



Analysis of Liquidity Management Practices in Algerian Banks According to International Standards liquidity

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Abstract

This paper examines the main liquidity management tools available to Algerian banks, including liquidity ratios, monetary policy instruments, and prudential regulations, while assessing their effectiveness in an unstable economic environment. It adopts a global and analytical approach through a review of current practices and a comparison with international standards. Stress testing is used to evaluate bank performance, showing that improving liquidity tools strengthens resilience. However, despite ongoing reforms, Algerian banks remain vulnerable to market fluctuations and global shocks. The analysis reveals a tendency to prioritize savings collection as a prerequisite while treating credit distribution as a selective prerogative. Although the solvency ratio ranges between 15–23%, reflecting long-term confidence, the capital-to-assets ratio remains low at 8–10%. This imbalance reflects a short-term liquidity issue, often managed through central bank refinancing, which raises interest rates. This situation affects performance of the banking sector and reduces its resilience to external shocks.

Keywords:

Bank liquidity; monetary instruments; prudential policies; stress tests; economic shocks.

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1. INTRODUCTION:

Bank liquidity management is a crucial issue for the stability of the financial system, particularly in environments subject to economic shocks. In Algeria, banks face increasing challenges related to managing their liquidity, exacerbated by market volatility and fluctuations in oil prices. A bank's ability to meet its short-term obligations, without compromising its operations, is essential to maintaining a balance between its liquid assets and its liabilities. However, this management becomes more complex in a context of structural dependence of the Algerian economy on hydrocarbons, leading to cyclical adjustments during each economic shock.

This article examines the measures by which Algerian banks can act to improve the management of bank liquidity in the face of external shocks, more specifically ; it involves analyzing management tools and evaluating their effectiveness in a fluctuating economic environment. Researchers have often highlighted key elements such as liquidity ratios, cash management instruments and liquidity policies as levers to ensure bank resilience. However, it is necessary to examine how these instruments can be strengthened to address the vulnerability of the Algerian banking sector. Through an IMF seminar in 2010, researcher Laksaci (2010) indicates that the resilience of the Algerian banking sector in the face of external shocks is closely linked to the macroeconomic framework and dependence on hydrocarbons. The author highlighted the importance of resource management and financial stability in a context of fiscal vulnerability. In addition, analyzes of the World Bank's annual reports (2017) show that the fall in oil prices has often exacerbated tensions on bank liquidity. These convergent studies, reinforced by the work of Benali (2022), analyzed the impact of monetary policy measures on bank liquidity during the COVID-19 crisis and showed that banks having implemented liquidity forecasting tools robust and more resistant to shocks. Therefore, improving management tools, such as forecasting models and liquidity policies are essential to anticipate and mitigate tensions in a banking system faced with frequent economic fluctuations. It is also important to strengthen cash management mechanisms and develop effective resilience tools in order to better protect banks, particularly Algerian banks, against economic vulnerabilities.

Hypothesis Development :

In light of the challenges facing Algerian banks and the increasing importance of aligning with international liquidity management standards, this study proposes the following two main hypotheses :

- Hypothesis 1 : Improving liquidity management tools would strengthen the resilience of Algerian banks in the face of external shocks.

- Hypothesis 2 : Without a profound reform of liquidity management policies, Algerian banks will remain vulnerable to market fluctuations and global economic crises.

To examine these hypotheses, the study adopts a comprehensive and analytical approach. It conducts an in-depth assessment of liquidity management practices within Algerian banks, benchmarking them against international standards. Additionally, a series of stress tests will be implemented to evaluate how these banks respond to various crisis scenarios.

The objective of this work is to analyze the liquidity management mechanisms in Algerian banks and to propose solutions aimed at improving their resilience to external shocks. In this context, we evaluate the effectiveness of existing management instruments (ratios, stress tests, etc.) and propose recommendations to strengthen the country's monetary and banking policies.

2. The development strategy of the bank savings collection activity and its deployment in Algeria:

The diversity of banking activity, particularly in the collection of deposits, leads to a deployment in techniques to encourage savings (*Mishkin & Eakins, 2018, p259*). Nowadays, the motivations for saving take into account reasons of precaution, investment and placement. In banked economies, competition and globalization make banks a tool for innovation in financial products. This modernization made it possible to put in place new savings products such as securities savings, insurance savings, health savings, investment savings plan, action savings plan, etc (*Saunders & Cornett, 2018, p76*).

In Algeria, banks suffer from insufficient collection of savings. The absence of an advanced financial market makes the integration of banking professions in the service of finance unconvincing. However, most banks offer services that fall within the traditional approach of a traditional bank. The diversification of savings from the saver's point of view is rather motivated in most cases in housing savings plans for long-term savings and traditional savings in passbook accounts or term accounts (term deposits).

The absence of a strategy focused on savings in the form of financial products leads the Algerian bank to diversify the techniques for collecting savings in its classic form. It often relies on the proximity policy in particular through extensions of the basic unit of the network, efficiency policies through the use of efficient IT resources dedicated to the management of activities and finally innovation in the marketing techniques.

