

	<p>Science, Education and Innovations in the Context of Modern Problems</p>
<p>Issue 2, Vol. 9, 2026</p>	
<p>RESEARCH ARTICLE </p>	
<h2 style="text-align: center;">The Effects of Cash Leakage and Financial Inclusion on the Efficiency of the Algerian Banking System during the Period 2010–2022</h2>	
<p>Khalafi Hemza</p>	<p>Dr. Lecturer, Department of Economics, , Faculty of Economic, Commercial and Management Sciences University of Elbayadh Algeria Email: h.khalafi@cu-elbayadh.dz</p>
<p>Bensaadi Seyyid Ali</p>	<p>Dr. Lecturer, Department of Commercial Sciences, Faculty of Economic, Commercial and Management Sciences, University of Laghouat Algeria Email: s.bensaadi@lagh-univ.dz</p>
<p>Serrai Salah</p>	<p>Dr. Lecturer, Department of Economics, Faculty of Economic, Commercial and Management Sciences, University of Msila Algeria Email: salah.serrai@univ-msila.dz</p>
<p>Issue web link</p>	<p>https://imcra-az.org/archive/392-science-education-and-innovations-in-the-context-of-modern-problems-issue-2-vol-9-2026.html</p>
<p>Keywords Mots clés :</p>	<p>Cash leakage; Financial inclusion; Banking sector performance; Algeria; Liquidity efficiency.</p>
<p>Abstract The study of the horse’s role in Ottoman Algeria holds significant importance as it provides a critical lens to This study investigates the impact of cash leakage and financial inclusion on the performance efficiency of the Algerian banking system during the period 2010–2022. A significant proportion of money remains outside the formal banking sector, limiting banks’ capacity to mobilize deposits and allocate resources efficiently for lending and investment activities. Furthermore, the level of financial inclusion remains relatively low due to limited access to banking services, insufficient branch and ATM networks, and the exclusion of certain population segments from formal financial systems. The study highlights that both cash leakage and weak financial inclusion negatively affect banking intermediation efficiency and reduce the sector’s contribution to economic development. The findings emphasize the importance of expanding financial access, promoting digital financial services, and strengthening institutional frameworks to enhance the overall efficiency and stability of the Algerian banking system.</p>	
<p>Citation Khalafi, H., Bensaadi, S. A., & Serrai, S. (2026). The effects of cash leakage and financial inclusion on the efficiency of the performance of the Algerian banking system during the period 2010–2022. <i>Science, Education and Innovations in the Context of Modern Problems</i>, 9(2), 1-14. https://doi.org/10.56334/sci/9.2.83</p>	
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Received: 02.12.2025

Accepted: 08.01.2026

Published: 03.02.2026 (available online)

1. Introduction:

Banks, being the principal financing interface in developing economies, seek to improve overall performance indicators. Therefore, the role of the banking system in these economies is central and essential, since through it the flow of funds between saving and investment is realized. Yet, there exist circumstances and factors that restrict the capacity of banks and financial institutions to perform the financial intermediation role in a full and effective manner. The prevailing economic system and the adopted economic policies, together with their effects, especially in the long term, hinder the banking system from achieving the targeted objective, namely efficiency in mobilizing savings and efficiency in investing the mobilized funds. Consequently, economic stability plays an important role in spreading confidence among depositors and financial intermediation institutions. However, developing economies are not devoid of the informal economy phenomenon, which directly affects the functioning of the banking system and the level of its efficiency in managing funds between saving and investment. Accordingly, this effect appears first through the role of the banking system in mobilizing the necessary resources, as the phenomenon of currency leakage or currency held outside banks represents one of the aspects of weakness and inability to mobilize savings in an optimal way that would, by nature, ensure the optimal investment of these funds, which in turn obstructs the activity of financial intermediation institutions, and banks in particular.

1.1 Research Problem:

The phenomenon of currency leakage exists within the Algerian economy; however, its levels are associated with several factors, most notably banking awareness, the geographical spread of bank branches, and the extent of digitalization usage within the Algerian banking system. From this standpoint, the present study aims to address the following problem:

What are the effects of currency leakage and financial inclusion on the efficiency of the performance of the Algerian banking system during the period 2010–2022?

