

Can Better Institutions Make Openness Work? Insights from Algeria's Financial Liberalization Path

BOUCHEDDA Mohamed El Mehdi ⁽¹⁾, MILIANI Yacine ⁽²⁾

¹ PhD - LAMEOR, University of Oran 2, Algeria, bouchedda.mohamed@univ-oran2.dz

² MCA, University of Oran 2, Algeria, miliani.yacine@univ-oran2.dz

ARTICLE INFORMATION

Original Research Paper

Received: 17/12/2025

Accepted: 15/01/2026

Published: 21/3/2026

Keywords:

FDI

Institutional Quality ;

Financial Depth ;

ARDL ;

Algeria.

JEL Classification Codes: B52, C22, E44, E61, G34, I10.

Abstract : times new roman; size-10

This study examines the relationship between foreign direct investment (FDI), institutional quality, and financial institutional depth in Algeria from 1995 to 2022 using the Autoregressive Distributed Lag (ARDL) model. The findings underline that Algeria's financial liberalization depends on improving institutional quality, enhancing governance, and sustaining macroeconomic stability.

Mots clés:

IDE ;

Qualité Institutionnelle ;

profondeur financière ;

ARDL:

Algérie:

Codes de classification JEL: B52, C22, E44, E61, G34, I10.

Le résumé : Cette étude analyse la relation entre l'investissement direct étranger (IDE), la qualité institutionnelle et la profondeur des institutions financières en Algérie sur la période 1995–2022, en s'appuyant sur le modèle à retards échelonnés autorégressifs (ARDL). Les résultats soulignent que la réussite de la libéralisation financière en Algérie dépend de l'amélioration de la qualité institutionnelle, du renforcement de la gouvernance et du maintien de la stabilité macroéconomique.

Corresponding Author: BOUCHEDDA Mohamed El Mehdi bouchedda.mohamed@univ-oran2.dz

1- The introduction:

Algeria's financial liberalization emerged in response to the late-1980s oil shock and the limits of state-led development, prompting reforms that aimed to modernize monetary policy, liberalize credit, and strengthen financial supervision. Despite these efforts, weak governance and public sector dominance have constrained financial deepening, leaving the system largely dualistic. While foreign direct investment can enhance financial institutional depth through technology transfer and improved practices, its impact depends critically on institutional quality. Consequently, the interaction between FDI, governance, and financial development remains central to assessing the sustainability of Algeria's economic transition.

Classical theoretical perspectives, including neoclassical and endogenous growth models, emphasize the role of financial intermediation in transforming savings into productive investment. Within this framework, (Dunning, 1993) eclectic OLI paradigm explains FDI behavior through ownership, location, and internalization advantages, providing a foundation for analyzing investment flows under diverse institutional conditions. Institutional economics frameworks—particularly those developed by (North, 1990), (LaPorta, Lopez-de-Silanes, Shleifer, & Vishny, 1997) and (Acemoglu & Robinson, 2013)—highlight governance and institutional quality as key determinants of economic and financial performance. These approaches demonstrate that corruption, regulatory uncertainty, and weak enforcement mechanisms undermine investor confidence and constrain financial sector development.

Empirical evidence broadly substantiates these theoretical perspectives. For instance, (Alfaro, Kalemli-Ozcan, & Volosovych, 2008) demonstrate that FDI promotes financial development in economies characterized by efficient financial systems and stable institutional environments. Similarly, (Law & Singh, 2014) and (Law, Azman-Saini, & Tan, 2014) argue that institutional quality functions as a threshold condition that determines the strength of the FDI–finance nexus, whereas (Maskin, 2015) find that governance quality and corruption control significantly amplify the positive spillovers of FDI across African economies. In the same vein, (Ahmed, 2010) and (Bist, 2018) show that financial liberalization fosters banking development only when accompanied by macroeconomic stability and institutional efficiency. Moreover, regional studies in the MENA context, such as (Sirag, SidAhmed, & Ali, 2018) and (Thorbecke, 2022), emphasize economic openness alone cannot deepen financial systems without credible regulatory and institutional reforms. Consistently, reports from the (International Monetary Fund, 2022) and the (World Bank, 2023) reinforce

this conclusion, identifying institutional quality as a cornerstone of sustainable financial development and resilience to external shocks.

Despite significant global progress, empirical research remains limited on how FDI, institutional quality, and financial depth interact in Algeria. Most regional analyses aggregate North African countries and overlook Algeria's distinct path of gradual, state-supervised liberalization. Algeria's economic transition evolved from a centrally planned model toward partial openness through successive reforms since the late 1980s—notably the “Law on Money and Credit” (1990), the 2000s reforms promoting private sector participation, and the recent “Monetary and Banking Law” (2022). As (Nadji & Belfatmi, 2024) observe, the 2022 reform restructured financial governance through new institutions such as the Monetary Policy Orientation Committee (COPM), the Financial Stability Council (CSF), and the National Payments Council (CNP), designed to enhance coordination and oversight. These reforms reflect a commitment to modernization, although persistent challenges—corruption, limited transparency, and gaps in technical capacity—continue to undermine governance effectiveness and institutional credibility.

