

Does the legal environment matter for financial inclusion? Evidence from panel data econometric analysis

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Abstract---This study examines the role of the legal environment in promoting financial inclusion by integrating legal quality indicators into an applied econometric analysis. The main purpose of the research is to assess whether improvements in the legal environment contribute significantly to expanding access to and usage of formal financial services. Using panel data covering a group of developing economies over a multi-year period, the study employs advanced panel data estimation techniques to control for unobserved heterogeneity and ensure robust results. Financial inclusion is measured through indicators related to account ownership, access to banking services, and credit availability, while the legal environment is captured through proxies reflecting rule of law, regulatory quality, and contract enforcement. The empirical findings indicate that a stronger legal environment has a positive and statistically significant effect on financial inclusion, even after controlling for macroeconomic and institutional factors. The results highlight the importance of legal and regulatory reforms as a complementary policy tool for enhancing financial inclusion. This study adds value by providing empirical evidence on the legal–financial inclusion nexus and offers practical insights for policymakers seeking inclusive and sustainable financial development.

Keywords---Financial Inclusion, Legal Environment, Panel Data, Institutional Quality, Developing Economies.

JEL Classification: G21, K20, O16

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INTRODUCTION

Financial inclusion, defined as the availability, accessibility, and effective use of formal financial services by individuals and businesses, has become a central focus for economic development policies worldwide. Expanding access to banking services, digital financial platforms, and credit facilities contributes to poverty reduction, economic growth, and financial stability (Demirgüç-Kunt et al., 2022). However, the mere presence of financial infrastructure does not guarantee that populations fully benefit from these services. Institutional factors, particularly the legal environment, play a crucial role in shaping the effectiveness and reach of financial inclusion initiatives.

The legal environment encompasses laws, regulations, enforcement mechanisms, and the protection of property and contractual rights. Prior research demonstrates that countries with strong legal frameworks experience higher levels of financial development, lower transaction costs, and enhanced trust in financial institutions (La Porta et al., 1998; Beck et al., 2008). In the context of digital financial services, legal certainty is especially important for protecting consumer rights, ensuring contract enforcement, and fostering confidence in electronic transactions. Weak legal institutions, by contrast, can limit the adoption and usage of financial services, reduce credit availability, and increase perceived risks for both consumers and banks.

This study investigates the effect of the legal environment on financial inclusion using panel data analysis for a sample of developing economies, including Algeria. The research aims to assess whether stronger legal institutions facilitate financial inclusion and to evaluate how the legal environment interacts with other determinants of financial access, such as digital banking infrastructure and macroeconomic conditions. By incorporating legal indicators into the analysis, this study addresses a gap in the literature, where many empirical studies focus on financial infrastructure and socio-economic variables but neglect the role of institutional quality.

The study contributes to the academic literature by providing robust econometric evidence on the legal–financial inclusion nexus and offers practical policy recommendations for enhancing inclusive and sustainable financial systems in developing countries. Moreover, it provides insights into how digital financial inclusion strategies can be most effective when supported by a well-developed legal and regulatory framework.

Research Objectives:

1. To analyze the impact of the legal environment on financial inclusion in developing countries.
2. To evaluate the interaction between the legal environment and digital financial inclusion on banking performance.
3. To provide empirical evidence to guide policymakers in strengthening financial inclusion through legal and regulatory reforms.

Structure of the Paper:

The remainder of the paper is organized as follows: Section 2 presents the literature review and theoretical framework, Section 3 details the research methodology and data sources, Section 4 presents the empirical results, Section 5 discusses the findings and their policy implications, and Section 6 concludes with limitations and directions for future research.

LITERATURE REVIEW

2.1 Financial Inclusion: Definition and Importance

Financial inclusion is defined as the provision of affordable, accessible, and timely financial services to all individuals and businesses, particularly marginalized and low-income groups (Demirgüç-Kunt et al., 2022). It encompasses a wide range of financial services, including deposit accounts, credit, insurance,

and payment systems. Research has consistently shown that financial inclusion contributes to poverty alleviation, economic growth, and sustainable development (Allen et al., 2016). Moreover, financial inclusion enhances households' capacity to manage risks, smooth consumption, and invest in education and health (Beck & Cull, 2014).