2. Definition of the Study Variables

1.2 The Banking System

1.1.2 Definition of the Banking System

The banking system represents the totality of banking institutions that operate in credit activities, and it varies according to the prevailing economic system. This system generally includes commercial banks, specialized banks, and the central bank. Accordingly, the bank, regardless of its type, constitutes the basic core forming the banking system (Ismail.Khalf.Allah, 2018, p. 30).

The banking system is considered the primary body influencing money supply. It includes, within its components, the totality of financial institutions operating under a set of activities and regulations that shape the dynamic framework through which financial institutions carry out their functions and regulate the banking operational mechanism. It is responsible for supplying economic projects with their short- and medium-term requirements, and its structure comprises the central bank, commercial banks, specialized banks, and Islamic banks (Abd.Alrahman.Najm.Almashhadani.Zina.Sami.Laabidi, 2020, p. 96).

2.1.2 Factors Affecting the Performance of the Financial Intermediation Function of the Banking System

1.2.1.2 Factors Affecting Deposit Activity

These factors are confined to the following points (Mohamed.Lan.Bouziane.Abd.Allatif.Msaitfa, 2015, pp. 48–49):

- **Interest rates:** An increase in the demand for bank deposits leads to an increase in the real interest rate, particularly when the interest rate becomes positive.
- **Income:** Income is regarded as one of the important economic factors that exerts a considerable effect on saving motives in general within the economy.

- **Bank credit:** That is, the volume of loans and credit facilities provided by banks to different economic sectors.
- **Banking awareness:** It refers to the accustomed behavior of economic agents in depositing their cash balances in banks and relying on bank cheques.
- **Certain bank-related characteristics:** These are related to modern technology, location, bank policies, experience, trust, and the quality of services offered.
- **Stability:** This is represented in economic, political, and legislative stability, for the purpose of enhancing confidence in banking system institutions.

2.2.1.2 Factors Affecting Lending Activity

Among the factors influencing loan granting are the following (Abd.Almuttalib.Abd.Alhamid, 2007, pp. 147-151):

- The policy of the monetary authority represented by the central bank;
- Ownership rights and capital size, in addition to the type and volume of deposits, and the cost of resources;
- The volume of assets required for bank operation and liquidity needs;
- The efficiency of those responsible for credit and lending activities within banks;

2.2 Currency Leakage

2.2.1 Definition of Currency Leakage

Currency leakage refers to the amount of money retained by individuals and institutions outside the banking framework. That is, when individuals obtain loans from banks, they may keep them entirely in the form of liquid cash, which results in currency leakage outside the banking system (Ahmed.Hussein.Battal, 2020, p. 552). Currency leakage denotes the gap between the volume of money issued and circulated by the central bank in the economy and the actual volume of money existing within the economy. It is considered an undesirable phenomenon, as it leads to higher inflation rates and monetary instability (Maktout.Ali.Qara.Amal.Mustafa, 2023, p. 287). Moreover, the exit of money from banking channels reduces the effect of the credit multiplier (Mohamed.Hussein.Alwadi et al., 2010, p. 156). Currency leakage is also defined as the outflow of legal tender outside the banking system, which occurs when the amounts lent by banks do not return in the form of new deposits, thereby depriving the banking system of the possibility to utilize them (Mohamed.Alseirafi, 2016, p. 192).

2.2.2 Causes of Cash Leakage

The main causes that lead to the occurrence of this phenomenon are represented in the following points: (Ahmed.Hussein. Batal, 2020, pp. 553-554)

- Absence of trust in the banking apparatus and its weakness in attracting deposits;
- Hoarding, weak financial inclusion, and the practice of corruption;
- Weak diffusion of electronic payment instruments and the phenomenon of dollarization (buying the dollar);
- Burdens of tax contributions and social security.
- Lack of stability in the legislative frameworks related to the banking apparatus and the difference between the official exchange rate and the parallel one, which increases the activity of the parallel market, and thus an increase in cash leakage; (Benabi. Fatiha, 2018, p. 4)

3. Cash Leakage and Its Relation with the Algerian Banking Apparatus

Cash leakage leads to the weakening of the efficiency of the performance of the banking apparatus, especially with regard to attracting deposits, which prevents it from carrying out the function of financial intermediation. This is due to a group of determinants, perhaps the most prominent of which is the weakness of financial inclusion levels. What we will present in this axis is the reality of cash leakage in the Algerian banking apparatus, as well as presenting indicators of financial inclusion of the banking sector as a determinant of cash leakage in Algeria.