The following table shows the importance of the collection of bank resources, in particular with a clear increase in bank deposits coming from resources deposited with public banks, their share of which represents more than three-quarters of the total resources collected by the banking system, i.e. 84.61% in 2021 compared to 15.39% for

private banks. (Bank of Algeria, 2021) In 2002, these resources came from the public sector with a share of 73.1% compared to 26.9% of resources coming from businesses and households. In 2021, a significant increase is recorded with nearly 12,500 billion dinars in bank deposits. The latter come up to 37.99% from the public sector (companies and public bodies), of which 47% represent demand deposits (2,455 billion dinars) and 27.29% (1,762.2 billion in term deposits) (Bank of Algeria, 2021) As for private resources coming from households, private companies and associations, their shares represent 62.1% of the total resources of which 53% (2775.6 billion Dinars) constitute demand deposits and 72.7% (4695 billion Dinars) represent term deposits. In terms of activity of transforming bank savings into credit, the credit/deposit transformation ratio shows a prudential ratio of less than 120% (Baseline III standard capping the ratio at 120%). Overall, Algerian commercial banks respect prudential standards and meet regulatory requirements which stipulate to grant 1.2 Dinars of credit for each additional 01 dinars collected in the form of deposit (120 Dinars to be granted for each additional 100 Dinars collected). In 2021, the consolidated figures show a ratio established at 78.74 Dinars of credit granted for each additional 100 Dinars collected compared to 56.14 Dinars of credit in 2010 (Report Bank of Algeria 2002 and 2021).

Table N°01: Evolution of the activity of collecting bank savings and their transformation into credit

	Share of public banks	Share of private banks	Total resources collected billions DA	Credit/deposit ratio
2000	94.8 %	5.2 %	1441.852	68.87
2004	93.5 %	6.5 %	2 705.372	56.72
2008	92.2 %	7.8 %	5 161.8	50.64
2012	87.1%	12.9%	7 238.0	59.21
2016	87.06	12.94	9079.9	87.09
2020	84.71%	15.29%	10 756.0	103.9
2021	84.61%	15.39%	12 492.0	78.74

Source: Established by the authors from the annual reports of the Bank of Algeria 2002, 2012, 2014 and 2017, 2022.

In light of the trends presented in the table showing the evolution of bank savings collection and their transformation into credit, it appears that bank savings products are closely linked to the motivations behind them. Savings is an instrument for accumulating income, a tool for managing funds and risks. As a tool for accumulating income, savings respond to the strategy of asset creation through savings plans intended for the purchase of real estate, to finance investment in means of production or business financing project ; example : housing savings account, securities savings account, etc.). Furthermore, its constitution makes it possible to meet liquidity requests expressed to cover regular expenses, particularly for households in difficulty, or a tool for managing the risks inherent in expected and unpredictable expenses threatening the survival of businesses. These are funds intended to cover unforeseeable expenses. Regulated savings accounts make it possible to secure investments and cash flow. Although the returns are low, access to savings remains free and the risks of loss of value are low (example : popular savings booklet, booklet A, development savings booklets, etc.). Being a reason for risk management, savings "taking place before the event by saving downstream" is reviewed as a required condition of "forced savings" with a view to constituting a safety cushion through the maintenance of a balance minimum savings at the level of banking institutions.

Table N°. 02 : Evolution of the ratio of banking activity

	Number of bank depositors	Number of population of working age 15-64 years	Banking activity ratio in Total assets/GDP	banking ratio of the economy
2009	8332261	23777386.7	35	0.35
2012	10363013	25063317.7	44.65	0.413
2014	11462869	25723573.1	52.71	0.446
2016	11921090	26079376.2	49.05	0.457
2018	11455313	26695763.9	57.56	0.429
2019	12178634	27047444.8	55.51	0.45
2020	10477946	27420608.3	59.14	0.382
2021	11966891	27818425	66.42	0.43

Source : Established by the authors using data from the Bank of Algeria for the number of depositors (banks) and statistics on the active population in % data : perspective Monde in www.perspective.usherbrooke.ca.

From the analysis of the ratios shown in the table above, In Algeria, access to banking and financial services constitutes a crucial economic and social issue involving the notable contribution of the banking system to financial inclusion, particularly through its policy of proximity and multiplication of banking agencies and its marketing aimed at easy access to banking services, particularly when opening accounts, or asset management through the introduction of ICT as well as access to credit. The table above shows that the size of the banking system is relatively small with a dominance of public banks which hold a good part of the total assets of the banking system. The activity ratio measured by total assets divided by GDP (total assets/GDP in %) shows that in 2021, the size of the banking system represents 66.42% of Algeria's GDP compared to 35% in 2009 and 13.82% in 2000. Although the sector has recorded a notable increase in banking activity, the ratio is relatively low if we compare it to developed countries, notably France which displays in 2021, a ratio of banking activity of 433% with a size of the banking sector of 4.33 times higher than the GDP generated. With this modest banking coverage, the banking rate in the Algerian economy remains low. Statistics indicate that the access rate to banking and financial services is less than 50%, which means that around 50% of Algerians do not have access to these services. In addition, the banking rate measured by the number of accounts opened by banks to customers of working age is slightly improving but remains insufficient. In 2021, this ratio is approximately less than one account opened for the population of working age, without taking into account the number of depositors outside the banking system such as depositors of accounts posting CCP and the public treasury.

