



Developing a financial stability index: Case of Algeria.

محاولة بناء مؤشر للاستقرار المالي: حالة الجزائر

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A B S T R A C T

This article aims to develop a financial stability index that considers the distinctive features of the Algerian banking industry. Following the global financial crisis of 2007–2009, it became clear that financial stability needed to be given more thought. Determining how to quantify this intricate phenomenon has so become essential. This work outlines the weighting technique to be employed, which is principal component analysis, to create the financial stability index of the Algerian financial system, which is based on nineteen balance sheets, macroeconomic, and macroeconomic financial indicators for the 2010–2022 study period. These indicators comprise five sub-indices: susceptibility, financial development, profitability, liquidity, and financial strength. We were able to recommend an ISF for Algeria as a result of this work. This result is consistent with the first sub-index of vulnerability hurting our financial stability index and the other sub-indices acting similarly to our financial stability index.

Keywords: Financial stability, Algeria, index of financial stability, FSI, Financial system, Principal Component Analysis.

JEL Classification : C51, G30, C43

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يهدف هذا المقال إلى تطوير مؤشر للاستقرار المالي مع الأخذ بعين الاعتبار خصوصيات القطاع المالي الجزائري. بعد الأزمة المالية العالمية 2007-2009، ازدادت الحاجة إلى إيلاء أهمية خاصة للاستقرار المالي، مما جعل من الضروري إيجاد وسائل لقياس هذا الظاهرة متعددة الأبعاد. لبناء مؤشر الاستقرار المالي للنظام المالي الجزائري تم استخدام طريقة تحليل المكونات الرئيسية (PCA)، استنادًا إلى تسعة عشر مؤشرًا ماليًا واقتصاديًا خلال فترة الدراسة الممتدة من 2010 إلى 2022. تم تصنيف هذه المؤشرات ضمن خمسة مؤشرات فرعية، وهي: مؤشر الفرعي للهشاشة، المؤشر الفرعي للتطور المالي، المؤشر الفرعي للسيولة، المؤشر الفرعي للربحية، والمؤشر الفرعي للصلاية المالية. وقد مكنتنا هذا العمل من اقتراح مؤشر استقرار مالي (ISF) في الجزائر. وقد تبين أن المؤشر الفرعي للهشاشة يؤثر سلبيًا على مؤشر الاستقرار المالي، في حين أن باقي المؤشرات الفرعية تتبع نفس اتجاه مؤشر الاستقرار المالي، مما يدل على اتساق هذه النتائج.

الكلمات المفتاحية: الاستقرار المالي، مؤشر الاستقرار المالي، تحليل المكونات الرئيسية، النظام المالي الجزائري.

تصنيفات JEL : C43، G30، C51 .

1. Introduction

The environment of the financial system is intricate and ever-evolving. A financial shock in one area can spread swiftly to other financial sectors and over national borders due to the growing interdependence between financial institutions and nations; this is how the idea of financial stability came to be. When the financial system—which includes markets, financial intermediaries, and market infrastructures—can withstand shocks and has the resources to absorb the resulting financial imbalances, it is said to be financially stable.

The aim of this perspective is to limit the risk of financial crises and to reduce their expenses in the event of occurrence. Among the measures taken by Basel III, we can cite measures aimed at strengthening the level and quality of capital of financial institutions. Macroprudential policies support this preventive approach.

According to Borio C. (2009), central banks have been pushed to create several tools for keeping an eye on the financial system to fulfill their responsibilities of preserving financial stability and determining how

vulnerable it is to systemic threats. Early warning systems, stress tests, and the monitoring of micro and macro-prudential indicators are some of the various methods utilized in analytical practice to evaluate financial stability. According to Patat (2000), financial stability is correlated with some aspects of macroeconomic stability; when monetary stability is maintained, financial stability emerges.

While the Algerian banking and financial system was not directly impacted by the 2007 financial crisis, it did go through a period of severe financial instability at the national level in the late 1980s and early 1990s, followed by a period of economic and financial recovery in the 2000s. However, the Algerian government made the decision to implement a number of policies aimed at bolstering the financial system's stability. These steps include the development of specialist units to precisely evaluate the crisis's effects as it developed and the bolstering of macroprudential oversight. These days, the Bank of Algeria has two centers: the central unpaid debt center and the central business and household risk center.