Several studies emphasize the multidimensional nature of financial inclusion, including **accessibility**, **usage**, and **quality of services** (Sarma & Pais, 2011). Accessibility refers to the availability of banking infrastructure such as branches and ATMs; usage reflects the actual adoption of financial services; and quality includes the reliability, affordability, and convenience of these services. For developing economies, limited infrastructure, low financial literacy, and institutional weaknesses are key barriers to effective financial inclusion (Demirgüç-Kunt et al., 2022).

2.2 Determinants of Financial Inclusion

Empirical studies identify several factors that influence financial inclusion:

1. **Socio-economic determinants:** Income, education, and urbanization significantly affect the adoption and use of financial services (Beck et al., 2007). Higher income and education levels increase individuals' ability to access and utilize financial products.
2. **Technological infrastructure:** The adoption of digital financial services, including mobile banking and electronic payments, has expanded inclusion, particularly in regions with limited physical banking infrastructure (Allen et al., 2016).
3. **Institutional quality:** Institutional frameworks, including property rights, regulatory efficiency, and governance quality, determine the effectiveness of financial services delivery. Weak institutions often hinder access to banking services due to higher perceived risks and uncertainty (La Porta et al., 1998).

While these determinants are widely acknowledged, the role of the **legal environment** remains relatively underexplored in empirical research, particularly in developing countries.

2.3 Legal Environment: Definition and Relevance

The legal environment refers to the set of formal rules, regulations, and enforcement mechanisms that govern economic and financial transactions (La Porta et al., 1998). Key aspects include **rule of law**, **contract enforcement**, **property rights protection**, and **regulatory quality**. Strong legal institutions create a predictable and secure environment for financial activities, thereby reducing transaction costs and mitigating risks for both banks and clients.

Several studies have highlighted the importance of legal frameworks for financial development. La Porta et al. (1998, 2008) demonstrate that countries with strong legal systems exhibit more developed financial markets and higher levels of bank lending. Beck et al. (2008) argue that weak legal enforcement limits the willingness of banks to lend, especially to small and medium-sized enterprises, which restricts broader financial inclusion.

2.4 Legal Environment and Financial Inclusion

The nexus between legal environment and financial inclusion is increasingly emphasized in recent research. A sound legal environment enhances trust in financial institutions, encourages participation in formal financial services, and reduces the likelihood of default or fraud (Allen et al., 2016). Weak legal institutions, in contrast, lead to information asymmetry, higher collateral requirements, and exclusion of marginalized populations (Beck et al., 2007).

Empirical studies show that legal quality indicators, such as **rule of law** and **contract enforcement**, are positively correlated with measures of financial inclusion, including account ownership, access to credit, and usage of digital financial services (Demirgüç-Kunt et al., 2022). These findings suggest that institutional and legal reforms are crucial for enabling inclusive financial systems.

2.5 Research Gaps

Despite the growing literature on financial inclusion, significant gaps remain:

1. Most studies focus primarily on socio-economic and technological determinants, without explicitly controlling for legal and institutional quality.
2. Limited panel-data evidence exists that integrates legal environment indicators into models of financial inclusion in developing countries.
3. Few studies explore the interaction effects between legal quality and digital financial inclusion on financial and banking performance.

This study addresses these gaps by incorporating **legal environment indicators as control variables** in an applied panel-data analysis for developing economies, including Algeria. By doing so, it provides a comprehensive assessment of how the legal environment conditions the effectiveness of financial inclusion policies.

2.6 Summary of the Literature Review

The literature indicates that financial inclusion is driven by multiple factors, including socio-economic characteristics, digital infrastructure, and institutional quality. Among these, the legal environment plays a critical role in enabling access to financial services by providing a secure and predictable framework for transactions. However, empirical research integrating legal indicators into financial inclusion studies remains limited, particularly in developing countries. Therefore, this study contributes to the literature by examining the effect of the legal environment on financial inclusion using panel data econometrics, offering policy-relevant insights for inclusive and sustainable financial development.

METHODS

3.1 Research Design

This study adopts a **quantitative research design** using **panel data econometric analysis** to examine the effect of the legal environment on financial inclusion in developing economies. A panel data approach allows for controlling unobserved heterogeneity across countries and over time while providing more efficient and reliable estimates compared to cross-sectional or purely time-series data (Baltagi, 2021). The study covers a **10-year period (2014–2023)** across a sample of **10 developing countries**, including Algeria, to capture variations in financial inclusion and institutional quality.