2.1 Savings and credit policy and bank liquidity management

The bank's policy is mainly based on insurance and customer protection, so it may refuse certain credit (loan) requests. However, in a purely financial logic, the savings and credit system in Algeria grants itself the privilege of making the collection of savings a prerequisite and the granting of credit a prerogative. This choice is all the more necessary given the historical context of the banking environment. The development of a credit savings policy favored through its banking intermediation function, the redistribution of savings previously collected in the form of credits. Furthermore, banks are called upon to improve their collection of resources by developing their capabilities to offer innovative services. Their imperative is to contribute to the expansion of the use of electronic payment instruments and to support companies by financing their project.

Liquidity refers to resources available without mobilization delays, which can be used immediately. The notion of liquidity extends to goods which have the capacity to immediately convert into free means of payment (notes, coins, checking accounts) with a free guaranteed value. Money is considered excellent liquidity. According to BEZIADÉ M., "the liquidity of a bank covers the bank's availability of central money, i.e. the

amount of its credit current account at the central bank, the notes in hand as well as the amount of its credit current accounts in other banks and postal current accounts (ccp) for which it can always demand the counterpart in currency central. Bank liquidity includes all these elements minus bank current accounts, which cancel each other out for the aggregate set of banks” (BEZIADE M., 1986. P55). In Algeria, the regulation of bank liquidity is characterized by a lack of harmonization at the international level. Indeed, liquidity represents the bank's ability to cope with the repayment of deposits and other debts as well as the increase in financing of the loan and investment portfolio. This state of affairs leads Algerian banks to practice rigorous selectivity by rationing a large part of company projects, particularly long-term ones, and often by limiting the distribution of credits to the financing of projects originating from the public sector.

2.2 Granting credit : a tool for monetizing debts

The bank is the only economic actor that has the power to create money. It gives itself the privilege of monetizing receivables and thereby creating new deposits. The granting of credit then becomes a means of circulation of scriptural money and a renewable savings tool when it does not escape the banking circuit. This is why banking regulations impose rules of conduct and obligations on commercial banks to maintain superior currency accounts. This central currency will serve as an instrument for controlling bank liquidity, a tool to combat inflation and a means of monetary creation, that is to say the creation of new deposits. The importance of bank credit is seen as a tool for using banking services and a means of banking the economy. It is in this vision that credit is reviewed as the privileged function of a bank. As a result, monetary creation is a mechanism linked to bank credit, which results in an increase in the quantity of money in circulation. Each time a bank grants a loan to an economic agent, it creates money because the means of payment available increase. (McLeay et al., 2014).

2.3 Liquidity regulation and its macro-prudential foundations

Banking regulation and supervision aim to ensure the stability of the financial system. Indeed, the concept of financial stability has become so widespread that most central banks have a department or department entirely dedicated to financial stability. These departments are most often in charge of developing regulations and must also protect the economy in general and the financial system in particular, from exogenous shocks such as recession and devaluations. At the macro-prudential level, liquidity regulation is closely linked to monetary policy, to the extent that it can complement the role of the central bank as lender of last resort (Rochet, 2008). In the absence of liquidity monitoring, banks may default on their liquidity risks and expose themselves to the risk of loss of liquidity and insolvency, thus forcing the central bank to intervene. Like the central bank, the existence of liquidity regulation allows the state to avoid intervening in the event of a banking crisis, as happened in the United States and the United Kingdom

during the financial crisis of 2008. The need for uniform and harmonized liquidity regulation at an international level therefore constitutes an important issue. The lack of standardization effectively creates discrimination against banks in countries where regulations are more restrictive. This situation necessarily harms the competitiveness of banks in these countries but also has a negative impact on the financing of their economy.

2.4 The monitoring system : effective banking surveillance tool

Regardless of the regulation of bank liquidity, permanent monitoring is therefore necessary for the banking sector supervisory authorities. This involves the establishment of a “monitoring” system which would require banks to periodically transmit to the Central Bank a certain number of indicators on their accounting and financial situation. The use and processing of information also allows issuers to evaluate and measure the state and evolution of bank liquidity, to determine its needs and to calibrate the quantity of liquid injected within the framework of monetary policy (Basel Committee on Banking Supervision, 2013). The transmission of statistical information to the central bank makes it possible to monitor the development and plan targeted interventions of banking establishments which encounter certain difficulties. Generally speaking, from the central bank's perspective, "liquidity and bank settlement regulations" can avoid risks including central bank intervention by injecting large amounts of liquidity in the event of external macroeconomic shocks.