The objective of this article is to use the "Xlstat" program to create a financial stability index for the Algerian financial system over a 13-year period, from 2010 to 2022, using the Principal Component Analysis approach.

This work will be composed of three sections: the first section presents a literature review of previous studies that have been carried out for different financial systems, the second section sets out the methodological approach used to carry out this work and the third section is devoted to the presentation of the results obtained and their interpretations.

2. Literature Review:

Many central banks, in their financial stability reports, seek to assess the risks associated with financial stability by focusing on a few key indicators. We will present an overview of previous studies on financial stability.

[Kondratovs \(2021\)](#) used data from 2001 to 2011 to create a composite financial fragility index for the Latvian banking system. The financial development index, financial vulnerability index, and financial stability index are some of the important sub-indices that make up the index and account for basic economic factors. The foreign currency lending ratio and the nominal effective exchange rate are two of the six macroeconomic parameters that were chosen for inclusion in the index because of their noteworthy influence on the nation's financial stability.

In 2011, the Central Bank of Jordan (CBJ) established a special department for financial stability and released an annual report to enhance banking resilience. The Financial Stability Index (FSI) used in this research is based on 15 variables that are separated into four categories: liquidity, earnings and profitability, asset quality, and capital adequacy. The FSI indicated that banking stability had improved until 2006. Then, during the global financial crisis, there was a significant drop, mostly because of the worsening of capital adequacy metrics. ([AL-Rjoub 2020](#))

The National Bank of Romania implemented macroprudential measures in 2016 to prevent financial instability, by introducing additional capital and liquidity requirements. The Financial Stability Index (FSI) was calculated using a macroprudential approach autoregressive on quarterly data from 2004 to 2016. This study shows that the index reacted strongly to economic crises, including the global financial crisis of 2008 and the sovereign debt crisis in 2011-2012. The results highlight the importance of GDP, interest rates, and bank assets in the evolution of financial stability. ([Claudiu Mihail Manolescu, 2017](#)).

[Modise \(2023\)](#) created the Financial Stability Index (AFSI), which combines four sub-indices: the external economic environment, financial development, financial vulnerability, and financial strength. Data from 2005 to 2020, including the effects of the 2008 financial crisis, form the basis of the AFSI. Systemic vulnerabilities, especially those of Botswana's dominating banking industry, are detected by the index. The AFSI is created by

combining standardized factors, some of which are related to the risk of financial fragility. The final index is determined by averaging the weights of the sub-indices.

These studies demonstrate that composite indices, which combine important financial and economic variables, are used to evaluate financial stability and enable the analysis and mitigation of systemic financial risks. To simulate the variables influencing the stability of financial systems in various nations, econometric techniques, and equal weighting procedures are among the ways that are employed.

3. Methodological approach :

To achieve the objective of our research, which is to build an **Algerian banking sector stability index in development**, we chose to work on a sample of 20 public and private banks operating in Algeria. To this end, we collected a wide range of financial and balance sheet data relating to these banks, taking into account the availability of information for the period 2010-2022.

Based on existing studies, we selected a set of **nineteen (19) representative indicators** of the Algerian banking sector. These indicators, widely used in the literature on financial stability, were extracted from various reliable data sources.

The following table presents these indicators, which reflect different dimensions of financial stability. They have been grouped into **five main sub-indices**, namely:

- Vulnerability sub-index,
- Financial development sub-index,
- Liquidity sub-index,
- Profitability sub-index,
- Financial strength sub-index.

These indicators provide a comprehensive overview of the situation of the Algerian banking system, where banking institutions constitute the dominant component of the financial system. In order to better capture the unique characteristics and dynamics of the Algerian banking industry, a majority of these indicators have been adopted.