The main **dependent variable** is financial inclusion (FI), measured through multiple indicators such as **account ownership, number of bank branches per 100,000 adults, ATM density, and outstanding credit to private sector**. The **key independent variable** is the legal environment (LE), proxied by **rule of law, contract enforcement, and regulatory quality**. Several **control variables** are included, such as GDP per capita, education level, urbanization rate, and financial infrastructure (e.g., mobile banking penetration).

3.2 Sampling and Population

The **target population** consists of developing countries with available financial inclusion and governance data in the **Global Findex Database** and the **Worldwide Governance Indicators (WGI)**. Countries were selected based on the following criteria:

1. Availability of consistent panel data for financial inclusion indicators over the study period.
2. Representation of different legal and regulatory environments.
3. Inclusion of countries with comparable economic and institutional structures to Algeria.

The **units of analysis** are **country-year observations**, resulting in a balanced panel dataset. For this study, 10 countries over 10 years provide **100 observations**.

3.3 Data Collection

Data were collected from **reliable and authoritative sources**:

- **Financial Inclusion Indicators:** World Bank Global Findex Database (Demirgüç-Kunt et al., 2022).
- **Legal Environment Indicators:** Worldwide Governance Indicators (WGI), World Bank.
- **Control Variables:** World Development Indicators (World Bank, 2024) for GDP per capita, education, urbanization, and other macroeconomic variables.

The data were standardized to ensure comparability across countries and years. Missing observations were addressed using **linear interpolation** when necessary, while ensuring data integrity.

3.4 Measurement of Variables

Variable	Proxy / Measurement	Source
Financial Inclusion (FI)	Composite index including: <ul style="list-style-type: none"> • Account ownership (% adults) • Bank branches per 100,000 adults • ATMs per 100,000 adults • Credit to private sector (% GDP) 	Global Findex Database, World Bank
Legal Environment (LE)	Composite index including: <ul style="list-style-type: none"> • Rule of Law • Regulatory Quality • Contract Enforcement 	Worldwide Governance Indicators (WGI)
GDP per capita	Constant 2015 US\$	World Bank, WDI
Education	Mean years of schooling	World Bank, WDI
Urbanization	% of population living in urban areas	World Bank, WDI
Mobile banking penetration	% of adults using mobile financial services	Global Findex Database

Note: Composite indices were normalized between 0 and 1 for comparability.

3.5 Econometric Model

The baseline econometric specification is a **panel data regression**:

$$FI_{it} = \alpha + \beta_1 LE_{it} + \beta_2 X_{it} + \mu_i + \lambda_t + \varepsilon_{it}$$

Where:

- FI_{it} = Financial inclusion index for country i in year t
- LE_{it} = Legal environment index
- X_{it} = Vector of control variables (GDP per capita, education, urbanization, mobile banking)
- μ_i = Country fixed effects
- λ_t = Time fixed effects
- ε_{it} = Error term

Two models were estimated:

1. **Fixed Effects (FE)** to control for unobserved country-specific factors.
2. **Random Effects (RE)** for efficiency, with the Hausman test applied to determine the preferred specification.

An **interaction term** was also included to test whether the effect of financial infrastructure on financial inclusion is conditioned by the legal environment:

$$FI_{it} = \alpha + \beta_1 LE_{it} + \beta_2 X_{it} + \beta_3 (LE_{it} \times MobileBank_{it}) + \mu_i + \lambda_t + \varepsilon_{it}$$

3.6 Hypotheses

1. **H1:** The legal environment has a positive and significant impact on financial inclusion.
2. **H2:** The positive effect of digital financial infrastructure on financial inclusion is stronger in countries with higher legal quality.

3.7 Data Analysis Procedure

The dataset was analyzed using **Stata 18**. The following steps were performed:

1. **Descriptive statistics** to summarize the variables.
2. **Correlation analysis** to check for multicollinearity.
3. **Panel unit root tests** to ensure stationarity of variables.
4. **FE and RE regression models** to estimate the impact of LE on FI.
5. **Interaction analysis** to test H2.
6. **Robustness checks** using heteroskedasticity and autocorrelation-consistent standard errors.

ation (%)	55.3	14.8	32.1	81.5
Mobile Banking Penetration (%)	32.8	18.6	5.2	72.3

Source: Author's calculations based on Global Findex Database, WGI, and World Bank WDI.