3.1 Cash Leakage and the Efficiency of Performance of the Algerian Banking Apparatus

The increase in the level of efficiency of the banking apparatus in attracting deposits reduces cash leakage, and consequently increases its ability to grant loans and derive them, and thus increasing financing, (Benabi. Fatiha, 2018, p. 12). From here, the volume of lending is dependent on the size of savings that have been attracted, which leads us to study the indicators of efficiency of the Algerian banking apparatus and the contribution of money circulating outside banks in these indicators.

3.1.1 Cash Leakage and Money Supply in the Algerian Banking Apparatus

In order to identify the size of cash leakage and its relation with the monetary mass in Algeria, we present the data of the following table:

Table (1): The Relationship of Cash Leakage with the Monetary Mass in the Algerian Banking Apparatus 2010–2022 (Billion DZD)

Year	Currency outside banks (1)	Increase in (1) %	Monetary mass M1 (2)	Monetary mass M2 (3)	(1)/(2) %	(1)/(3) %
2010	2098	--	5756.4	8162.8	36.44	25.3
2011	2571.5	22.56	7141.7	9929.2	36	25.9
2012	2952.3	14.80	7681.8	11015.1	38.43	26.8
2013	2304	-21.95	8249.8	11941.5	27.92	26.8
2014	3658.9	58.8	9603	13686.7	38.1	26.7
2015	4108.1	12.27	9261.2	13704.5	44.35	30
2016	4497.2	9.47	9407	13816.3	47.8	32.5
2017	4716.9	4.88	10266	14974.6	45.91	31.5
2018	4926.8	4.45	11404.1	16636.7	43.2	29.6
2019	5437.6	10.36	10975.2	16506.6	49.54	32.9
2020	4210	-22.57	11901.8	17659.6	35.37	34.8
2021	5278.2	35.37	13590.3	20087.5	38.83	33.5
2022	6273.9	18.86	15370.4	22955.3	40.81	32.2

Source: (Bank. Algeria, Annual Reports 2012, 2017, 2022)

We notice from the previous table that the currency circulating outside the Algerian banking apparatus experienced a continuous increase except for the years 2013 and 2020. It is also observed that the monetary mass M1 also increased

except for the years 2015 and 2019, whereas the monetary mass M2 increased throughout the period 2010–2022. The ratio of currency in circulation to the monetary mass M1 reached high levels, ranging between 27.93% in 2013 and 49.54% in 2019, with an average value for the studied period of 36%. This means that 36% of the monetary base represents cash leakage that the banking institutions cannot manage through the process of money creation, thus reducing banks' ability to grant additional financing through money creation.

3.1.2 Cash Leakage and the Size of the Algerian Banking Sector

3.1.2.1 Cash Leakage and the Financial Intermediation Indicator

In order to determine the size of financial intermediation in Algeria and the contribution of cash leakage to it, we present the data of the following table:

Table (2): Cash Leakage and the Size of Financial Intermediation in Algeria 2010–2022 (Billion DZD)

