)*: The curve shows a number of fluctuations which can be explained by the rentier nature of the Algerian economy, which is highly exposed to fluctuations in world commodity prices. GDP per capita showed an upward trend from 1995 to 2008, which could be explained by the economic recovery (2001-2004) and the implementation of government spending programs. From 2010 to 2012, the ratio rose steadily as a result of the increase in the volume of exports linked to the rise in oil prices. During the period (2013 to 2016), the GDP per capita shows a slight increase to return to a decline between 2017 and 2018.

- *Money supply (MAS)*: This index saw its lowest level during 1996, (33%), which can be justified by the adoption of the IMF's structural adjustment program in 1994, which provides for a reduction in the volume of money supply. For the period 2000-2022, the index is expected to fluctuate, peaking at 96.01% in 2020. The upward trend in the index during this period can be explained by the cumulative effects of the Algerian government's adoption of an expansionary economic policy, and the application of wage increase policies on several occasions, requiring massive injections of liquidity.

The statistical characteristics of the variables used in our study are described in Table 1.

Table 1. Descriptive statistics of study variables

	IC	CSP	LIBF	PIBH	MAS
Mean	0.522118	14.75780	35.35714	3424.689	64.68963
Median	0,520450	13.35300	30.00000	3799.395	66.02395
Maximum	0,601800	29.54520	50.00000	5610.733	96.01160
Minimum	0,445900	3.907400	20.00000	1466.545	33.00580
Std. Dev.	0,042217	7.465555	9.615629	1392.304	17.48973
Skewness	0.295027	0.279430	0.787962	-0.037699	-0.280261
Kurtosis	2.308113	2.013534	1.972597	1.740330	2.156939
Jarque-Bera	0.964683	1.499680	4.128941	1.857863	1.195760
Probability	0.617336	0.472442	0.126885	0.394976	0.549976
Sum	14.61930	413.2185	990.0000	95891.30	1811.310
Sum Sq. Dev.	0.048122	1504.832	2496.429	52339747	8259.049
Observation	28	28	28	28	28

Source: Eviews 9 software output

From the results in Table 1, we can suggest that the variables we have selected are normally distributed, given that the p-values of the Jarque Bera statistic are above the critical threshold of 5%. In addition, we note that all the series display a significant level of harmony since their own mean and median values lie within their maximum and minimum values.

3.2. Estimating the Effect of financial variables on export diversification

After presenting the descriptive analysis of the different variables chosen in the framework of our study and their evolutions during the period (1995-2022), we empirically test in what follows, the effect that financial variables can exert on export diversification. The results obtained are shown in Table 2.

Table 2. Multiple regression estimation results

Dependent Variable: IC
Method: Least Squares
Date: 05/20/24 Time: 11:26
Sample: 1995 2022
Included observations: 28

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CSP	-0.008137	0.002122	-3.834987	0.0008
LIBF	-0.004776	0.000884	-5.401038	0.0000
PIBH	-5.54E-06	5.73E-06	-0.965870	0.3442
MAS	0.001068	0.001004	1.063279	0.2987
C	0.760979	0.061962	12.28145	0.0000
R-squared	0.726900	Mean dependent var	0.522118	
Adjusted R-squared	0.679404	S.D. dependent var	0.042217	
S.E. of regression	0.023904	Akaike info criterion	-4.469121	
Sum squared resid	0.013142	Schwarz criterion	-4.231227	
Log likelihood	67.56769	Hannan-Quinn criter.	-4.396394	
F-statistic	15.30456	Durbin-Watson stat	2.022813	
Prob(F-statistic)	0.000003			

Source : EvIEWS 9 software output

The coefficient of determination (R^2) is used to assess the quality of a multiple linear regression. It is used to estimate the fit between the model and the observed data. This coefficient can take a value between 0 and 1.

From the estimation results of the multiple regression shown in Table 2, the coefficient of determination (R^2) shows that the concentration index is 72% explained by the linear composition of the explanatory variables (CSP, LIBF, PIBH, and MAS).