Table 1 : Decomposition of the index

Indicators	Source
<i>Sub-index of vulnerability</i>	
Inflation rate	(Boudebbous, 2013)
Budget balance/GDP	(Albulescu, 2009)
Exchange rate volatility	(Albulescu, 2009)
Current account balance/GDP	(Betz, 2014)
GDP growth rate	(Boudebbous, 2013)
<i>Sub-index of financial development</i>	
Total credits/GDP	(Borio, 2002)
Financial institutions assets/GDP	(Cihak, 2013)
Bank net interest margin/asset income	(Gersl, 2006)
<i>Sub-index profitability</i>	
ROA	(Hanschel, 2005)
Bank loan-deposit spreads	(Cihak, 2013)
Operating expenses/Net banking income	(Annual Financial Stability Report, 2006)
<i>Sub-index of liquidity</i>	
Deposits/Credits	(Cihak, 2013)
Liquid assets/Total assets	(Baltagi, 2007)
Liquid assets/Current liabilities	(Baltagi, 2007)
<i>Sub-index financial strength</i>	
Regulatory capital of banks/Risk-weighted assets	(Gersl, 2006)
Classified loans/Total loans	(Demirgüç-Kunt, 1998)
Capital / Assets	(Gersl, 2006)
Provisions for non-performing loans	(Gonzalez-Hermosillo, 1999)
Liquid assets / Short term deposits	(Annual Financial Stability Report, 2006)
<i>Global index financial stability</i>	

Source: Established by the author

For data collection, we reviewed available data from credible international sources such as the IMF and relied on the Bank of Algeria and the National Statistics Office websites for macroeconomic data.

In order to carry out our project, we chose the principal component analysis (PCA) method as a weighting method. The PCA method is based on multidimensional descriptive statistics that allow a large number of quantitative variables to be processed simultaneously. Its objective is to search for a limited number of factors by optimally summarizing the data taken into account. It gives rise to graphical representations of the data according to these factors, symbolized by axes. The aim is to present and synthesize the information present in the different data to obtain a representation that facilitates interpretation. The principle of PCA is to reduce the dimension of the initial data, by replacing the p initial variables with q appropriate factors ($q < p$). The q factors sought are weighted averages of the initial variables. Their choice is made by maximizing the dispersion of individuals according to these factors.

This method groups the separate collinear sub-indicators to produce a composite indicator that expresses as much of the information shared by the sub-indicators as possible. The set of indications that each parameter is most closely related to is highlighted. The underlying idea of this approach is to use the fewest number of components to account for the maximum variation of the collection of indicators. In this manner, the resulting index will represent the statistical dimensions of the data rather than the dimensionality of the dataset. When variables are associated, the Principal Component Analysis approach offers weights to account for interactions between them.

This method must be grounded and must depend on the specific characteristics of financial stability for the result to be usable and for the index to explain the phenomenon in question in a sufficiently convincing way.

To construct an aggregate index using the principal component analysis (PCA) method, it is first necessary to collect relevant and comprehensive data on financial stability indicators covering a representative period. Then, these data must be normalized to ensure comparability between indicators, eliminating differences in scale or unit. After calculating the mean and standard deviation of each indicator, the indicators were normalized according to the following formula:

$$X^{normalisé} = \frac{Xi - \bar{x}}{S}$$

Following that, PCA is used to find orthogonal principle components that capture the most variance in the data, choosing those that account for a sizable amount of the variance overall. After that, each primary component is given a weight based on how much it contributes to this variation. The weighted components are then added together to form a single financial stability index. Lastly, by interpreting the primary components, we can gain insight into their significance and how they relate to the overall stability of the financial system, which helps us identify the origins of instability or stability.

4. Descriptive study:

The table below presents a descriptive analysis of the data concerning the indicators used to construct the financial stability index:

Table 2: Descriptive analysis of data

Variable	obs	Min	Max	Average	AND
Inflation rate	13	0.02	0.09	0.05	0.02
GDP Growth %	13	-0.05	0.05	0.02	0.02
Budget balance/GDP	13	-0.15	0.01	-0.05	0.05
Current account balance/GDP	13	-0.16	0.10	-0.04	0.10
USD exchange rate variance	13	0.28	81.97	13.58	22.82
Liquid assets/Total assets	13	0.13	0.53	0.33	0.13
Liquid assets/short term liabilities	13	0.37	1.14	0.78	0.28
Deposits/Credits	13	0.96	1.81	1.35	0.29
ROA = Net income / Average assets	13	0.01	0.02	0.02	0.00
EXP charge + endowment/GNP	13	0.24	0.36	0.30	0.04
Loan-deposit gap in billions	13	-4329.85	-445.85	-1614.53	1115.18
Credits/GDP	13	0.26	0.61	0.41	0.11
Assets of inst/GDP	13	0.10	0.80	0.29	0.17
Interest Margin/Gross Income	13	0.55	0.79	0.71	0.07
Overall solvency ratio	13	0.16	0.24	0.20	0.02
Rate of provisions for classified receivables	13	0.46	0.73	0.58	0.10
Liquid assets/CT deposit	13	0.26	1.24	0.65	0.27
Capital/Assets	13	0.08	0.10	0.09	0.01
Classified debt rates	13	0.10	0.20	0.14	0.04

Source: Output XLSTAT

The descriptive statistics presented provide a detailed overview of the stability of the Algerian banking sector over the period 2010-2022. Overall, the data reveal adequate liquidity of banks, as evidenced by high ratios of liquid assets to short-term liabilities (average of 78%) and short-term deposits (65%). The average solvency ratio of 20% reflects a good capacity of banks to absorb potential losses. However, some indicators highlight significant challenges: notable economic volatility, as evidenced by variations in the GDP growth rate (-5% to 5%) and the exchange rate (average variance of 13.58 with a high standard deviation), as well as average budget deficit of 5% and an average current account deficit of 4%. In addition, the non-performing loans ratio (14%) highlights persistent risks in loan portfolios, despite a good level of provisions (58%). Finally, the deposit-to-loan ratio (135%) reveals a relatively low use of deposits for financing loans, which could limit the role of banks in supporting economic growth. These observations illustrate a banking sector marked by prudent management and good liquidity, but also exposed to macroeconomic and structural vulnerabilities.

4.1. Correlation of sub-indices:

The following table shows the correlation between the sub-indices constituting the overall financial stability index:

Table 3: Correlation of sub-indices

Variables	S1	S2	S3	S4	S5
S1	1				
S2	0.006	1			
S3	-0.310	0.579	1		
S4	-0.475	0.771	0.829	1	
S5	-0.549	0.483	0.775	0.771	1
<i>Values in bold are different from 0 at a significance level of alpha=0.05</i>					

Source : Output « XLSTAT »

In the next section, we will examine the important relationships from the correlation matrix between the sub-indices. First, we find a strong correlation between the following two sub-indices: Financial Development Sub-Index and Liquidity Sub-Index. It should be remembered that the financial development sub-index is made up of the indicators: "Total credits / GDP", "Assets of financial institutions / GDP" and "Net banking interest margin / Total asset income" and that the liquidity sub-index is made up of three indicators as well as they are: "Deposits / Credits", "Liquid assets / total assets" and "Liquid assets / short-term liabilities". The liquidity sub-index facilitates financial development by improving risk management where economic agents can protect themselves against unforeseen events which promotes financial stability, and financial development in turn strengthens the liquidity of financial institutions. Therefore, we have explained the significant and positive correlation between these two sub-indices.

In the second step, we will examine the positive relationship between the two sub-indices related to profitability and financial development. We recall that the profitability sub-index is made up of the indicator "ROA", "Bank loan-deposit spreads" and "operating ratio = operating expenses / Net banking income". A profitable bank has an increased capacity to attract deposits and grant loans, which promotes the circulation of money in the economy and offers economic agents the possibility of obtaining financing. In general, profitable banks have higher capitalization and increased resistance to economic shocks, which promotes the stability of the financial system. Financial development can increase the liquidity of banking institutions by facilitating access to credit, this can lead to an increase in loan quantities and interest margins, by improving the efficiency of banks which can subsequently reduce operating costs. Hence this positive and significant correlation coefficient.

It is notably observed that the profitability sub-index is positively linked to the liquidity sub-index. This Favorable correlation generally means that banks that maintain sufficient liquidity are more profitable than those that do not. Indeed, adequate liquidity allows banks to seize lucrative investment

opportunities, meet their customers' credit needs, and cope with unexpected events. In addition, ample liquidity can bolster depositor and investor confidence, which can lead to lower funding costs.