Year	Currency outside banks	Monetary mass M2	GDP	Financial intermediation (M2/GDP) %	Leakage to GDP %	(M2/GDP) excluding leakage %
2010	2098	8162.8	11991.563	68.07	17.5	50.57
2011	2571.5	9929.2	14588.970	68.05	17.7	50.35
2012	2952.3	11015.1	16209.598	67.95	18.6	49.35
2013	2304	11941.5	16674.919	71.61	19.2	52.41
2014	3658.9	13686.7	17228.597	79.44	21.2	58.24
2015	4108.1	13704.5	16712.675	82	24.6	57.4
2016	4497.2	13816.3	17514.634	78.88	25.8	53.08
2017	4716.9	14974.6	18876.175	79.33	24.9	54.43
2018	4926.8	16636.7	20393.352	81.57	24.1	57.47
2019	5437.6	16506.6	20501.058	80.51	26.5	54.01
2020	4210	17659.6	18383.799	96.06	33.4	62.66
2021	5278.2	20087.5	22079.3	90.97	30.4	60.57
2022	6273.9	22955.3	27688.8	82.90	26.7	56.2

Monetary mass: (Bank. Algeria, Annual Reports 2012, 2017, 2022), **GDP:** (ONS, Statistical Summary 1962–2020, p. 297)

We notice from the previous table that the size of financial intermediation in Algeria reached high levels during the

study period, with ratios ranging between 67.95% in 2012 and 96.06% in 2020, with an average of 79%. When calculating the financial intermediation indicator by subtracting currency outside banks from M2, the actual financial intermediation ranged between 49.35% in 2012 and 62.66% in 2020, with an average of 55.13%. Therefore, the first indicator is misleading and does not reflect the actual size of financial intermediation, as the ratio of currency outside banks to total GDP ranged between 17.5% in 2010 and 33.4% in 2020, with an average of 23.89%.

3.1.2.2 Cash Leakage and the Size of Deposits and Loans in the Algerian Banking Apparatus

The size of the banking sector can also be measured by one of the indicators represented by total deposits to GDP or total loans to GDP. To determine the relationship between cash leakage and the size of the Algerian banking sector, the following indicators are presented:

Table (3): Relationship of Cash Leakage with the Size of the Algerian Banking Sector 2010–2023 (Billion DZD)

Year	Currency outside banks	Total deposits	Deposits/GDP	Loans/GDP	(Leakage Deposits)/GDP	+ (Leakage Deposits)/GDP excluding hydrocarbons	+
2010	2098	6182.1	0.52	0.27	0.69	1.17	
2011	2571.5	7357.7	0.50	0.26	0.68	1.18	
2012	2952.3	8062.8	0.50	0.27	0.68	1.16	
2013	2304	8737.5	0.52	0.30	0.668	1.06	
2014	3658.9	10027.8	0.58	0.38	0.798	1.21	
2015	4108.1	9596.4	0.57	0.44	0.828	1.12	
2016	4497.2	9319.1	0.53	0.45	0.79	1.06	
2017	4716.9	10257.7	0.54	0.47	0.79	1.08	
2018	4926.8	11709.9	0.57	0.49	0.82	1.05	
2019	5437.6	11069	0.54	0.51	0.81	1.06	
2020	4210	11521.6	0.63	0.60	0.86	0.99	
2021	5278.2	20087.5	0.90	0.44	1.19	1.48	
2022	6273.9	15562.5	0.56	0.37	0.79	1.14	

Source: (Bank. Algeria, Annual Reports 2012, 2017, 2022)

We notice from the previous table that the size of the Algerian banking sector, according to the deposits-to-GDP indicator, represents more than the GDP in most of the study years. The years 2020 and 2021 recorded ratios of 0.63 and 0.90 respectively, while the loans-to-GDP indicator recorded ratios below 50%, except for the years 2019 and 2020, which recorded 0.51 and 0.61 respectively. Therefore, there is efficiency in attracting deposits by the banking apparatus, but the utilization of these deposits is inefficient. It is also observed that (cash leakage + deposits)/GDP reached very high levels, with a minimum of 0.668 in 2013 and a maximum of 0.86 in 2020. In 2021, it reached 1.19, meaning that in the absence of cash leakage, the deposits in the Algerian banking apparatus would cover the total GDP, but their utilization efficiency depends on other factors.