3. Analysis of monetary indicators of commercial banks and the performance ratios

In this part, we will focus on the evolution of outstanding amounts granted to the economy, analysis of the evolution of the credit ratio to the economy/GDP as well as the distribution of credits according to their maturities and by institutional sectors. This analysis makes it possible to highlight the weight of the banking sector and its place in financing the economy and its contribution to the formation of wealth (GDP). Furthermore, the analysis of banking performance indicators makes it possible to answer the question of, on the one hand, the capacity of banks to mobilize liquidity (bank savings) which are used to improve bank profitability and, on the other hand, its power to transform liquidity through its credit granting activities (*Mishkin & Eakins, 2018, p315*).

3.1 Analysis of the evolution of monetary indicators

Assistance granted to the economy recorded an average annual growth of 12.02% between 2000 and 2017. The amount of credits granted to the economy increased from 993.7 billion dinars in 2000 to 8,880 billion in 2017, i.e. multiplication by 9.

Table N°. 03: Evolution of bank deposits and credits granted to the economy

Billions/DA	Credit to the economy	Credit to the economy (Annual variation %)
2000	993.7	-13.6
2003	1 380.2	8.95
2006	1 905.4	7.1
2009	3086.5	18
2012	4298.4	15.3
2015	7 277.2	11.9
2018	9974	8.83
2019	10 855.6	2.99
2020	11 180.2	-12.01
2021	9 836.6	3.72%

Source: Established by the authors from the annual reports of the Bank of Algeria 2002, 2012, 2014 and 2017, 2022.

In 2021, the amount of credit reached 9,836.6 billion Dinars recording a notable drop in their annual growth going from 8.83 between 2016 and 2017 to a drop of 12% between 2020 and 2021. This state of affairs renews the idea of the structure of the Algerian economy which has remained a debt economy weakened by economic shocks, notably the drop in oil prices and the health crisis which has affected the country since 2019 elsewhere, we notice that the banks granted more money than they generated. Deposits in current accounts represent almost half of the sums leaving banks in the form of credit.

Table N°. 04 : Evolution of the ratio of credits to the economy/GDP

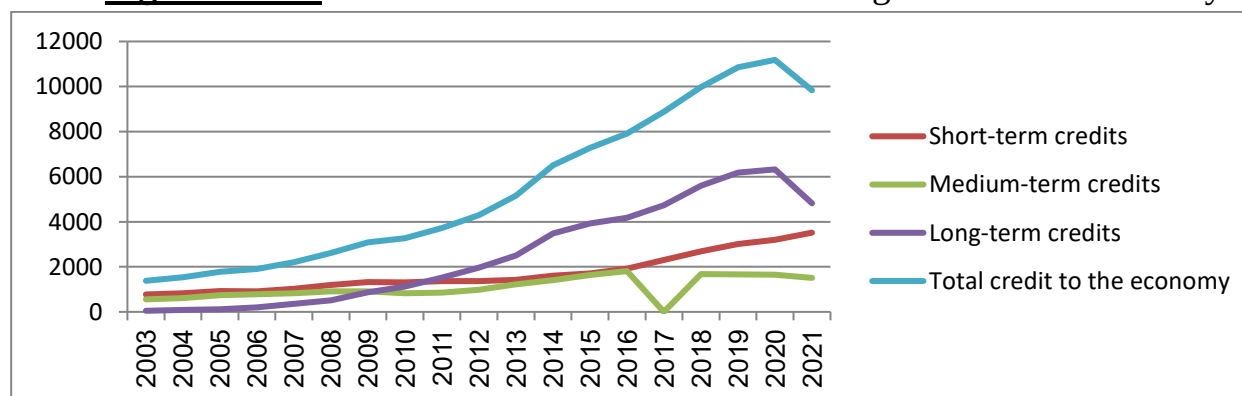
Billions/DA	Credits to the economy/GDP Ratio
2000	24
2003	26.3
2006	22.5
2009	31
2012	27.1
2015	43.6
2019	56.63
2020	61.46
2021	52.30

Source : Established by the authors from the annual reports of the Bank of Algeria 2002, 2012, 2014 and 2017, 2022.

This situation will imply the problem of banking liquidity unless the public authorities through the monetary authorities guarantee the refinancing of the economy via the transmission channels of monetary policy (*Saunders & Cornett, 2018, p108*). The analysis of the evolution of the credit to the economy/GDP ratio allows us to bring out the same findings relating to the place occupied by a bank in the financing of the Algerian economy. The ratio increased sharply from single to double.

Credits to the economy represented 24% of GDP in 2003 and increased to 52.3% in 2021. The analysis of the credit/GDP debt ratio makes it possible to raise the growth of credits and therefore debts to pre individuals and businesses. It is important to monitor the use of this debt to highlight its effects on the economy in terms of creating new values. The distribution of bank outstanding by their maturity indicates that the share of short-term bank credit in total outstanding has relatively fallen by almost half during the period 2003-2021. While in 2003 it represented more than half of the debt on the economy, in 2021 it constitutes around a third of the total debt, or 35%. At the same time, the share of long-term credit, particularly investment credit, recorded a record, rising from 3.44% in 2000, i.e. 47.5 billion DA, to 53.3% in 2017, i.e. a debt of 4,737.6 billion dinars. Restructuring investments, financing of business creation projects and real estate loans to households have contributed to the increase in debt in the economy. The share of medium-term credit declined from 40.7% in 2003 to 20.77% in 2017. In figures, they increased on an annual average of 8.89% over the period 2003-2017. In 2021, the total medium and long-term credits reached 6,321.7 billion dinars, thus constituting more than 65% of the credits granted to the economy.