Thus, we detect that the sub-indices of financial strength and liquidity are positively correlated. The sub-index of financial strength consists of five indicators: "Overall solvency", "Ratio of classified debts", "Ratio of provisions for classified debts", "Capital / Assets" and "Liquid assets / Short-term deposits". These two sub-indices are two essential pillars of a stable and efficient financial system. The financial strength of financial institutions gives access to lower-cost financing and more advantageous conditions, which allows it to maintain a stronger liquidity position. At the same time, an institution that has good liquidity will be able to meet its short-term obligations and honor its commitments to its customers, which strengthens its financial solidity. Thus, we explain the significant and positive correlation between the financial strength sub-index and the liquidity sub-index.

Next, we examine the positive association between the two sub-indices in terms of profitability and financial strength. A strong financial institution can get lower-cost funding and draw in more business thanks to its high profitability, which instills confidence in investors and clients. However, by building up capital and reserves to cover potential losses, a successful bank is better equipped to solidify its financial stability.

Regarding the sub-index of vulnerability of the financial system, we note that it is negatively correlated with the sub-index of financial solidity. We recall that the sub-index of vulnerability is made up of five indicators: "Inflation rate", "Budget balance / GDP", "GDP growth rate", "Volatility of the USD exchange rate" and "Current account balance / GDP". The solidity of the financial system acts as the protector against the vulnerabilities of the financial system, the stronger a financial system is, the less vulnerable it is to shocks and disruptions. In the event of customer defaults or economic turbulence, healthy financial institutions with adequate capital can be more

effective in dealing with losses. In contrast, a fragile financial system is characterized by high exposure to risks and low capacity to absorb shocks.

5. The construction of the final index of financial stability of the Algerian financial system:

Now, we will move on to the aggregation stage of our index using the method we chose earlier: Principal Component Analysis (PCA). This method simplifies the analysis and dissemination of results, while allowing us to identify sources of weakness and prioritize corrective measures. In addition, PCA takes into account the links between indicators, which allows us to have a more global vision of the stability system. Due to its flexibility and adaptability, it is able to adapt according to the economic and financial context.

Before performing the analysis, we will first perform a Bartlett's Sphericity test which allows us to validate or invalidate the hypothesis that the variables are not significantly correlated. Since the calculated added value is lower than the significance level $\alpha=0.05$, we must reject the null hypothesis H_0 and retain the alternative hypothesis H_1 .

As long as at least one of the correlations between the variables is significantly different from 0 according to Bartlett's test, it is legitimate to look for components using Principal Components Analysis.

Then we performed the Kaiser-Meyer-Olkin (KMO) sampling accuracy test, which gives us for each variable the value of the KMO measure as well as the overall KMO. A high value corresponds to the case where it is possible to extract synthetic factors. We obtained an overall coefficient $0.563 > 0.5$, which is considered good. Therefore, it is possible to perform the principal component analysis.

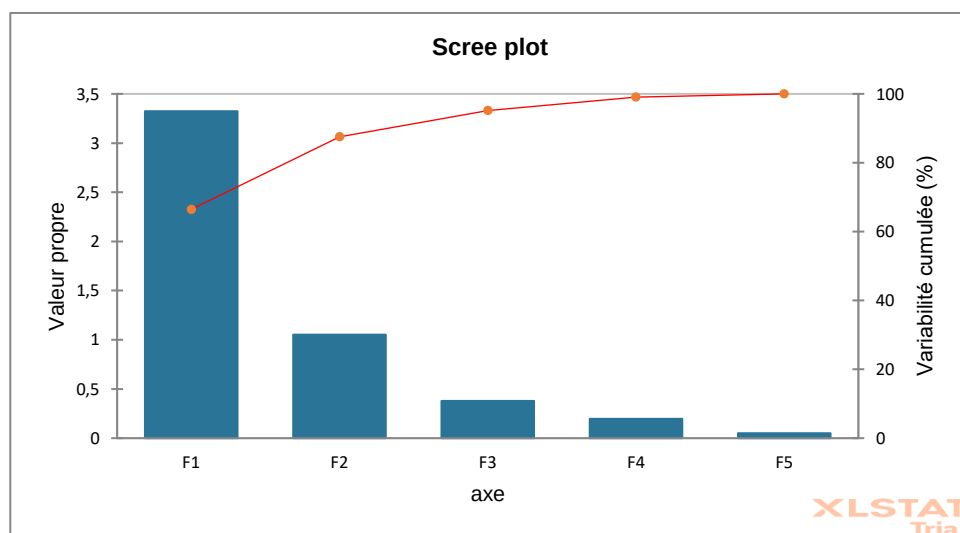
5.1 Presentation of the ACP results:

The results of the principal component analysis that we carried out on the previously constructed sub-indices will be presented in the following.:

Table 4: Eigenvalues

	F1	F2	F3	F4	F5
Eigenvalue	3,323	1,054	0.379	0.195	0.049
Variability (%)	66,460	21,073	7,587	3,904	0,976
% cumulative	66,460	87,533	95,120	99,024	100,000

Source: Output XLSTAT

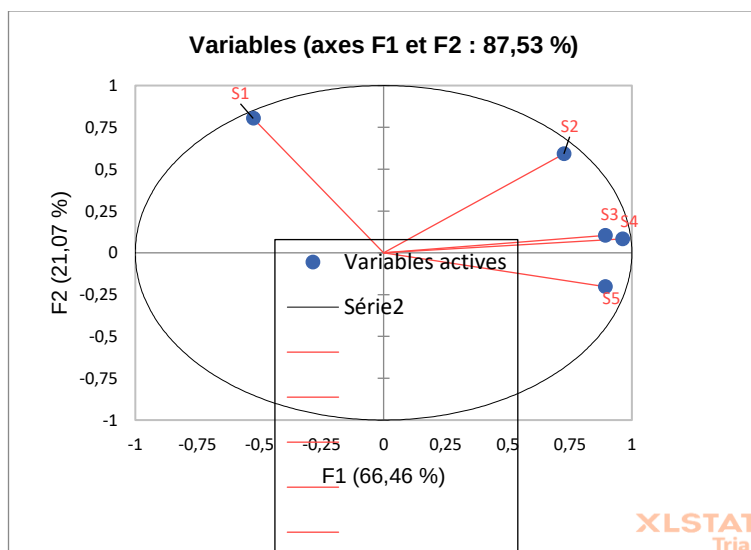
Figure 1: The Screen Plot

Source: Output Xlstat

In order to calculate the coefficients of the sub-indices in the overall index, it is necessary to analyze the various factors that result from the PCA. These coefficients are selected so that the index can explain as much as possible of the total variation of the sub-indices. In our situation, the initial component represents more than 66% of the total variance. This is a fairly significant percentage that will allow us to obtain interesting results on the overall index. In addition, according to the "Screen Plot" the first factor F1 offers a fairly clear explanation of the phenomenon. And 87% by accumulating the second factor F2.

The following figure shows the projection of the stability sub-indices on a two-dimensional plane F1 and F2, which shows the correlations between the components and the sub-indices.

Figure 2: Projection of sub-indices onto two dimensions



Source: Output XLSTAT

With this graph, it is possible to see the coefficients assigned to each sub-index according to the projection of the first factor F1, which preserves more than 66% of the variations of the variables and which we will retain for the creation of our global index. To obtain additional information, it is possible to interpret the results by referring to the second axis represented by the second factor F2. In the following, we will focus on the coefficients of the sub-indices according to the projection on the first factor that will contribute to the creation of the overall financial stability index.

Table 5: Coordinates of the sub-indices

	F1
S1	-0.525
S2	0.726
S3	0.892
S4	0.963
S5	0.892

Source: Established by the author

Using these coefficients, we will obtain our index according to the following formula:

$$\text{ISF} = -0.525 * S1 + 0.726 * S2 + 0.892 * S3 + 0.963 * S4 + 0.892 * S5$$

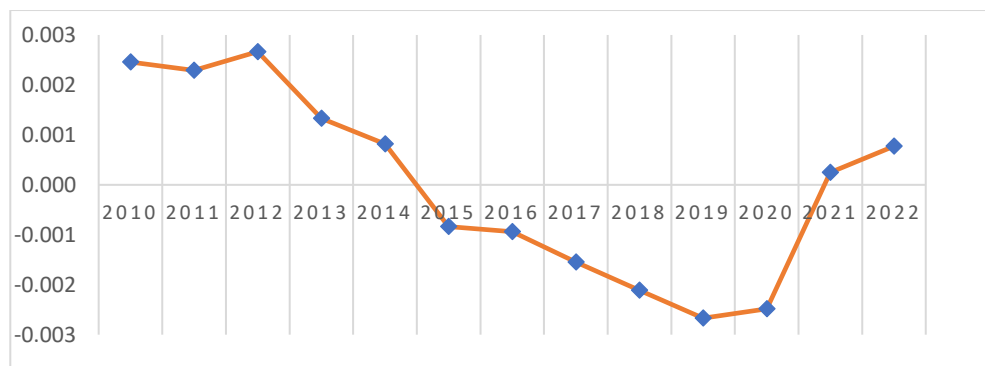
It can be noted that the first sub-index, that of vulnerability, negatively impacts our financial stability index with a coefficient of **0.525**. We noticed this during the correlation study between the sub-indices that make up the final index. This sub-index varies in the opposite direction of the stability of liquidity, profitability and the solidity of the financial system. This informs us that the vulnerability sub-index is a risk factor. The more stable the Algerian financial system is, the less vulnerable it is to shocks and financial crises.

Moreover, the other sub-indices behave in the same way as our financial stability index, which shows consistency in this result. The financial development sub-index positively impacts our index with a coefficient of **0.726**. Our index is positively influenced by the liquidity and financial strength sub-indices with the same coefficient of **0.892**. As well as the profitability sub-index has a positive and very significant effect of **0.963** on our financial stability index.

5.2. Evolution of the ISF:

We can observe the evolution of our index over time through the following diagram:

Figure 3: Evolution of the ISF



Source: Output XLSTAT

We note that the level of our financial stability index was very high and positive during the period 2010-2012, which gave the impression that the situation was balanced. However, in 2013 the index shows a clearly downward trend which was perhaps meant to signal that the financial system would not be resilient to a shock and that it is visibly vulnerable. Then, in 2015 the vulnerability of the Algerian financial system was demonstrated because it failed to cope with the shocks that followed the famous oil crisis of 2014, because Algeria is a country very dependent on hydrocarbons. The sudden drop in oil prices in 2014-2016 from \$100 per barrel to less than \$30 per barrel, led to a drastic drop in Algeria's revenues that impacted the entire economy of the country. During the efforts of economic diversification, consolidation of public finances and strengthening of the governance of Algeria in order to overcome this crisis, the world has experienced a second global crisis which is the covid-19 health crisis in 2020 which caused a contraction in global demand for energy, accentuating the fall in oil prices in 2020. This new crisis has reinforced the economic difficulties already present in Algeria, further weakening its financial and budgetary situation. The Algerian economy experienced a recovery in 2021. Oil prices rose sharply in 2021, generating a significant increase in tax revenues for the Algerian state.

6. Conclusion :

This article aims to construct a financial stability index for Algeria, covering the period from 2010 to 2022, using the principal component analysis (PCA) method. This strategy seeks to solve the issue of creating an index that adapts to the unique characteristics of the Algerian financial industry. To achieve this, 19 macroeconomic and financial indicators that represent several facets of the financial system, including liquidity, profitability, solvency, and financial development, were chosen. Given the strong correlations between the macroeconomic environment and the banking system's performance, these indicators enable the capture of the variables that determine financial stability.

The final index, constructed from the PCA results, is dominated by a single component explaining more than 66% of the variability of the subcomponents, which ensures a robust and reliable interpretation. The results show that macroeconomic vulnerability negatively impacts financial stability, while liquidity, profitability, financial strength, and financial development have a significant positive effect. These observations confirm the research hypotheses and highlight the importance of these dimensions in assessing the stability of the Algerian financial sector.

The suggested index gives regulators a useful tool for tracking financial stability over time, identifying new vulnerabilities, and evaluating the success of macroprudential measures. However, the study has some limitations, including the lack of comparison with other existing indices and the inability to perform a robustness analysis, mainly constrained by time. Research perspectives include the construction of a new index using other methods, such as exploratory factor analysis, and a collaboration with the Bank of Algeria to develop and refine this tool to better protect the national economy and consumers.