The banking sector remains the backbone of Algeria's financial system, yet it continues to exhibit structural weaknesses that constrain its contribution to economic growth. Indeed, (Guendoul & Iguergaziz, 2023) report that public banks dominate more than 85 percent of the market, and this dominance limits both competition and innovation. Moreover, the underdevelopment of private and foreign banks reduces credit availability and thereby weakens financial intermediation. Similarly, (BESSAI-KESSOUH, 2020) argues that state control and a shallow financial market inhibit efficient capital allocation, while (Bouriche, 2022) highlights excessive cash circulation outside the banking system and the absence of effective macro-financial instruments as indicators of persistent structural imbalance. Together, these factors underscore the urgent need for comprehensive institutional modernization.

Furthermore, foreign direct investment (FDI) plays a pivotal role in this transformation process, as it can enhance financial depth and introduce modern banking practices. For instance, (OUNASSI & KARA, 2020) describe Algeria as one of the most promising markets in the MENA region, but they emphasize that persistent institutional rigidities discourage sustained FDI inflows. Although the gradual entry of foreign banks has introduced new technologies and management practices, (KHELIFA & BENBAYER, 2023) show that market competition remains too limited to achieve full liberalization. Consequently, the coexistence of dominant public institutions and marginal private or foreign actors maintains a segmented and inefficient financial system that restricts innovation and efficiency.

Additionally, recent research linking financial inclusion, stability, and institutional depth provides new insights into Algeria's financial evolution. For example, (BENDJELLOUL, 2024) applies an ARDL framework and finds that financial access and active account ownership strengthen banking stability when supported by effective regulatory supervision. Conversely, (Nouioua, 2024) argues that bureaucratic inertia and legacy institutional structures still prevent the banking sector from fulfilling its developmental potential. Therefore, despite sustained reform efforts, inefficiencies persist and continue to delay the emergence of a dynamic, inclusive, and competitive financial system.

After more than three decades of reform, Algeria's financial system remains relatively shallow and largely dominated by public institutions, which continues to limit the overall effectiveness of financial liberalization policies. The literature suggests that financial liberalization yields meaningful results only when accompanied by strong institutional quality and macroeconomic stability (Demetriades & Law, 2006). Yet, in Algeria, the link between foreign direct investments, institutional quality, and financial development remains insufficiently explored. FDI can enhance financial liberalization through competition, technology transfer, and improved governance practices, but these effects depend on the credibility of regulatory institutions, corruption control, and the consistency of financial reforms.

This raises a central question: *Does FDI effectively contribute to the deepening of Algeria's financial institutions, and under what institutional and macroeconomic conditions does this relationship become significant?*

In pursuing this objective, the study seeks to answer the following questions:

- *To what extent do foreign direct investment inflows contribute to the deepening of Algeria's financial institutions?*
- *How do institutional quality factors—specifically corruption control and regulatory quality—influence the relationship between FDI and financial liberalization?*
- *Under which macroeconomic conditions does FDI exert a sustained impact on financial institutional depth?*

From these questions, emerge three guiding hypotheses:

- H1: *Foreign direct investment has a positive and statistically significant effect on the depth of Algeria's financial institutions.*
- H2: *Institutional quality—proxied by corruption control and regulatory quality—enhances the positive effect of FDI on financial liberalization.*
- H3: *Favorable macroeconomic condition reinforce the positive relationship between FDI and financial institutional depth.*

Within this framework, the study applies an autoregressive distributed lag (ARDL) approach to estimate both short- and long-run relationships between financial institutional depth, FDI, institutional quality, and selected control variables. This empirical strategy allows the identification of dynamic adjustment paths and long-term equilibrium effects in the context of Algeria's evolving financial sector. By integrating institutional and macroeconomic dimensions into the analysis of financial liberalization, the research contributes to understanding how external capital flows interact with domestic governance structures to shape financial development in emerging economies undergoing controlled transitions toward openness and institutional reform.

The study follows the IMRAD structure, which organizes academic research into four interconnected components: Introduction, Methods, Results, and Discussion. The introduction establishes the theoretical and contextual background, formulates the problem statement, and defines the research questions and hypotheses. The methods section explains the data sources, defines the variables, and presents the ARDL econometric model that tests the proposed relationships empirically. The results section presents the empirical findings and interprets their significance, while the discussion section situates these results within the broader literature and policy implications. This structure ensures methodological clarity, analytical coherence, and a logical progression from conceptual foundations to empirical validation and interpretative synthesis.

2- Research Methods, tools and measures:

This study analyzes how foreign direct investment (FDI), institutional quality, and macroeconomic factors shape the depth of financial institutions in Algeria during the period 1995–2022. It relies on a quantitative and econometric framework grounded in the Autoregressive Distributed Lag (ARDL) model. The ARDL approach developed by (Pesaran & Shin, 1995) captures both the short-term dynamics and the long-run equilibrium mechanisms linking financial liberalization, institutional development, and foreign investment inflows. By focusing on annual time-series data, the study follows the evolution of Algeria's financial structure across successive phases of economic reform.

The research applies a positivist and post-positivist epistemological perspective. Through the positivist lens, it treats economic and institutional behavior as observable, measurable, and suitable for modeling to uncover objective relationships. This perspective guides the empirical strategy and frames the search for causal patterns through statistical verification. The post-positivist view complements this approach by acknowledging that these relationships evolve within complex socio-economic settings. The

analysis therefore interprets the estimated relationships as probabilistic, recognizing that institutional dynamics respond to changing governance practices, policy reforms, and macroeconomic conditions.

The study uses a causal-analytical framework in which FDI drives financial institutional depth, while institutional quality and macroeconomic fundamentals condition this influence. It treats financial institutional depth as the dependent variable and uses it as a proxy for financial liberalization. This variable reflects how well the financial system supports intermediation, credit expansion, and institutional diversification. The dataset comes from the World Bank Financial Development Database.