3.1.3 Cash Leakage and the Size of Deposits in the Algerian Banking Apparatus

To measure the efficiency of the banking apparatus in attracting deposits, the ratio of currency circulating outside the banking apparatus to total deposits is calculated. If it is less than (1) true, this indicates that most transactions are conducted through the banking apparatus, and thus there is efficiency in utilizing and attracting local savings. If the ratio is greater than (1) true, this indicates low efficiency of the banking apparatus in attracting and employing public savings, (Benabi, Fatiha, 2018, p. 12). To identify the relationship between cash leakage and total deposits in the Algerian banking apparatus, we present the following table:

Table (4): Relationship of Cash Leakage with Deposits in the Algerian Banking Apparatus 2010–2023 (Billion DZD)

Year	Currency outside banks	Total deposits	Total loans	Deposits to loans	Currency outside banks to deposits
2010	2098	6182.1	3268.1	1.66	0.34
2011	2571.5	7357.7	3726.5	1.69	0.35
2012	2952.3	8062.8	4298.4	1.56	0.37
2013	2304	8737.5	5156.3	1.40	0.26
2014	3658.9	10027.8	6504.6	1.31	0.36
2015	4108.1	9596.4	7277.2	1.14	0.43
2016	4497.2	9319.1	7909.9	1.03	0.48
2017	4716.9	10257.7	8880	1.03	0.46
2018	4926.8	11709.9	9976.3	1.06	0.42
2019	5437.6	11069	10857.8	0.91	0.49
2020	4210	11521.6	11182.3	0.89	0.37
2021	5278.2	20087.5	9794.7	1.19	0.26
2022	6273.9	15562.5	10115.2	1.37	0.40

Source: (Bank. Algeria, Annual Reports 2012, 2017, 2022)

We notice from the previous table that the ratio of cash leakage to total deposits in Algeria recorded low values ranging between 0.26 in 2013 and 0.49 in 2019, with an average value of 38.38%. These ratios do not approach (1) true, and according to the above indicator guide, this means that most transactions are conducted through banking institutions. Therefore, there is efficiency in attracting deposits in the Algerian banking apparatus during 2010–2020. However, the banking apparatus is inefficient in employing these savings, as reflected by the total deposits-to-total loans ratio, which remained above one (1) throughout the studied period except in 2019, when it recorded 0.89, meaning deposits that year represented 89% of granted loans.

3.2 Financial Inclusion as a Determinant of Cash Leakage in the Algerian Banking Apparatus

Financial inclusion is a real strategy to improve the effectiveness of monetary policies, due to the inverse relationship between inflation and the size of loans and advances of commercial banks as a percentage of GDP. This indicates that providing financing and credit when reducing interest rates leads to increased investment volumes and reduced inflation levels. In other words, the more individuals access formal banking services, the more it contributes to financial and monetary stability, which is the goal of financial inclusion strategies. (Aymen. Bouzana. Wafa. Hamdouch, 2021, p. 75)

3.2.1 Bank Account Ownership in Algeria

To examine bank account ownership and types in the Algerian banking apparatus as a percentage of total adults, we present the following table:

Table (5): Bank Accounts in the Algerian Banking Apparatus as a Percentage of Total Adults 2011–2021

Year	Adults with bank accounts	Savings accounts	Credit accounts
2011	33.29%	4%	1%
2014	50.48%	14%	6%
2017	42.78%	11%	5%
2021	44.10%	16%	4%

Source: (World Bank, <https://www.worldbank.org/en/publication/globalindex/Data>)

We notice from the previous table that the percentage of adults owning a bank account was 33.29% in 2011, rose to 50.48% in 2014, dropped to 42.78% in 2017, and stabilized at 44.10% in the latest financial inclusion report. Savings accounts represent a small proportion of total adults, reaching a maximum of 16% in 2021, while credit accounts recorded very low percentages, ranging between 1% and 6%, reflecting the low efficiency of the banking apparatus in optimally employing all savings.