It is essential to refer to the student test, which is used to check whether the explanatory variable has an effect on the endogenous variable (to be explained). If the p-values of the variables are less than 5%, this indicates that the variables are significant at the 5% threshold. From our results, we can see that the p-values of the variables (CSP and LIBF) are below 5%, which indicates that the coefficients corresponding to these variables are significant.

From the results of the estimation of the multiple regression model, equation (1) obtained is given as follows:

$$IC = -0.008137 \cdot CSP - 0.004776 \cdot LIBF - 5.54e-06 \cdot PIBH + 0.001068 \cdot MAS + 0.760979$$

It follows from the estimation of the model, all other things being equal and depending on the significance of the variables, that a:

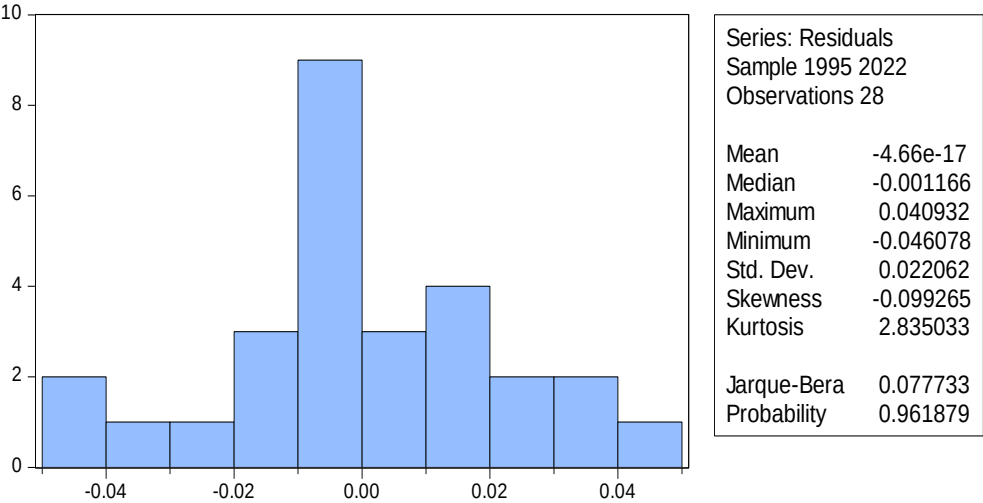
- An increase of 1% in credit provided to the private sector (CSP) generates a 0.0081% decrease in the concentration index which means a 0.0081% increase in export diversification; This result testifies to the statements of some authors including (Chaney, 2016) who suggests that domestic credit should reduce liquidity constraints, which will facilitate export diversification.
- An increase of 1% in the financial freedom index (LIBF) leads to a 0.0047% decrease in the concentration index hence a 0.0047% increase in export diversification.

3.3. Validation tests

Validation of the model, requires a series of statistical tests to be carried out on the coefficients as well as on the residuals. The results of these various tests are summarized in the figures and tables below:

3.3.1. Residuals normality test

Fig.2. Results of the residual normality test



Source: Eviews 9 software output

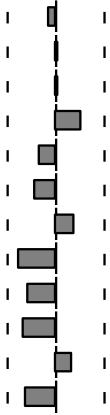
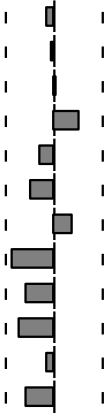
We note that the value of jarque-Bera is equal to 0.077, which is less than the critical value of 5.99 (0.077<5.99), so the probability of jarque-Bera is equal to 0.96 which is greater than the 5% threshold (0.96>0.05), so

we accept H0 and can state that the residuals follow a normal distribution and the hypothesis that the OLS regression is based on this is validated.