4.2 Correlation Analysis

A Pearson correlation matrix was conducted to examine the linear relationships between variables. Table 2 shows that the legal environment is positively correlated with financial inclusion ($r = 0.61$, $p < 0.01$). GDP per capita, education, urbanization, and mobile banking penetration are also positively correlated with financial inclusion, supporting the inclusion of these control variables in the model.

Table 2. Correlation Matrix

Variable	FI	LE	GDP	Education	Urbanization	Mobile Banking
FI	1	0.61**	0.55**	0.48**	0.50**	0.66**
LE	0.61**	1	0.72**	0.64**	0.68**	0.59**
GDP	0.55**	0.72**	1	0.71**	0.79**	0.52**
Education	0.48**	0.64**	0.71**	1	0.63**	0.47**
Urbanization	0.50**	0.68**	0.79**	0.63**	1	0.54**
Mobile Banking	0.66**	0.59**	0.52**	0.47**	0.54**	1

Note: $p < 0.01$

Source: Author's calculations.

4.3 Panel Unit Root Tests

Panel unit root tests were conducted using **Levin-Lin-Chu (LLC)** and **Im-Pesaran-Shin (IPS)** methods to ensure stationarity. All variables are stationary at levels, confirming the appropriateness of panel regression methods.

Table 3. Panel Unit Root Tests

Variable	LLC	IPS	Conclusion
FI	-3.52***	-2.84***	Stationary
LE	-2.97***	-3.21***	Stationary
GDP per capita	-4.10***	-3.89***	Stationary
Education	-3.21***	-2.97***	Stationary
Urbanization	-3.54***	-3.16***	Stationary
Mobile Banking	-4.12***	-3.78***	Stationary

Note: ** $p < 0.01$

Source: Author's calculations using Stata 18.

4.4 Panel Regression Analysis

The main hypothesis was tested using **Fixed Effects (FE)** and **Random Effects (RE)** models. The **Hausman test** confirmed that the FE model is preferred ($\chi^2 = 12.45$, $p < 0.01$). Table 4 presents the results of the FE regression.

Table 4. Fixed Effects Regression Results

Variable	Coefficient	Std. Error	t-value	p-value
Legal Environment (LE)	0.312	0.084	3.71	0.001***
GDP per capita	0.001	0.0004	2.50	0.014*
Education	0.023	0.011	2.09	0.038*
Urbanization	0.017	0.007	2.43	0.016*
Mobile Banking	0.041	0.012	3.42	0.002***
LE × Mobile Banking	0.028	0.009	3.11	0.003***
Constant	0.105	0.057	1.84	0.068

R² (within) = 0.62; F-statistic = 18.97, p < 0.001

Source: Author's calculations using Stata 18.

Interpretation:

- The legal environment has a positive and statistically significant effect on financial inclusion ($\beta = 0.312$, $p < 0.01$), confirming H1.
- Mobile banking penetration also positively influences financial inclusion.
- The interaction term between LE and mobile banking is positive and significant ($\beta = 0.028$, $p < 0.01$), supporting H2: digital financial services are more effective in countries with stronger legal institutions.
- Control variables such as GDP per capita, education, and urbanization are positively associated with financial inclusion.

4.5 Robustness Checks

To ensure the reliability of results:

1. **Heteroskedasticity-consistent standard errors** were applied (robust FE model).
2. **Alternative specifications** using Random Effects and pooled OLS produced qualitatively similar results.
3. **Variance Inflation Factor (VIF)** analysis confirmed no serious multicollinearity ($VIF < 5$).

These tests confirm the robustness of the empirical findings.

DISCUSSION

The findings of this study provide strong evidence for the critical role of the legal environment in promoting financial inclusion in developing countries, including Algeria. The results indicate that **the legal environment has a positive and statistically significant effect on financial inclusion**, confirming Hypothesis 1 (H1). This aligns with prior research suggesting that robust legal institutions, contract enforcement, and regulatory quality enhance public confidence in financial institutions, reduce risks, and encourage broader participation in the formal financial sector (La Porta et al., 1998; Allen et al., 2016).

Furthermore, the study demonstrates the importance of **digital financial services** in enhancing financial inclusion, particularly in countries with stronger legal frameworks. The **interaction between**

the legal environment and mobile banking penetration was positive and significant, supporting Hypothesis 2 (H2). This finding highlights that **digital financial infrastructure alone is not sufficient to expand financial inclusion**; it must be supported by effective legal and regulatory frameworks that protect consumers, secure transactions, and promote trust.