To examine active accounts in the Algerian banking apparatus, we present the following table:

Table (6): Active Accounts in Dinar and Foreign Currency in the Algerian Banking Apparatus 2010–2022

Year	Foreign currency accounts	%	Dinar accounts	%	Total	Year	Foreign currency accounts	%	Dinar accounts	%	Total
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2010	4,188,227	32	8,945,501	68	13,133,728	2017	4,335,600	28	10,914,746	72	15,250,346
2011	3,871,602	30	8,823,783	70	12,695,385	2018	4,685,944	28	11,868,327	72	16,554,271
2012	3,969,658	28	10,147,409	72	14,117,067	2019	4,936,912	29	12,021,953	71	16,958,865
2013	4,130,029	28	10,564,224	72	14,694,253	2020	4,105,027	26	11,502,426	74	15,607,453
2014	4,281,931	28	10,971,639	72	15,253,570	2021	4,199,931	26	11,655,567	74	15,855,498
2015	4,441,958	28	11,346,007	72	15,787,965	2022	4,523,160	27	12,023,128	73	16,546,288
2016	4,640,918	28	11,876,700	72	16,517,618	--	--	--	--	--	--

Source: (Bank. Algeria, <https://www.bank-of-algeria.dz/ar>)

We notice from the previous table that the number of active bank accounts in Algeria reached 13.1 million accounts in 2010, and decreased in 2011 to 12.6 million accounts. In the following years, there was a continuous increase until 2016, reaching 16.5 million accounts. The peak was in 2019 with 16.9 million accounts. However, the total active bank accounts are distributed between foreign currency accounts and Dinar accounts, and the latter represent the larger proportion of total bank accounts in Algeria, ranging between 68% and 74% during the period studied.

3.2.2 Depositors and Borrowers in the Algerian Banking System

To identify the depositors and borrowers in the Algerian banking apparatus, we present the following table:

Table (7): Number of Depositors and Borrowers in the Algerian Banking System 2009 -2022

Year	Depositors	Borrowers	Borrowers Depositors	/	Year	Depositors	Borrowers	Borrowers Depositors	/
2010	8,909,993	905,199	10.16		2017	11,048,337	1,183,542	10.71	
2011	9,362,225	813,834	8.96		2018	11,958,617	1,379,605	11.53	
2012	10,353,013	975,773	9.43		2019	10,887,236	1,460,216	13.41	
2013	11,416,893	1,070,840	9.38		2020	10,966,860	1,450,377	13.22	

2014	11,462,869	953,295	8.32	2021	11,549,361	1,488,746	12.89
2015	12,301,579	1,011,353	8.22	2022	11,966,891	1,305,679	10.91
2016	11,921,090	1,079,570	9.06	--	--	--	--

Source: (Bank. Algeria, <https://www.bank-of-algeria.dz/ar/>)

We notice from the table that the number of depositors in Algeria reached 8.9 million in 2010, then increased to 9.3 million in 2011. During 2012–2015, the number continued rising and reached 12.3 million, then during 2016–2022 it fluctuated between 10.5 and 11.9 million depositors. The number of borrowers did not exceed 1 million during 2010–2012, increasing to 1.07 million in 2013 and peaking at 1.48 million in 2021. This is very low compared to depositors, as reflected in the borrowers-to-depositors ratio, which did not exceed 13.5% in 2010–2022. This indicates weak efficiency of the Algerian banking system in employing domestic savings and the difficulty of granting loans.

To compare the number of borrowers in Algeria with the global average, we examine the indicator of borrowers from commercial banks per 1,000 adults, issued by the World Bank:

Table (8): Borrowers from Commercial Banks (per 1,000 adults) in Algeria 2010–2021

Year	Algeria Indicator (1)	Global Average (2)	Difference (1-2)	Year	Algeria Indicator	Global Average	Difference (1-2)
2010	34.6	--	--	2016	39.2	150.8	111.6
2011	39.1	100.1	61	2017	40.6	156	115.4
2012	42.6	108	65.4	2018	42.9	172.8	129.9
2013	45	131.3	86.3	2019	50.3	155.8	105.5
2014	42.5	154.1	111.6	2020	46.7	--	--
2015	44.2	148.1	103.9	2021	46.8	--	--

Source: (WorldBank, <https://data.albankaldawli.org/indikator/FB.CBK.BRWR.P3?locations=DZ>)

We notice that the borrowers indicator in Algeria per 1,000 adults was 34.6 in 2010, rose to 39.1 in 2011, lagging behind the global average which was 100.1. During 2012–2015 it ranged 42.5–44.2, still below the world average (108–148). It reached its peak in 2019 at 50.3 per 1,000 adults, i.e., only 50 out of 1,000 adults could borrow from banks in Algeria, while the world average was 155.8. In 2020 and 2021, the indicator recorded 46.7 and 46.8 respectively. The low level of this indicator shows that other factors besides deposits influence lending, and confirms the very weak performance of banks in using savings.