The analysis considers FDI (percentage of GDP), extracted from the World Development Indicators (WDI), as the main explanatory variable. FDI reflects the degree of Algeria's integration into global markets and signals the openness and attractiveness of its financial system. To capture the institutional environment, the study incorporates two indicators from the Worldwide Governance Indicators (WGI): Control of Corruption (CC) and Regulatory Quality (RQ). CC reflects the degree to which public officials resist private capture. RQ evaluates the ability of regulatory authorities to design and implement rules that promote productive private-sector activity. These indicators represent the governance dimension of financial liberalization and play a central role in the financial-institutional nexus.

The model incorporates three control variables to reduce omitted-variable bias. The Human Development Index (HDI), taken from the United Nations Development Programme, reflects the social and educational environment that shapes financial inclusion and investment behavior. Inflation (INF), measured by the Consumer Price Index (CPI), reflects the stability of the macroeconomic environment. The Real Interest Rate (IR), from the World Bank, captures the monetary stance influencing financial intermediation. Together, these variables create a comprehensive macro-institutional setting for assessing financial depth.

The econometric strategy unfolds in several stages. First, the study evaluates the stationarity of each variable using the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests. These tests identify whether each variable follows an $I(0)$ or $I(1)$ process. The ARDL model accommodates a mixture of $I(0)$ and $I(1)$ variables as long as none reaches $I(2)$, which makes the method ideal for the 1995–2022 Algerian dataset.

After confirming the order of integration, the study specifies the ARDL model to estimate the relationship between financial institutional depth (FID), FDI, institutional quality (CC and RQ), and the control variables (HDI, INF, IR). The general form of the model is:

The general ARDL specification takes the following form:

$$Y_t = \varphi + \theta_1 Y_{t-1} + \dots + \theta_p Y_{t-p} + \beta_0 X_t + \dots + \beta_q X_{t-q} + \varepsilon_t$$

We can also express the equation in its differenced form as:

$$Y_t = \varphi + \sum_{i=0}^p \theta_p Y_{t-p} + \sum_{j=0}^q \beta_j \Delta X_{t-j} + \varepsilon_t$$

In this representation, the coefficients β_j capture the short-run effect of X_t on Y_t and the long-run effect arises from the following equilibrium relationship:

$$Y_t = k + \varphi X_t + u_t$$

Where:

$$\varphi = \frac{\sum \beta_j}{1 - \sum \theta_p}$$

Once the model is selected, the study applies the bounds test from (Pesaran, Shin, & Smith, 2001) to verify whether a long-run cointegrating relationship exists between FID, FDI, institutional quality, and the macroeconomic variables. When the F-statistic exceeds the upper critical bound, the test confirms cointegration. After establishing cointegration, the study estimates the Error Correction Model (ECM), which measures the speed of adjustment toward long-run equilibrium. The error correction term (ECT) indicates how quickly financial institutional depth reverts to stability aftershocks affecting governance, macroeconomic conditions, or FDI inflows. The empirical estimations rely on EViews 12, which supports advanced diagnostics and structural-stability testing. The analysis uses several diagnostic tools to confirm model validity:

- The Breusch–Godfrey LM test to detect serial correlation
- The Breusch–Pagan–Godfrey test to detect heteroskedasticity
- The Jarque–Bera test to check residual normality
- The CUSUMSQ tests to assess structural stability over time

The study interprets all coefficients within the broader trajectory of Algeria's financial transformation. It evaluates how FDI and governance interact to shape financial institutional depth, and how inflation, human development, and interest rates condition this interaction.

The methodological framework therefore combines theoretical coherence with empirical rigor. It links the ARDL modeling strategy to a post-positivist epistemology, recognizing that statistical evidence reflects structured yet evolving realities. This approach ensures a scientifically grounded and context-sensitive understanding of how governance and foreign investment shape financial institutional depth in Algeria.

3. Résultats:

This section presents the study's empirical findings, highlighting how FDI, institutional quality, and macroeconomic factors influence Algeria's financial depth in both the short and long run. The analysis integrates descriptive statistics, correlations, and ARDL estimates to examine dynamic interactions and link results to the research hypotheses.

3.1. Descriptive and Preliminary Analysis

3.1.1. Descriptive statistics

The descriptive statistics for the period 1995–2022 summarize the primary characteristics of the variables employed in the analysis. Table 1 reports the mean, median, minimum, maximum, standard deviation, skewness, kurtosis, and Jarque–Bera test statistics for all variables.