3.3.2. Correlogram of the residual series

Table 3. Correlogram of the residual series

Date: 05/20/24 Time: 11:31
Sample: 1995 2022
Included observations: 28

Autocorrelation	Partial Correlation	AC	PAC	Q-Stat	Prob
		1 -0.05...	-0.05...	0.1087	0.742
		2 -0.00...	-0.01...	0.1103	0.946
		3 0.004	0.003	0.1108	0.991
		4 0.189	0.190	1.3605	0.851
		5 -0.12...	-0.10...	1.9158	0.861
		6 -0.16...	-0.18...	2.9842	0.811
		7 0.153	0.142	3.9159	0.789
		8 -0.28...	-0.33...	7.3233	0.502
		9 -0.21...	-0.22...	9.3697	0.404
		1... -0.25...	-0.26...	12.291	0.266
		1... 0.116	-0.05...	12.954	0.296
		1... -0.23...	-0.20...	15.950	0.194

Source: EvIEWS 9 software output

The structure of the correlogram of the residual series shown in Table 3 reveals that it is stationary, since the terms of the auto-correlation have no distinctive context. Moreover, the probability associated with the Ljung-box Q statistic for the lag $h=5$ is equal to 0.86, which is greater than the critical threshold of 5% ($0.86 > 0.05$).

3.3.3. Test of Breusch-Godfrey

The hypothesis tested in our case is that of the auto-correlation of the residuals of order 2. The test regresses the residuals on all the explanatory variables in the model as well as on the lagged residuals from the second period.

If the probability associated with the Fisher statistic is below the critical threshold of 5%, the residuals in the model are considered to be auto-correlated and vice versa.

Table 4. Results of the second-order auto-correlation test for residuals

F-statistic	0,053745	Prob. F (2,21)	0,9478
Obs*R-squared	0,142590	Prob. Chi-Square (2)	0,9312

Source: Eviews 9 software output

The results of the Breusch-Godfrey second-order auto-correlation test indicate that the probability associated with the Fisher statistic is equal to 0.94, which is greater than the critical threshold of 5% ($0.94 > 0.05$), so we accept $H_0=0$ and the residuals are not auto-correlated.

3.3.4. Test of Breusch-Pagan-Godfrey

This is a crucial test, as it verifies not only heteroskedasticity but also model misspecification.

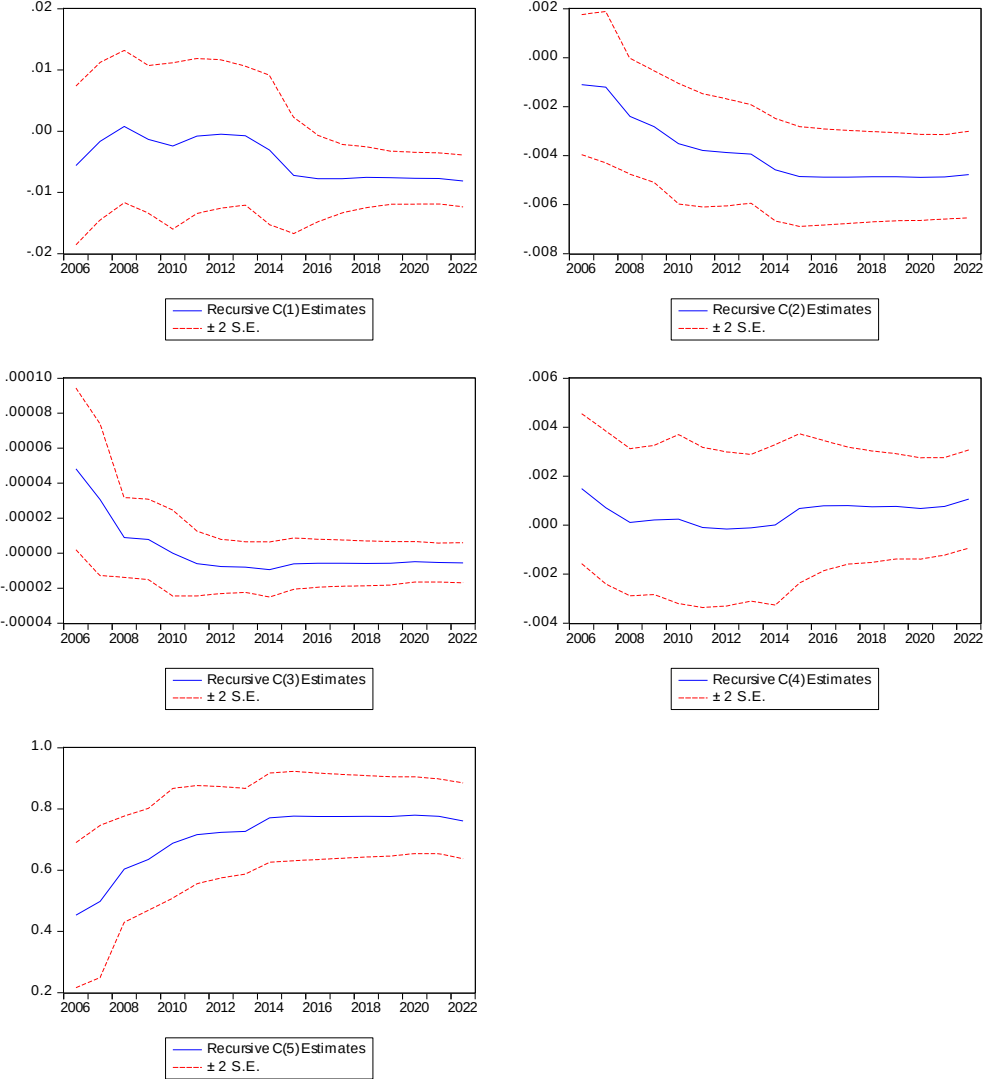
Table 5. Result of Heteroscedasticity of residuals