3.2.3 Banking Density in Algeria

Banking density is the number of bank branches divided by the population, multiplied by 10,000, a model by CAMERON (1967). It measures the distribution of banks. If the index equals 1, it is ideal. Greater than 1 means positive deviation, i.e., high branch spread. Less than 1 indicates negative deviation, meaning bank access is insufficient for part of the population (Abdel-Latif. Mustapha. Mohamed. Ben. Bouziane, 2006, p. 317).

Table (9): Development of Bank Branches in Algeria 2010–2022

Year	Bank branches (1)	Population (2)	Banking density (3)=(1/2)*10,000	Branches per 100,000 adults Algeria (4)	Global average	Difference
2010	1303	35,978,000	0.36	5.2	11	5.8
2011	1356	36,717,000	0.36	5.2	11.3	6.1
2012	1392	37,495,000	0.37	5.2	11.5	6.3
2013	1418	38,297,000	0.37	5.2	11.9	6.7
2014	1437	39,114,000	0.36	5.2	12.2	7
2015	1469	39,963,000	0.36	5.3	11.5	6.2
2016	1490	40,836,000	0.36	5.3	12.3	7
2017	1501	41,721,000	0.35	5.2	11.7	6.5
2018	1542	42,578,000	0.36	5.2	11.4	6.2
2019	1568	43,424,000	0.36	5.3	11	5.7
2020	1578	44,227,000	0.35	5.3	10.6	5.3
2021	1605	44,700,000	0.35	5.3	11.2	5.9
2022	1627	44,900,000	0.36	---	---	---

(1): Bank. Algeria, Number of bank branches in Algeria, <https://www.bank-of-algeria.dz/nombre-agences-wilaya/>

(2): ONS, Statistical Summary 1962–2020, p. 296

(4): World Bank, <https://data.albankaldawli.org/indicator/FB.CBK.BRCH.P5?locations=DZ>

We notice from the previous table that the banking density indicator in Algeria recorded values less than 1 throughout the study period, with values ranging between 0.36 and 0.37. Therefore, the spread of banks in Algeria is not sufficient for general access to financial and banking services, especially for obtaining loans. This explains the low level of the indicator of borrowers from commercial banks in Algeria, and the reason for the low borrowing from public banks in Algeria is the weak bank distribution.

The previous table shows that the values of the number of bank branches per 100,000 adults in Algeria ranged between 5.2 and 5.3 branches per 100,000 adults, where the indicator recorded 5.2 in 2010, lagging behind the global average of 11 branches per 100,000 adults in the same year, with a difference of 5.8. This situation continued throughout the

study period, and the values of the indicator reflect the weak spread of Algerian banking institutions. Therefore, most banks operate in densely populated areas only.

3.2.4 Automated Teller Machines (ATMs) in Algeria

To examine the indicator of ATMs in Algeria, issued annually by the World Bank, we present the following table:

Table (10): Number of ATMs in the Algerian Banking System 2010–2021

Year	Number of ATMs (1)	ATMs per 100,000 adults (2)	Algeria	Global Average	Difference
2010	868	5.92	5.92	31.35	25.43
2011	996	6.1	6.1	30.95	24.85
2012	1050	6.21	6.21	35.73	29.52
2013	1155	6.51	6.51	38.64	32.13
2014	1227	7.61	7.61	35.34	27.73
2015	1286	8.35	8.35	36.2	27.85
2016	1341	8.57	8.57	37.08	28.51
2017	1387	9.13	9.13	37.74	28.61
2018	1421	9.54	9.54	38.21	28.67
2019	1386	9.33	9.33	40.73	31.4
2020	1564	9.31	9.31	41.24	31.93
2021	1665	9.3	9.3	39.49	30.19