Figure N°01: Evolution and distribution of credits granted to the economy

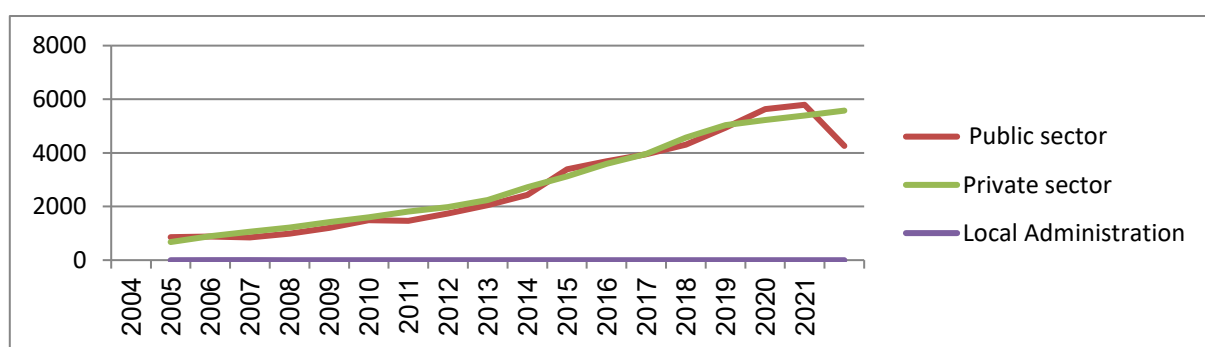


Source : Established by the authors from the annual reports of the Bank of Algeria 2002, 2012, 2014 and 2017, 2022.

The analysis of the structure of debt by legal sector makes it possible to highlight the weight of each of the public and private sectors. Thus, public debt continues to weigh

on the growth of the economy, particularly through the inability of certain public companies to repay their debt. We cite the case of SONELGAZ which, through its large-scale projects and the problem of non-repayment of debts held by its customers (public administration and households), is no longer able to make its projects profitable, particularly through the price of the KWh which does not cover not its cost price. The private sector monopolizes half of the bank loans, particularly through the assistance requested for the financing of private business creation projects (private SMEs constitute more than 90% of the SME fabric in Algeria).

Figure N°02: Distribution of credits granted to the economy by sector of activity



Source : Established by authors from the annual reports of the Bank of Algeria 2002, 2012, 2014 and 2017, 2022.

3.2 Analysis of performance ratios of Algerian banks

The solvency ratio is the ratio which measures the ability of a bank to ultimately honor its commitments. It determines the financial strength of a bank in terms of its ability to meet deposit withdrawal requests. It is for this reason that the solvency ratio is a way of showing customers that a bank is capable of managing major risks. It is given by the formula : The general solvency ratio = equity / total liabilities. The minimum tolerated solvency must be between 8% and 10.5%.

We note that the solvency ratio of the banking sector is higher than the minimum retained with a variation of around 15 to 23%. The ratio, which fell slightly from 23% in 2010 to 19% in 2017 then to 21.82% in 2021, remains generally comfortable.

The third party solvency ratio indicates the degree of solvency of the bank in terms of its ability to estimate the risk linked to granting a loan. The latter must not exceed 25%. Thus, the solvency ratio on third parties indicates that the risk incurred by beneficiaries is below 25%. It varie depending on the year between 15 and 17% without exceeding the required threshold. Returns on equity express the profitability of capital in terms of its ability to generate profits. Bank profitability is measured by returns on equity and returns on assets. The latter are measured by the ratio of net income generated to equity and total assets respectively.

Table N°. 05 : Evolution of bank performance indicators

	Overall solvency ratio	Third party solvency ratio	Return on equity ROE	Return on assets ROA	Liquid assets/total assets ratio	Bank liquidity Billions Dinars	Capital/banks asset Ratio
2010	23.64%	17.67%	26.7%	2.16%	52.98%	2610.8	8.22
2012	23.62%	17.48%	22.67%	1.93%	45.87%	2876.26	8.3
2014	15.98%	13.27%	23.55%	1.98%	37.96%	2730.9	7.93
2016	18.86	16.33%	18.14%	1.86%	24.1%	820.9	9.87
2017	19.56%	15.18%	18.8%	2.05%	23.51%	1380.6	9.77
2018	19.05%	14.98%	22.4	2.42	19.84	1557.9	9.95
2019	17.99%	14.26%	14.08	1.51	15.97	1,100. 8	9.859
2020*	19.17%	15.38%	8.31	1.43	13.11	632.3	10.28
2021*	21.82%*	17.93%	11.2	1.95	35.74*	1331.9	nb

Source : Established by authors from the annual reports of the Bank of Algeria 2014 and 2017. * updated data ** provisional data

We note that the return on assets fell then slightly recovered in 2017 where it recorded a rate of 2.01%. In 2021, it stands at 1.95%, which allows compliance with prudential standards required at 2% (European standards). As for returns on equity, these have experienced a significant drop from 26% in 2010 to 11.2% in 2021. However, the level of returns on equity has been relatively low since 2012 when it recorded a rate lower than that of European banks which is around 25%.