Table No. (1): Descriptive statistics of the study variables (1995–2022)

	FID	FDI_GDP	CC	RQ	HDI	INF	IR
Mean	0.051851	0.925000	30.14571	18.92179	0.696429	5.696429	2.509286
Median	0.047496	0.800000	30.93500	18.60000	0.709000	4.300000	1.335000
Maximum	0.085024	2.000000	40.98000	43.63000	0.745000	29.80000	21.57000
Minimum	0.027889	-0.300000	15.12000	7.140000	0.607000	0.300000	-10.33000
Std. Dev.	0.018151	0.572600	5.894776	10.66949	0.042640	5.840249	8.556579
Skewness	0.298339	0.077673	-0.897547	0.726049	-0.663110	2.981832	0.302771
Kurtosis	1.912621	2.798912	3.976146	2.377266	2.151565	12.16968	2.202200
Jarque-Bera	1.794822	0.075330	4.871093	2.912451	2.891819	139.5898	1.170360
Probability	0.407624	0.963035	0.087550	0.233114	0.235532	0.000000	0.557006
Sum	1.451821	25.90000	844.0800	529.8100	19.50000	159.5000	70.26000
Sum Sq. Dev.	0.008895	8.852500	938.2065	3073.625	0.049091	920.9296	1976.806
Observations	28	28	28	28	28	28	28

The source: calculated by the authors using EVIEWS 12

The descriptive statistics reveal that Algeria's financial sector remains relatively underdeveloped, with financial institutional depth (FID), averaging 0.0518 and exhibiting low dispersion, indicative of gradual yet steady financial development. Foreign direct investment is modest, averaging 0.93% of GDP, reflecting limited openness and constrained FDI attraction. Governance indicators display considerable variability, with control of corruption remaining moderate and regulatory quality fluctuating across reform phases, suggesting uneven institutional credibility. In contrast, the HDI shows steady progress with low volatility, highlighting sustained social advancement alongside economic reforms. Macroeconomic indicators, particularly inflation and real interest rates, exhibit pronounced volatility, capturing shifts in monetary conditions and real returns. Collectively, these patterns underscore the coexistence of incremental institutional improvements and persistent macroeconomic instability, providing a substantive context for the subsequent ARDL analysis.

3.1.2. Correlation Matrix

Table 2 presents the correlation matrix, showing the linear relationships among the study variables.

Table No. (2): Correlation matrix of study variables

	FID	FDI_GDP	CC	RQ	HDI	INF	IR
FID	1	-0.1816455...	0.16012441...	-0.5760500...	0.89958651...	-0.2303488...	0.31789611...
FDI_GDP	-0.1816455...	1	0.14939479...	0.37447032...	-0.0323106...	-0.4016718...	-0.0471439...
CC	0.16012441...	0.14939479...	1	0.04763481...	0.38071312...	-0.1953770...	-0.0433846...
RQ	-0.5760500...	0.37447032...	0.04763481...	1	-0.4756813...	-0.1172167...	-0.2949456...
HDI	0.89958651...	-0.0323106...	0.38071312...	-0.4756813...	1	-0.4084245...	0.24201374...
INF	-0.2303488...	-0.4016718...	-0.1953770...	-0.1172167...	-0.4084245...	1	-0.1885131...
IR	0.31789611...	-0.0471439...	-0.0433846...	-0.2949456...	0.24201374...	-0.1885131...	1

The source: calculated by the authors using EViews 12

Financial institutional depth (FID) strongly correlates with human development (HDI) ($r = 0.90$), while its relationship with regulatory quality (RQ) is moderately negative ($r = -0.58$) and with FDI weakly negative ($r = -0.18$). Governance indicators show limited interdependence, and inflation and real interest rates negatively affect FID and HDI. These patterns highlight that human development and governance strongly shape financial depth, whereas FDI's effect depends on institutional quality, supporting the use of the ARDL model for further analysis.

3.2. Preliminary Econometric Tests

3.2.1. Unit Root Tests

Before estimating the ARDL model, the study evaluates the stationarity of all variables using the Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) tests.

Table No. (3): Augmented Dickey–Fuller (ADF) and Phillips–Perron (PP) Unit Root Test Results

Variable	ADF I(0)	ADF I(1)	PP I(0)	PP I(1)	Integration Order
FID	Non-stationary	Stationary	Non-stationary	Stationary	I(1)
FDI/GDP	Non-stationary	Stationary	Non-stationary	Stationary	I(1)
CC	Non-stationary	Stationary	Stationary	Stationary	I(0)
RQ	Non-stationary	Stationary	Non-stationary	Stationary	I(1)
HDI	Stationary	Stationary	Stationary	Stationary	I(0)
INF	Stationary	Stationary	Stationary	Stationary	I(0)

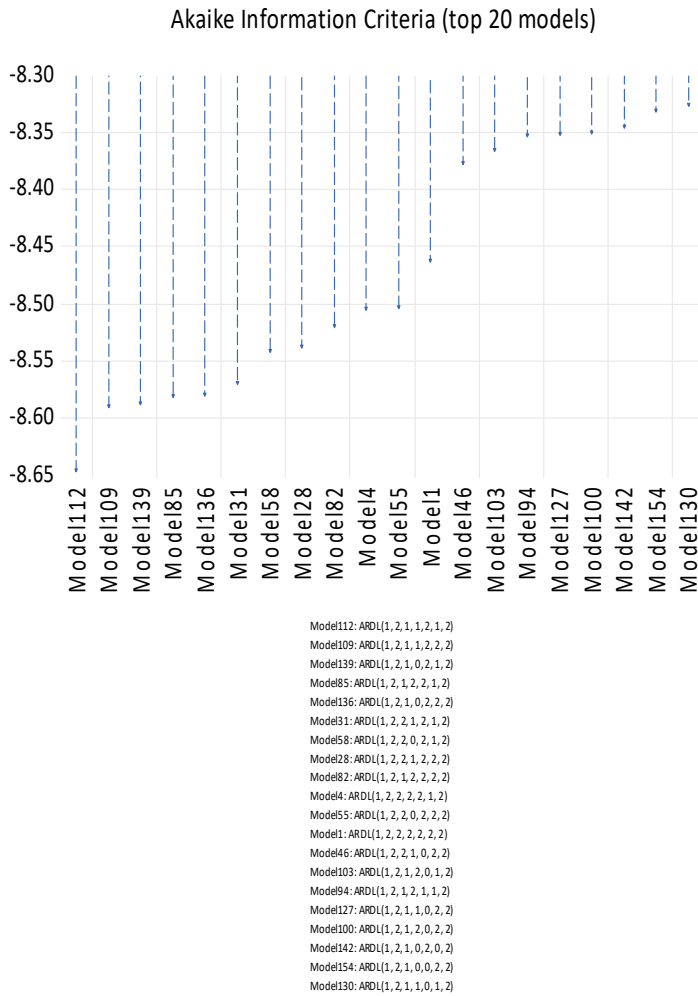
The source: calculated by the authors using EViews 12