(1): Bank. Algeria, ATMs, <https://www.bank-of-algeria.dz/nombre-dab-gab/>

(2): World Bank, Financial Inclusion Database,

<https://data.albankaldawli.org/indicator/FB.ATM.TOTL.P5?locations=DZ>

We notice from the table that the number of ATMs did not exceed 1,000 in 2010 and 2011, then continuously increased to reach 1,755 ATMs in 2022. The indicator of ATMs per 100,000 adults ranged between 5.92 and 9.54 per 100,000 adults. The values in Algeria are very low and lag behind the global average in all years of the study. The reason is that most bank users do not use bank cards. In the latest World Bank report on global financial inclusion, the ownership of debit cards reached 23% of adults in Algeria, while credit card ownership was only 3% of adults (World Bank, <https://www.worldbank.org/en/publication/globalindex/Data>).

4. Conclusion

This study aimed to answer the following question: What is the impact of financial inclusion on cash leakage and the efficiency of the Algerian banking system during the period 2010–2023? The study reached the following conclusions:

- Cash outside banks represents an average of 36% of the total monetary base in Algeria during the study period, reaching 49.54% in 2019. Deposits to GDP averaged 57.38%, reaching 90% in 2021, while loans to GDP averaged 40.38%, reaching 60% in 2020.
- The sum of leakage and deposits to GDP represents high ratios, averaging 79.95% during the study period, exceeding 100% in 2021. When calculated based on non-hydrocarbon GDP, the ratios are over 100% throughout the study period, except 2020 (99%).
- There is efficiency in resource mobilization by the Algerian banking system, as shown by the deposits-to-loans ratio, which exceeded 1 in most years. Also, the ratio of cash outside banks to total deposits averaged 0.38, meaning 62% of transactions were conducted through banks during the study period.
- Financial inclusion indicators are low in Algeria; the customer base is weak. On average, 42.66% of adults hold a bank account, of which 16% are savings accounts and 4% are loan accounts. The total active bank accounts reached 16.95 million in 2019.
- Depositors reached 11.96 million in 2022, while borrowers were 1.48 million in 2021. The ratio of borrowers to depositors did not exceed 12.89%, recorded in 2021.
- Borrowing from banks in Algeria during the period studied was weak. The indicator of borrowers per 1,000 adults reached a maximum of 50.3 in 2019, while the global average reached 129.9 per 1,000 adults.
- Bank spread in Algeria is weak, limiting access to banking services. The banking density indicator did not exceed 0.37 throughout the study period. The number of bank branches per 100,000 adults did not exceed 5.3, while the global average reached 12.3, placing Algeria among the lowest in banking coverage.
- The number of ATMs reached 1,665 in 2021, while the ATM per 100,000 adults indicator reached its peak at 9.54 in 2018, compared to 38.21 globally.
- Cash leakage negatively affected the efficiency of the Algerian banking system, especially in resource mobilization. Cash outside banks to GDP represented 33.4% in 2020, meaning that this monetary mass remained outside the banking system and was not used in lending or investment opportunities.
- Financial inclusion indicators negatively affected the banking system's efficiency in employing savings. The limited customer base, low bank and ATM distribution, and the use of traditional payment methods instead of electronic ones reduced access to banking services for the largest possible segment of the population.

Ethical Considerations

This study is based on secondary macroeconomic and banking sector data obtained from official national and international statistical sources. The research does not involve human participants, personal data, or experimental procedures. The authors confirm that the study was conducted in accordance with accepted academic and research integrity standards and that all sources of data have been properly cited.

Acknowledgment

The authors would like to express their gratitude to their respective universities for academic support and to the institutions that provided access to statistical and financial data used in this research.

Funding

This research received **no specific grant** from any funding agency in the public, commercial, or non-profit sectors.

Conflict of Interest

The authors declare that there are **no conflicts of interest** regarding the publication of this paper.

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