Analysis of the liquid assets/total assets ratio makes it possible to understand the liquidity risk incurred by the bank. We have shown above that banks are faced with this risk due to the increased banking outstanding that they grant to the economy compared to the demand deposits that they generate which represent in amount half of that of loans. Thus the ratio of liquid assets to total assets fell by almost half, from 52% in 2010 to 23% in 2017 then 35% in 2021. This ratio indicates that liquid assets (cash, quasi-assets) expired and certain securities and transferable assets) represented almost half of total assets in 2010. This composition significantly deteriorated, passing to 23% in 2017 then to 35% in 2021. This situation resulted in a drop of almost half in bank liquidity, particularly immediate liquidity, which went from 2,610.8 billion Dinars in 2020 to 1,332 billion Dinars in 2021. The capital/asset ratio of banks is measured by the capital ratio (equity, reserves, retained earnings and provisions, etc.) on the total assets of banks. The latter refers us to the prudential management of risks emanating from the activity of granting

credit in the face of capital losses incurred. By following this rule, a bank cannot grant more than 12.5 times of its capital and therefore avoid the risk of bankruptcy within the limit where this rule stipulates that for a rate of 8% of its capital compared to in total of these assets ; a bank can face the risk of capital losses. Analysis of the evolution of this ratio shows that banks respect this international prudential standard with a ratio which is between 8 and 10%, i.e. a rate lower than 12.5%.

4. Forecasting bank liquidity : What tools to control the evolution of currency in circulation ?

Bank liquidity forecasting is a crucial aspect of financial management for banking institutions. Banks must anticipate and plan their liquidity in order to meet financing needs and cope with possible economic shocks. Liquidity forecasting models use historical data, economic indicators and bank-specific parameters to estimate future cash flows. These models can take into account deposits, loans, funding sources and other factors to assess the availability of short-term liquidity.

4.1 Bank liquidity management instruments

Regular monitoring of these forecasts allows banks to adjust their cash management policies, make informed investment decisions and prepare for possible stress scenarios. Effective liquidity management helps strengthen financial stability and minimize the risk of payment default, thereby ensuring the smooth functioning of banking activities. Forecasting bank liquidity using monetary instruments involves examining specific financial tools that influence liquidity availability. Some of these instruments include :

- Open Market Operations (OMO) : Securities market transactions carried out by a central bank to influence the quantity of money in circulation and interest rates.
- Marginal Lending Facility (MPF) : An instrument through which banks can borrow funds from the central bank to meet their short-term liquidity needs.
- Deposit Facility : A mechanism allowing banks to deposit excess liquidity with the central bank.

4.2 Forecast models : what lessons for Algeria

Forecasting models could therefore incorporate these instruments, taking into account anticipated changes in interest rates, open market operations and the use of lending and deposit facilities, for example (*Saunders & Cornett, 2018, p45*) :

$$\text{Liquidity} = \text{DC} - \text{PA} - \text{INV} + \text{FTO} - (\text{Interest Costs} - \text{Interest Income}) + \text{OMO} + \text{FPM} - \text{Deposit Facility}$$

By integrating these monetary instruments into the forecasting model, the bank can better anticipate its liquidity position and make informed decisions on the management of its assets and liabilities to maintain appropriate liquidity levels (*BCBS, 2018*). An example bank liquidity forecasting model could include the following variables :

- Customer Deposits (CD) : The amount of money that customers deposit into the bank.
- Loans granted (PA) : The amount of loans that the bank has granted.
- Investments (INV) : The bank's financial investments.
- Cash flow from operations (FTO) : The inflows and outflows of cash resulting from daily activities.
- Interest Rates (IT) : Current interest rates that affect financing costs and investment returns.