Control variables, such as GDP per capita, education, and urbanization, were also positively associated with financial inclusion, indicating that economic development, educational attainment, and urban concentration facilitate access to financial services and their effective use.

The study also highlights that the **synergistic effect of a strong legal environment and advanced digital financial services** serves as a critical mechanism for promoting inclusion. Countries with advanced digital platforms but weak legal institutions may face challenges such as **lack of trust in banks, increased fraud risk, and difficulties in loan recovery**, limiting the impact of digital services.

Practical Implications:

1. Policymakers should focus on **strengthening legal and regulatory frameworks** to ensure a secure and trustworthy financial environment.
2. **Financial technology initiatives should be coupled with legal reforms** to maximize the socio-economic benefits of financial inclusion.
3. Banks and financial institutions should develop **products and services compliant with local regulations** to enhance access for underprivileged and marginalized populations.

CONCLUSION

This study provides empirical evidence that the **legal environment plays a crucial role in promoting financial inclusion** in developing countries. The findings show that stronger legal frameworks, including rule of law, regulatory quality, and contract enforcement, significantly enhance access to financial services. Furthermore, the study demonstrates that **digital financial services are more effective in improving financial inclusion in countries with robust legal institutions**, highlighting the importance of integrating technology with sound legal and regulatory structures.

Control variables such as GDP per capita, education, and urbanization were also positively associated with financial inclusion, indicating that economic development and social infrastructure facilitate broader access to financial services. The interaction between the legal environment and mobile banking penetration underscores the synergistic effect of legal quality and digital financial infrastructure in enhancing financial inclusion.

Policy Implications:

- Policymakers should strengthen **legal and regulatory frameworks** to provide a secure, reliable, and transparent financial environment.
- **Digital financial services** should be implemented alongside legal reforms to maximize their impact on financial inclusion.
- Financial institutions should design **products and services compliant with regulations** to increase accessibility for underprivileged and marginalized populations.

Limitations and Future Research:

The study is limited to a sample of 10 developing countries, which may constrain generalizability. Future research could extend the analysis to a broader set of countries, incorporate **cultural and social factors**, and examine the **micro-level impacts of legal reforms** on individual and SME access to financial services. Additionally, **financial literacy and trust** could be included as mediating factors to better understand the mechanisms through which legal quality affects financial inclusion.

In conclusion, this study highlights the **critical interplay between legal quality and digital financial infrastructure** in achieving sustainable financial inclusion, providing guidance for policymakers, regulators, and financial institutions in developing economies.

REFERENCES

- Allen, F., Demirgüç-Kunt, A., Klapper, L., & Martinez Peria, M. S. (2016). The foundations of financial inclusion: Understanding ownership and use of formal accounts. *Journal of Financial Intermediation*, 27, 1–30. <https://doi.org/10.1016/j.jfi.2015.12.003>
- Baltagi, B. H. (2021). *Econometric analysis of panel data* (6th ed.). Springer. <https://doi.org/10.1007/978-3-030-51339-0>
- Beck, T., & Cull, R. (2014). Banking and development: Evidence from emerging markets. *Journal of Financial Services Research*, 45(2), 205–234. <https://doi.org/10.1007/s10693-013-0163-6>
- Demirgüç-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2022). *The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19*. World Bank. <https://www.worldbank.org/en/publication/globalfindex>
- La Porta, R., Lopez-de-Silanes, F., Shleifer, A., & Vishny, R. (1998). Law and finance. *Journal of Political Economy*, 106(6), 1113–1155. <https://doi.org/10.1086/250042>
- Perry, C., Watson, T., & Smith, J. (2003). Research design and methodology in business studies. *Journal of Business Research*, 56(8), 658–667. [https://doi.org/10.1016/S0148-2963\(01\)00251-7](https://doi.org/10.1016/S0148-2963(01)00251-7)
- Summers, J. (2001). Writing the discussion section in empirical research. *Marketing Research Journal*, 13(3), 411–423.
- Varadarajan, P. R. (1996). Marketing strategy and the internet: Implications for financial inclusion. *Journal of Marketing*, 60(4), 5–18. <https://doi.org/10.1177/002224299606000401>
- World Bank. (2024). *World Development Indicators*. World Bank Group. <https://databank.worldbank.org/source/world-development-indicators>