The stationarity tests indicate that the dataset comprises a mix of level-stationary [I(0)] and first-difference-stationary [I(1)] variables. Financial institutional depth (FID), foreign direct investment (FDI/GDP), and regulatory quality (RQ) are stationary only after first differencing, confirming their I(1) nature. In contrast, control of corruption (CC) and the human development index (HDI) remain stationary in levels [I(0)], reflecting stable institutional and social conditions over time. Inflation (INF) and the real interest rate (IR) are also level-stationary, indicating persistent short-term fluctuations without underlying trends. This combination of I(0) and I(1) variables justifies the use of the Autoregressive Distributed Lag (ARDL) model, which accommodates mixed integration orders while capturing both short-run dynamics and long-run equilibrium relationships.

3.2.2. ARDL Lag Order Selection

After confirming that the variables are integrated of order I(0) and I(1), the next step involves determining the optimal lag structure for the ARDL model. The selection of appropriate lag lengths is crucial to capture both the short-run dynamics and the long-run equilibrium relationships among the variables.

Figure (1). : Akaike Information Criterion (AIC) for ARDL Lag Order Selection (Top 20 Models)



The source: calculated by the authors using EViews 12

Figure 1 reports the twenty highest-ranked ARDL specifications according to the Akaike Information Criterion (AIC). The results identify ARDL (1,2,1,1,2,2) as the optimal model, as it yields the lowest AIC value (approximately -8.65), indicating the best trade-off between model fit and parsimony. The AIC profile shows a distinct turning point, beyond which adding further lags fails to improve model performance.

3.2.3. Bounds Test for Cointegration

This study employs the bounds testing approach developed by (Pesaran & Smith, 2001) to assess the existence of a long-run equilibrium relationship among the variables.

Table (4). : Bounds Test for Cointegration Results

Test Statistic	Value	Signif.	I(0)	I(1)
Asymptotic: n=1000				
F-statistic	8.122632	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99
Finite Sample: n=35				
Actual Sample Size	26	10%	2.254	3.388
		5%	2.685	3.96
		1%	3.713	5.326
Finite Sample: n=30				
		10%	2.334	3.515
		5%	2.794	4.148
		1%	3.976	5.691

The source: calculated by the authors using EViews 12

The bounds test yields an F-statistic of 8.1228, which exceeds the upper critical bounds at the 1%, 5%, and 10% significance levels under both asymptotic and finite-sample criteria. For the finite sample size ($n = 30$), the 1% upper bound equals 5.691, well below the calculated statistic. This result confirms the existence of a stable long-run cointegrating relationship among the variables.

3.3. Estimated ARDL Model

3.3.1. Long-Run Coefficients

Table 5 presents the long-run estimation results derived from the ARDL model.

Table (5). : Long-run ARDL estimates

Variable	Coefficient	Std. Error	t-Statistic	Prob.
FDI_GDP	-0.009448	0.004547	-2.078000	0.0675
CC	-0.002410	0.000593	-4.065002	0.0028
RQ	-7.53E-06	0.000286	-0.026369	0.9795
HDI	0.921667	0.204143	4.514805	0.0015
IPC	-0.001679	0.001340	-1.253255	0.2417
IR	-0.000843	0.000541	-1.558595	0.1535
C	-0.515335	0.130017	-3.963586	0.0033
EC = FID - (-0.0094*FDI_GDP -0.0024*CC -0.0000*RQ + 0.9217*HDI -0.0017*IPC -0.0008*IR - 0.5153)				

The source: calculated by the authors using EViews 12

The long-run ARDL estimates reveal that foreign direct investment (FDI) exerts a negative impact on financial institutional depth in Algeria, reflecting its concentration in capital-intensive sectors and limited integration with domestic financial intermediaries. Control of corruption also exhibits a significant negative effect, which may result from transitional reforms that temporarily restrict credit expansion and informal financial activity. Regulatory quality, inflation, and real interest rates do not display statistically significant long-term effects, underscoring persistent structural constraints within the financial system. Overall, human development emerges as the principal driver of financial depth, whereas governance and regulatory reforms produce inconsistent and partial effects on the process of financial liberalization.

3.3.2. Short-Run Coefficients AND Error Correction Term

This section analyzes short-run dynamics using the ARDL error-correction model, showing how changes in FDI, institutional quality, human development, and macroeconomic factors influence financial depth, while the ECT indicates the speed of adjustment toward long-run equilibrium.