The model could then take the form of equations that express the relationship between these variables.

$$\text{Liquidity} = \text{DC} - \text{PA} - \text{INV} + \text{FTO} - (\text{Interest costs} - \text{Interest income})$$

By using historical data and adjusting the coefficients of the variables according to market conditions, the bank can forecast its future liquidity position. This forecast would then make it possible to adjust cash management strategies, such as purchasing or selling assets, to ensure adequate liquidity in all circumstances. Forecasting bank liquidity using monetary policy instruments involves the analysis of the tools used by monetary authorities to influence the money supply and interest rates. Some of these instruments include :

- Policy rate : The interest rate set by the central bank, which influences borrowing rates in the economy.
- Open market operations (OMO) : Purchases or sales of securities carried out by the central bank to adjust the quantity of money in circulation.
- Reserve Requirements (RO) : The requirements imposed on banks to retain a certain proportion of their deposits in reserves, thereby regulating the amount of liquidity available. A forecasting model could integrate these instruments by considering how potential adjustments to the policy rate, open market operations and reserve requirements may affect bank liquidity. Thus liquidity is given by the following formula :

$$\text{Liquidity} = \text{DC} - \text{PA} - \text{INV} + \text{FTO} - (\text{Interest costs} - \text{Interest income}) + \text{OMO} - \text{Mandatory reserves} \times \text{DC}$$

By anticipating potential movements in these monetary policy instruments, banks can adjust their liquidity forecasts and take appropriate measures to maintain adequate liquidity levels, in alignment with overall economic conditions (BCBS, 2018).

The stress test is one of the forecasting tools that make it possible, through simulation, to assess the resilience of banks in the face of extreme economic situations. It tests their ability to withstand financial crises or adverse events that could affect their stability, such as a recession, a fall in asset prices, a rise in interest rates, or a liquidity crisis. As part of banking forecasting, the stress test focuses on several key aspects :

- Solvency : it measures the ability of a bank to absorb losses while remaining solvent. The test assesses whether the bank has sufficient capital to weather significant economic shocks without compromising its operations.
- Liquidity : it analyzes the bank's ability to respond to massive withdrawals or sudden financing needs. This component checks whether the bank has sufficient liquidity reserves to avoid a payment default.
- Credit risk : the stress test assesses the impact of deterioration in asset quality (for example, an increase in loan defaults) on the bank's balance sheet. It checks whether an increase in bad debts could weaken the strength of the bank.
- Market risk : this component tests the impact of the volatility of financial markets (shares, bonds, currencies, etc.) on the bank's assets and its ability to react to sudden fluctuations.
- Extreme scenarios : Stress tests are often based on "extreme but plausible" hypothetical scenarios, such as a global recession or a major oil shock. They make it possible to simulate the impact of these scenarios on a bank's financial indicators.

All of these tests help regulators and banks themselves to anticipate crises and take corrective measures before they become critical. The results of stress tests may lead to adjustments in risk management strategies, the creation of additional reserves, or changes in credit policy. Stress testing allows banks to predict potential risks associated with financial crises and assess whether they are robust enough to continue operating even in extreme situations (SAOULI S., ZAID H., 2022.P416-418).

4.3 Analysis of the performance of Algerian banks using the stress test

The evaluation of the performance of Algerian banks through indicators of solvency, return on equity (ROE) and liquidity provides an overview of the health of the banking system in Algeria. However, the results vary and show certain structural weaknesses. Here is an analysis of each indicator to understand the situation of Algerian banks.

- Solvency ratio : The solvency ratio measures the ability of a bank to cover its risks with its own funds. In the case of Algerian banks, most largely comply with solvency requirements. According to the Basel standards (I, II and III), banks must maintain a minimum solvency ratio of 8%, and the analysis of the ratios indicates that Algerian banks often exceed this threshold (BCBS, 2018). In Algeria, and in particular public banks, generally have high capital levels in proportion to their risks, which reflects fair solvency. However, this good solvency is often due to the capital structure strongly supported by the State rather than to optimized risk management. This masks some structural inefficiency.
- Return on equity (ROE) : ROE measures a bank's ability to generate profits in relation to the equity invested. A high ROE is a sign of financial performance, but it can be nuanced depending on the risk taken. In Algeria, the ROE of Algerian

banks is generally modest by international standards. This situation is due to several factors including the predominance of public banks, which tend to have prudent policies and to focus on financing large public companies rather than on risk diversification, the shallow depth of the Algerian financial market and the absence of fierce competition and an economic environment dependent on hydrocarbons. Furthermore, banking sector reforms are slow, which limits financial innovations and the ability of banks to improve their efficiency. Overall, the profitability of Algerian banks is low compared to other emerging markets (*DERRARDJA N., TALHAOU F., ZAID H., 2022. P4-9*).

- Bank liquidity : it measures the ability of banks to honor their short-term commitments. A good level of liquidity is essential to maintain customer confidence and avoid liquidity crises. In general, Algerian banks face high levels of liquidity due to the importance of public savings, but this liquidity remains poorly transformed into credits, particularly for SMEs and private projects. Algerian banks have long favored financing large public companies or state projects, which limits the impact of liquidity on economic growth in the private sector. The liquidity ratio of Algerian banks tends to be comfortable, but the efficiency of the transformation of savings into loans remains a challenge.
- The overall performance of Algerian banks : Although Algerian banks generally respect solvency standards and display a good level of liquidity, several structural weaknesses compromise their real performance :
 - Low risk diversification : The concentration of banks' portfolios on large public companies limits their ability to take risks and finance innovative projects or SMEs, which slows down profitability.
 - State dependence : State involvement in the banking sector creates inertia in innovation and in the adoption of modern banking practices.
 - Weak modernization of financial systems : Algerian banks remain behind in the adoption of new technologies (fintech, digitalization) and in the integration of best risk management practices.
 - Moderate return : The profitability of equity is relatively low, in particular due to limited competition and an economic environment highly dependent on fluctuations in hydrocarbon prices. Algerian banks cannot be considered fully efficient on the international scene in terms of profitability and efficiency. However, they are relatively strong in terms of solvency and liquidity, mainly thanks to state support. Economic diversification, better risk management, and modernization of the banking sector would be necessary to improve their performance, especially in a post-COVID context where digital transition and

financial inclusion have become imperatives for competitiveness (BESSAI F., 2022.P76-84).