7. Bibliography

- Albulescu, C. (2009). Forecasting Romanian Financial System Stability Using a Stochastic Simulation Model. International Network for Economic Research, Working Paper 2009.4.
- AL-Rjoub, S. A. (2020, April). A financial Stability Index for Jordan. Theoretical and Applied Economics .
- Baltagi, B. P. (2007). Financial Development, Openness and Institutions: Evidence from Panel Data. Conference on New Perspectives on Financial Globalization. IMF Research Department.
- BELAID, D. (2011). L'impact d'un contrôle bancaire efficient sur la régulation du système bancaire en Algérie. Algerian Scientific Journal Platform, 189-209.
- Betz, F. O. (2014). Predicting distress in European Banks. Journal of Banking and Finance, Vol. 45.
- Borio, C. (2009). "Implementing the Macroprudential Approach to Financial Regulation and Supervision". Financial Stability Review.
- Boudebous, T. e. (2013). Determinants of systemic banking crise countries of central and eastern Europe. Journal of Business Studies Quarterly, Vol. 05, No 01.
- Brand D.A, S. M. (2007, April 04). Comparative Analysis of Alcohol Control Policies in 30 Countries. Récupéré sur PLoS Medicine: www.plosmedicine.org
- Čihák, M. A.-K. (2013). "Financial development in 205 economies, 1960 to 2010. National Bureau of Economic Research, Working Paper 18946.
- Claudiu Mihail MANOLESCU, E. M. (2017). The financial stability index – An insight into the financial and economic conditions of Romania. Theoretical and Applied Economics.
- Crockett. (2000). Why is financial stability a goal of public policy? Federal Reserve Bank of Kansas City. Récupéré sur Federal Reserve Bank of Kansas City.
- Demirgüç-Kunt, A. e. (1998). The determinants of banking crises in developing and developed countries. IMF Staff Papers 45 No 01.

- EICHENGREEN, B. (1998). Exchange Rate Stability and Financial Stability. University of California, Berkeley, Department of Economics, Berkeley, Kluwer Academic Publishers. .
- EVANS O, L. A. (2000, April). Macroprudential Indicators of Financial System Soundness. INTERNATIONAL MONETARY FUND : OCCASIONAL PAPER , pp. 192-246. Récupéré sur IMF.
- Gersl, A. e. (2006). Financial Stability Indicators: advantages and disadvantages of their use in the Assessment of the Financial System Stability. Financial Stability Report Czech National Bank. .
- Gonzalez-Hermosillo, B. (1999). Determinants of ex-ante banking system stress: a macro-micro empirical exploration of some recent episodes. IMF, Staff Papers N°99/33.
- Hanschel, E. e. (2005). Measuring and forecasting stress in the banking sector: Evidence from Switzerland. BIS Papers, No 22, pp. 431-449.
- Hayet Abbad, M. A. (2015). Evaluation du système financier Algérien: Construction d'un indice agrégé de stabilité bancaire. EconomiX HAL Id: hal-04141394.
- Kondratovs, K. (2021). MODELLING FINANCIAL STABILITY INDEX FOR LATVIAN FINANCIAL SYSTEM. e-journals of Université à Klaipėda, Lituanie.
- Padoa-Schioppa, T. (2002). Central banks and financial stability : exploring land in between . The transformation of the european financial system. Second ECB Central Banking Conference.
- Patat, J. (2000). la stabilité financière, nouvelle urgence pour les banque centrales, dans « Bulletin de la banque de France ». Banque de France,N°84, pp. 50-51.
- Rapport annuel de la stabilité financière. (2006). FMI.
- Roger W. Ferguson, J. (2002). Should Financial Stability Be An Explicit Central Bank Objective? IMF Conference : Challenges to Central Banking from Globalized Financial Systems. Washington.
- Romanie, L. b. (2011). Rapport sur la stabilité financière.

Tuduetso Pamela Modise, L. L. (2023). Constructing an aggregate financial stability index for Botswana . AEISS Publications, Vol. 13, No. 11, 738-755.