Table (6). : Short-Run ARDL Coefficients and Error-Correction Term

ECM Regression Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(FDI_GDP)	-0.000918	0.000880	-1.042566	0.3243
D(FDI_GDP(-1))	0.003116	0.000836	3.728774	0.0047
D(CC)	-0.000598	7.65E-05	-7.819376	0.0000
D(RQ)	-0.000228	9.84E-05	-2.312722	0.0460
D(HDI)	1.123759	0.169107	6.645243	0.0001
D(HDI(-1))	0.756325	0.131299	5.760325	0.0003
D(IPC)	-0.001593	0.000201	-7.932334	0.0000
D(IR)	9.34E-05	5.43E-05	1.721979	0.1192
D(IR(-1))	0.000299	5.73E-05	5.223270	0.0005
CointEq(-1)*	-0.488491	0.045449	-10.74811	0.0000
R-squared	0.906141	Mean dependent var		0.001753
Adjusted R-squared	0.853345	S.D. dependent var		0.005557
S.E. of regression	0.002128	Akaike info criterion		-9.183449
Sum squared resid	7.25E-05	Schwarz criterion		-8.699566
Log likelihood	129.3848	Hannan-Quinn criter.		-9.044108
Durbin-Watson stat	1.985618			

The source: calculated by the authors using EViews 12

The short-run ARDL results reveal that variations in foreign direct investment, institutional quality, and macroeconomic conditions exert

differential effects on financial institutional depth. Immediate changes in FDI are statistically insignificant, whereas lagged FDI positively influences financial depth, indicating a delayed transmission into the domestic financial system. Improvements in human development exhibit strong and significant positive effects, while short-term anti-corruption measures and inflationary shocks impose temporary constraints on financial intermediation. Moderate increases in real interest rates contribute positively to financial expansion. The negative and highly significant error-correction term ($ECT = -0.4849$) confirms that approximately 48% of short-term deviations are corrected annually, demonstrating robust adjustment toward the long-run equilibrium.

3.4. Post-Estimation Diagnostic Tests

3.4.1. Residual Diagnostics

This section assesses the validity and reliability of the ARDL–ECM model using a series of residual diagnostic tests.

Table (7). : Serial correlation test (Breusch–Godfrey)

F-statistic	1.224491	Prob. F(2,19)	0.3161
Obs*R-squared	2.968604	Prob. Chi-Square(2)	0.2267

The source: calculated by the authors using EViews 12

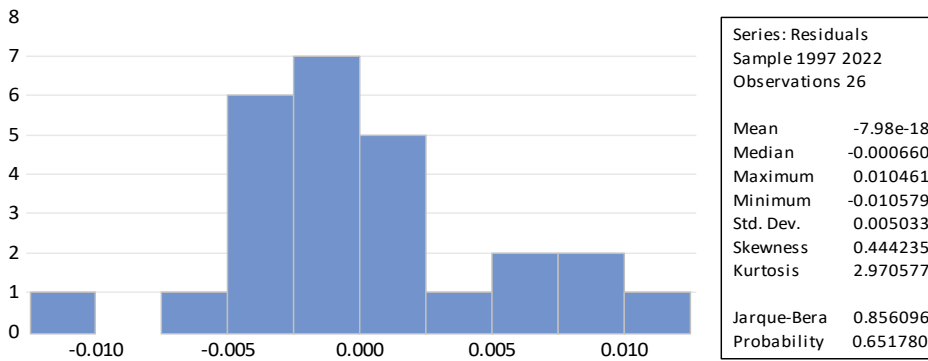
The Breusch–Godfrey LM test produces a p-value of 0.3161, which is well above the 5% significance level.

Table (8). : Heteroskedasticity test (Breusch–Pagan–Godfrey)

F-statistic	0.917844	Prob. F(4,21)	0.4720
Obs*R-squared	3.869091	Prob. Chi-Square(4)	0.4240
Scaled explained SS	2.486935	Prob. Chi-Square(4)	0.6470

The source: calculated by the authors using EViews 12

The Breusch–Godfrey LM test produces a p-value of 0.3161, which is well above the 5% significance level. This result shows that the model does not exhibit serial correlation in its residuals.

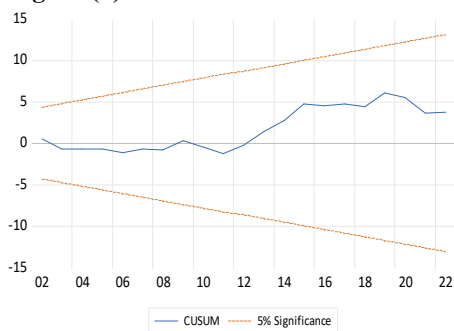
Figure (2): Residual normality test (Jarque–Bera)

The source: calculated by the authors using EViews 12

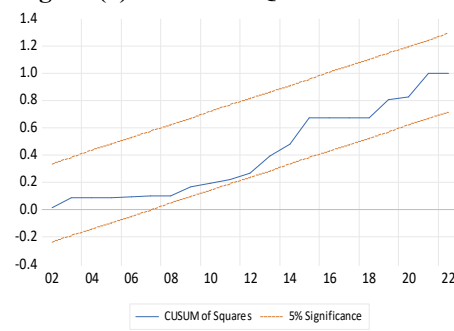
The Jarque–Bera normality test yielded a statistic of 0.8560 with an associated p-value of 0.6517, which is well above the 5% significance threshold.

3.4.2. Stability Tests

Figure 3 presents the CUSUMSQ test results, which assess the structural stability of the estimated ARDL model over the sample period.