F-statistic	0,284294	Prob. F (4,23)	0,8851
Obs*R-squared	1,319164	Prob. Chi-Square (4)	0,8581
Scaled explained SS	0,816681	Prob. Chi-Square (4)	0,9362

Source: Eviews 9 software output

According to our results, the probability associated with the Fisher statistic is equal to (0.88) which is greater than 5%, so we can say that there is no heteroskedasticity in the model and therefore the estimate is ideal.

3.3.5. Test of coefficients stability



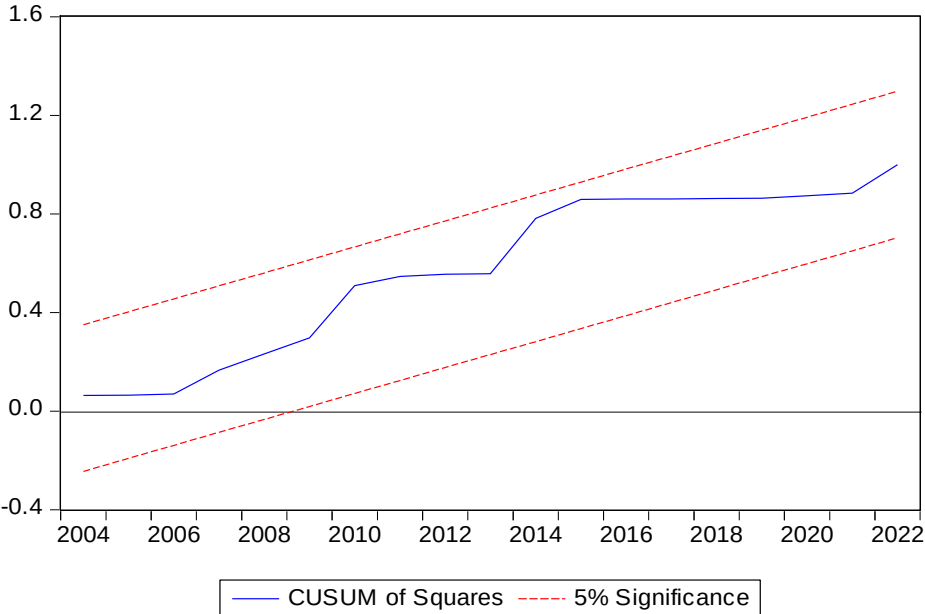
Source: EvIEWS 9 software output

Fig.3. shows that all the coefficients associated with the variables in the study are within the confidence interval, which suggests that the parameters are stable.