5. CONCLUSION:

Algerian banks contribute massively to financing the economy. The weight of both the public and private sectors is felt through the debt of the economy as a whole. Deposit collection activities remain marginalized. We confirm the approach of the banking system based on the privilege of granting credit and the principle of savings in advance. The image of the bank by reference to the solvency ratio still leaves confidence in the long term but in the short term refers to a critical situation involving the liquidity of the banks and therefore an increase in the bank interest rate emanating from the use of refinancing with of the central bank.

To improve liquidity management in Algerian banks, it is imperative to adopt several strategies. First of all, banks must diversify their savings products by introducing more attractive financial products to encourage banking use and promote greater banking inclusion. Additionally, there is a need to strengthen liquidity forecasting models, relying on modern tools such as open market operations and lending facilities. Finally, cooperation between the Central Bank and commercial banks must be strengthened to guarantee constant monitoring of liquidity ratios and ensure lasting financial stability. The development of a harmonized regulatory framework, inspired by international practices, would allow Algeria to better resist external shocks and improve the overall performance of its banking sector.

6. List of references:

1. Bensiahmed, Y., & Azzaoui, K. (2023). The impact of credit and liquidity risks on the financial stability of Algerian banks. *Journal of Economics and Management Studies*, 6(1).
2. Bessai, F., & Kessouh, (2020). Analysis of the performance of public and private banks in Algeria. *Finance & Markets Review*, 7(3), 76 - 84.
3. Beziade, M. (1986). *Money* (2nd ed.). Masson.
4. Basel Committee on Banking Supervision. (2013). *Basel III : The liquidity coverage ratio and liquidity risk monitoring tools*. Bank for International Settlements. <https://www.bis.org/publ/bcbs238.pdf>
5. Basel Committee on Banking Supervision. (2018). *Stress testing principles*.
6. Chabane, F., Madadi, A., & El Hirts, A. (2021). Financial inclusion in Algeria : Determinants and constraints. *Economie et Développement Humain Review*, 12(2), 9-10.

7. Derrardja, N., & Zaid, H. (2022). The determinants of liquidity and bank profitability : The case of Algerian banks. *Djadid El-Iktissad*, 17(1), 615 - 646.
8. Derrardja, N., Talhaoui, F., & Zaid, H. (2022). The determinants of banking liquidity : A look at Algerian banks facing the COVID-19 health crisis. *Djadid El-Iktissad*, 9(3), 4 - 9.
9. Laksaci, M. (2010). *Resource management and financial stability in Algeria*.
10. McLeay, M., Radia, A., & Thomas, R. (2014). Money creation in the modern economy. *Bank of England Quarterly Bulletin*, 2014 Q1. <https://www.bankofengland.co.uk/-/media/boe/files/quarterly%20bulletin/2014/money-creation-in-the-modern-economy>
11. Mishkin, S., & Eakins, G. (2018). *Financial markets and institutions* (9th ed.).
12. Bank of Algeria. (2002). *Annual report 2002*.
13. Bank of Algeria. (2012). *Annual report 2012*.
14. Bank of Algeria. (2014). *Annual report 2014*.
15. Bank of Algeria. (2017). *Annual report 2017*.
16. Bank of Algeria. (2021). *Annual report 2021*. <https://www.bna.dz/wp-content/uploads/2023/01/rapport-bna-2021.pdf>
17. Bank of Algeria. (2022). *Annual report 2021*.
18. Bank of Algeria. (2024). *Number of depositors*.
19. Perspective Monde. (n.d.). *World perspective*.
20. Rochet, J.-C. (2008). Liquidity regulation and the lender of last resort. *Financial Stability Review, Bank of France*(11), 45 - 52. <https://ideas.repec.org/a/bfr/fisrev/2008117.html>
21. Saouli, S., & Zaid, H. (2022). Analytical study of a liquidity stress test during the COVID-19 crisis: Case of Algerian public banks. *Journal of Research and Studies in Development*, 9(2), 416 - 418.
22. Saunders, A., Cornett, M., & Erhemjamts, O. (2022). *Financial institutions management : A risk management approach*.
23. Touati-Tliba, M., & Benilles, B. (2021). The impact of the oil shock on the relative performance of banks in Algeria : Public banks vs foreign private banks. *The Cread Notebooks*, 37(2).