Figure (3): CUSUM test

The source: calculated by the authors using EViews 12

Figure (3): CUSUMSQ test

The source: calculated by the authors using EViews 12

The CUSUM and CUSUMSQ plots remain within the 5% confidence bounds throughout the period from 2002 to 2022, confirming the stability of the estimated parameters and indicating that the ARDL model robustly captures the long-run relationships among the variables.

4. Discussion:

4.1. Long-Run Estimation Results

The long-run ARDL estimates elucidate the structural relationships between foreign investment, institutional quality, and financial deepening in Algeria over the period 1995–2022. Foreign direct investment (FDI) exhibits a negative effect on financial institutional depth, contradicting the expectation of H1. This suggests that FDI inflows, predominantly directed toward capital-intensive sectors such as hydrocarbons, rely on external financing rather than domestic banking channels, limiting their contribution to broader financial intermediation. These findings are consistent with (Demetriades & Law, 2006), who emphasize that FDI's impact on financial development is contingent upon institutional robustness.

Control of corruption (CC) also exerts a negative influence, challenging H2, which hypothesized that stronger governance enhances financial liberalization. In practice, Algeria's anti-corruption measures often coincide with periods of administrative tightening and reduced liquidity in informal credit networks, temporarily constraining financial activity. This dynamic aligns with observations by (Nadji & Belfatmi, 2024), who note that institutional reforms may initially restrict financial operations before yielding long-term benefits. Thus, improvements in governance are effective only when accompanied by consistent and credible regulatory implementation.

Regulatory quality (RQ) demonstrates minimal impact, reflecting the incomplete and inconsistently enforced nature of Algeria's regulatory reforms. This result corroborates the arguments of (Law & Singh, 2014) and (Law, Azman-Saini, & Tan, 2014), who posit that regulatory institutions in developing economies influence financial development only after achieving sufficient credibility and independence. Consequently, H2 receives partial support: governance reforms have limited influence on financial deepening when continuity and institutional trust are absent.

Human development (HDI) emerges as a decisive long-term driver of financial institutional depth, confirming H3. Enhanced human capital, education, and social progress strengthen confidence in the banking system, mobilize savings, and expand the demand for financial services. (Bist, 2018) and (Ahmed, 2010) who demonstrated that social development amplifies the long-term gains from financial liberalization, provide comparable evidence.

Macroeconomic variables, including inflation and the real interest rate, exert only marginal long-term effects on financial depth. Algeria's managed monetary framework, characterized by predominant public credit allocation, appears to buffer the financial system against external shocks, consistent with (Nkoro & Uko, 2016), who highlight the moderating role of controlled inflation on financial outcomes.

Finally, enduring structural rigidities—including limited banking competition, bureaucratic credit allocation, and reliance on state-driven financing—persist as significant constraints on the expansion of financial institutions.

4.2. Short-Run Dynamics and Adjustment Process

The short-run ARDL analysis highlights how immediate changes in foreign investment, institutional quality, and macroeconomic conditions influence financial institutional depth in Algeria. Short-term fluctuations in foreign direct investment (FDI) do not immediately affect financial intermediation, but lagged FDI inflows positively influence financial depth after a temporal adjustment, partially supporting H1. (Alfaro, Kalemli-Ozcan, & Volosovych, 2008) and (Thorbecke, 2022), who show that FDI contributes to financial expansion when absorbed through credible institutions and gradual market adaptation, document comparable delayed effects.

Control of corruption exhibits a short-term contractionary effect on financial activity, contradicting H2, as intensified anti-corruption measures can temporarily disrupt informal financial circuits and constrain liquidity. Similar patterns appear in (Eichengreen & Leblang, 2003) and (Nadji & Belfatmi, 2024), who emphasize that governance reforms may initially hinder financial transactions before improving transparency and credit allocation.

Regulatory quality exerts negligible short-run influence, reflecting Algeria's gradual and uneven implementation of financial regulations. (Law & Singh, 2014) note that regulatory reforms require institutional maturity and market responsiveness before producing visible effects on financial structures.

Human development emerges as the most powerful short-term driver of financial deepening. Improvements in education, digital inclusion, and household income translate rapidly into higher financial participation and confidence, consistent with the findings of (Bist, 2018), who demonstrates

that human development reduces the adjustment lag between economic growth and financial expansion.

Inflationary shocks negatively affect financial depth by discouraging savings and reducing real credit capacity, while moderate increases in real interest rates enhance intermediation efficiency. These dynamics underline the critical role of monetary stability in sustaining short-run financial resilience.

5. Conclusion:

This study employs an ARDL framework to examine the dynamic interactions between foreign direct investment (FDI), institutional quality, and financial institutional depth in Algeria over the period 1995–2022. The findings indicate that FDI does not automatically enhance financial depth; in the long run, it exerts a negative effect due to its concentration in capital-intensive sectors with limited reliance on domestic banking, whereas short-run effects emerge after a lag, highlighting the importance of gradual absorption and integration.

Institutional quality produces mixed outcomes: control of corruption initially constrains financial intermediation, while regulatory quality shows no significant impact, reflecting incomplete and uneven enforcement.

Human development emerges as the most consistent determinant of financial depth, reinforcing the role of education, income, and social inclusion in strengthening financial participation. Macroeconomic factors exert differentiated effects, with inflationary shocks reducing financial depth and moderate real interest rates supporting intermediation.

The significant error correction term confirms a stable long-run equilibrium, with rapid adjustment to short-term deviations. Policy implications underscore the need to combine foreign investment with credible, coordinated institutional reforms and sustained human development.