3.3.6. Test of CUSUM Squares

The CUSUM test is another test used to check the stability of the coefficients. This test is based on the cumulative sum of the square of the alternative residuals. If the value of the statistic changes between two lines representing the limits of the interval, this indicates a stable relationship.

Fig.4. Results of CUSUM SQUARES test



Source: Eviews 9 software output

We note that the CUSUM statistic evolves within the confidence interval, which allows us to conclude in favor of the stability of the parameters and the estimated model.

4. CONCLUSION

Our analysis adds to the existing literature dealing with the effect of financial development on export diversification, while highlighting the case of Algeria. Our study is based on an econometric model, using the ordinary least squares (OLS) method, carried out in Eviews for the period of (1995-2022).

The results of the analysis of the variables used in our study show the negative effect of financial indicators on the concentration index (IC), which means that they have a significant and positive effect on export diversification, namely domestic credit provided to the private sector (CSP), thus confirming our main hypothesis, and financial freedom (LIBF). As for the variables money supply % GDP (MAS) and GDP per capita (PIBH), the estimation of the equation shows that they are not statistically significant in explaining the endogenous variable concentration index (IC).

Several obstacles to export diversification remain in Algeria. Our results point to the importance of the financial sector, since the state must take ownership of the issue of export diversification in general and bank financing in particular.

At the end of this work, we would like to emphasize the need to act by speeding up structural changes aimed at promoting the banking sector in particular, in order to respond actively to exporting companies (active or potential). Indeed, poor access to bank finance, as measured by the ratio of credit to the private sector, is one of the obstacles to private sector development:

- The need to create a bank specializing in export financing by granting funds to investments in export activities;
- Put competition at the center of the financial sector development strategy since it is the driving force behind innovation;
- Outsource Algerian banks abroad, especially to African countries, which constitute a very buoyant market;
- Diversify the range of banking products for the benefit of exporting companies (active and potential) and comply with their requirements;
- Progressive liberalization of interest rates allowing the mobilization of savings towards productive investments which could stimulate exports;
- Strengthening the financial capacity of banks.

5. Bibliography List :

- Altowaim, S. (2018, August). Promoting and Financing industrial diversification in Resource-Dependent Developing Countries. *PhD Thesis*. (U. o. Glasgow, Éd.) Scotland: College of social Sciences.
- Beck, T. (2003). Financial dependance and international trade. *Review of international Economics*, 11(2), 296-316.
- Berthelemy, J. C. (2005). Commerce international et diversification économique. *Revue d'économie politique*, 115(5), 591-611.
- Chaney, T. (2016). Liquidity constrained exporters. *Journal of Economic Dynamics and Control*, 72, 141-154.

- Dermechi, F., & Zakane, A. (2017). Les facteurs budgétaires et financiers pour une diversification économique solide en Algérie. *Revue Finance et Marchés*, 4(2), 308-329.
- Diop, M. (2019). Facteurs de diversification des exportations: Une analyse empirique au cas des pays de l'UEMOA. *Finance & Finance internationale*,, ISSN: 2489-1290.
- Hamdad, A., & Gheddache, L. (2022). Analyse des déterminants de la stratégie de diversification de Cevital agro-industrie. *Journal d'études en économie et Management*, 05(01), 857-876.
- Heritage foundation. (2022). World Perspective .
- Imbs, J., & Wacziarg, R. (2003). Stages of diversification. *American Review Economic*, 93(1), 63-86.
- Lo, S. B., & Ramde, F. (2019). Développement financier et transformation structurelle des pays africains de la zone franc: une approche panel-VAR. 61, pp. 1-21.
- Noureen, S., & Mahmood, Z. (2016). Explaining Trends and Factors Affecting Export Diversification in ASEAN and SAARC Regions: An Empirical Analysis. *Nust Journal of Social Sciences and Humanities*,, 2(1), 1-28.
- Shakib, M., Sohag, K., Hassan, M. K., & Vasilyeva, R. (2023). Finance and export diversification Nexus in Russian regions: Role of trade globalization and regional potential. *Emerging Markets Review*,, 57, 101059.
- UNCTAD. (2023). Database.
- World Bank. (2023). Database.