Limitations include the use of aggregate indicators and the potential underrepresentation of informal institutional practices, suggesting avenues for future micro-level and sector-specific research

Identify the main research results, and provide general recommendations or suggestions.

References

1. Acemoglu, D., & Robinson, J. A. (2013). Why nations fail: The origins of power, prosperity, and poverty. . Crown Currency.
2. Ahmed, A. D. (2010). Financial liberalization, financial development and growth linkages in Sub-Saharan African countries: An empirical investigation. *Studies in Economics and Finance*, 27(4), 314-339.
3. Alfaro, L., Kalemli-Ozcan, S., & Volosovych, V. . (2008). Why doesn't capital flow from rich to poor countries? An empirical investigation . *The review of economics and statistics*, 90(2), 347-368.
4. BENDJELLOUL, R. M. (2024). Analyse de situation de l'inclusion financière en Algérie entre 2004- 2022. *Revue Dirassat Iqtissadiya* Volume 11 / Numéro 1, 424-448.
5. BESSAI-KESSOUH, F. (2020). Analyse de la performance des banques publiques et privées en Algérie. *مجلة الاسواق & المالية* Review Markets & Finance, 71-87.
6. Bist, J. P. (2018). Financial development and economic growth: Evidence from a panel of 16 African and non-African low-income countries. *Cogent Economics & Finance*, 6(1), 1449780.
7. Bouriche, S. (2022, 49-61). Indicateurs De Mesure Du Développement Du Secteur Bancaire Dans Le Face Aux Obstacles Au Financement De L'activité économique En Algérie Durant Période (2000-2019). *Revue Maghrébine Management des Organisations*, 7(1).
8. Demetriades, & Law, H. (2006). Finance, institutions and economic development. *International journal of finance & economics*, 11(3), 245-260.
9. Dunning, J. H. (1993). Internationalizing Porter's diamond. *MIR: Management International Review*, 7-15.
10. Eichengreen, & Leblang. (2003). Capital account liberalization and growth: was Mr. Mahathir right? *International Journal of Finance & Economics*, 8(3), 205-224.
11. Guendoul, F., & Iguergaziz, W. (2023). Analyse Du Secteur Bancaire Algérien : Un Secteur Mal-développé, Dans Une économie à Fort Besoin De Financement. *مجلة إقتصاد المال والأعمال*, 8(1), 1069-1086.
12. International Monetary Fund, I. (2022). *Regional Economic Outlook: Middle East and Central Asia*. Washington, D.C: International Monetary Fund.
13. KHELIFA, A., & BENBAYER, H. (2023). Compétitivité bancaire et performance économique : le cas des banques Algériennes. *Revue Algérienne d'Economie et gestion* Vol. 17, N° : 01 (2023), 138-162.
14. LaPorta, Lopez-de-Silanes, Shleifer, & Vishny. (1997). Legal determinants of external finance. *The journal of finance*, 52(3), 1131-1150.

15. Law, S. H., & Singh, N. .. (2014). Does too much finance harm economic growth? *Journal of Banking & Finance*, 41, 36-44.
16. Law, S. H., Azman-Saini, W. N., & Tan, H. B. (2014). Economic globalization and financial development in East Asia: a panel cointegration and causality analysis. *Emerging Markets Finance and Trade*, 50(1), 210-225.
17. Maskin, E. (2015). Why haven't global markets reduced inequality in emerging economies?. *The world bank economic review*, 29(suppl_1), S48-S52.
18. Nadji, M. S., & Belfatmi, S. (2024). Évolution de la Réglementation Financière en Algérie : De l'Ordonnance de 2003 à la Loi Monétaire et Bancaire de 2023. *Revue D'Etudes juridiques et Economiques* ISSN 2602-7321/ EISSN 2773- 2649, 07(01), 573-592.
19. Nkoro, E., & Uko, A. K. (2016). Autoregressive Distributed Lag (ARDL) cointegration technique: application and interpretation. *Journal of Statistical and Econometric methods*, 5(4), 63-91..
20. North. (1990). *Institutions, institutional change and economic performance*. Cambridge university press.
21. Nouioua, A. (2024). Réforme Du Secteur Bancaire Et Financier En Algérie. *social and human sciences review* مجلة العلوم الاجتماعية والانسانية, 405-418.
22. OUNASSI, H., & KARA, R. (2020). La libéralisation financière et son impact sur les objectifs de la politique monétaire en Algérie (1990 - 2015). *Revue finance et Marché*, 07(01), 63-85.
23. Pesaran, M. H., & Shin, Y. (1995). An autoregressive distributed lag modelling approach to cointegration analysis (Vol. 9514, pp. 371-413). Cambridge, UK: Department of Applied Economics, University of Cambridge.
24. Pesaran, M. H., & Smith, R. J. (2001). Bounds testing approaches to the analysis of level relationships. . *Journal of applied econometrics*, 16(3), 289-326.
25. Sirag, A., SidAhmed, S., & Ali, H. S. (2018). Financial development, FDI and economic growth: evidence from Sudan. *International Journal of Social Economics*, 45(8), 1236-1249.
26. Thorbecke, W. (2022). Understanding the transmission of COVID-19 news to French financial markets in early 2020.. *International Economics*, 170, 103-114.
27. World Bank, W. (2023). *Global Financial Development Report 2023: Rebuilding Resilience*. Washington, D.C: World Bank Publications.