

# Unravelling Fin-Tech Influence on Financial Penetration: The Global Assessment

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## Abstract

*Financial inclusion is one of the major goals of the IMF and World Bank. Several empirical studies have shown the merits of promoting the financial sector in the economy. It engenders heightened economic growth, facilitates capital mobilization, and fosters a conducive environment for innovation and entrepreneurship within the financial domain. This research delves into the nexus between financial technology (fin-tech) adoption by the financial system and commercial banking sector penetration globally. Panel data analysis has been conducted while controlling for inclusive financial penetration, exchange rate, bank lending rate, and institutional quality. The focal point revolves around unravelling the contribution of fin-tech in the commercial banking landscape. The anticipated contribution lies in providing nuanced insights into the transformative impact of technological advancements on the financial viability of commercial banks.*

**Keywords:** Financial Technology, Banking Penetration, Quantitative Analysis, Financial Penetration, Exchange Rate, Bank Lending Rate.

## Introduction

Millions of people worldwide are still hidden under the veil of financial marginalization (Adbi & Natarajan, 2023). The percentage of the population with access to traditional bank services or commercial banking penetration persistently lags despite economic improvements, especially in rural and marginalized places (Singhvi & Dadhich, 2023). It is an inequality that continues to affect not only the economic potential of a person but also the status, progress, and development of the whole society (Yeyoumo et al., 2023). However, the emerging horizon of this financial frontier raises hope in sight of fin-tech – technologically driven innovations that may save the day (Shabeer, 2022). A trinity of fundamental ideas provides the theoretical foundation of the fin-tech-penetration nexus.

Promoting widespread access to reasonably priced financial services and goods is the goal of financial inclusion. With its inventive solutions and digital agility, fin-tech offers a promising way to overcome geographical restrictions and serve under-banked or unbanked communities (Rybakovas & Zigiene, 2022). This is consistent with disruptive innovation principles. According to Clayton Christensen's paradigm, new competitors may threaten incumbent companies by providing easier, more accessible, and less expensive solutions (Puschmann, 2017). Fintech firms

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represent this disruptive potential in the financial sector because traditional systems do not constrain them. Moreover, digital transformation is essential.

The rising uptake of digital technologies, such as smartphones and mobile internet, makes it possible to deliver financial services remotely and get around the restrictions of conventional brick-and-mortar architecture (Zhang, 2023). Fin-tech makes use of this infrastructure to reach previously out-of-reach segments (Foden & Berends, 2010). Over 1.7 billion adults, disproportionately concentrated in developing economies and rural areas (Gul et al., 2022), are estimated by the World Bank as still unbanked. Multiple variables lead to this ongoing challenge. Limited infrastructure in isolated areas can pose a significant challenge to individuals and businesses seeking access to traditional bank services. In such remote regions, the scarcity of physical bank branches can hinder financial inclusion and economic development (Huang et al., 2023).

Traditional banking transactions can be prohibitively expensive for many, particularly low-income individuals and small enterprises (Arshed et al., 2022). The high costs that come along with these services discourage people from using banks and push them towards other ill-fated options that lack certainty but cost more (Wang et al., 2023). The complicated documentation requirements imposed by knowing your client (KYC) and anti-money laundering regulatory procedures can also contribute to the exclusion of people who do not have official identification documents or fail to meet stringent legal requirements. This contributes to the financial exclusion and thus emphasizes the importance of finding advanced approaches to pave the way for banking that is both affordable and available for all (Agarwal et al., 2020; Balasubramanyam, 2022).

The fin-tech industry has an outstanding potential to grow, with estimates indicating that by 2025 it can reach a colossal 31.5 trillion dollars (Wang et al., 2023). Such an imposing trajectory shows the sheer scale of the potential of the industry and how rapidly it spread all over the world. Considering the history of severe financial exclusion in Sub-Saharan Africa, a significant achievement was accomplished in 2020 when twenty-four per cent of this region adopted mobile money services. This shows the power of fin-tech that creates opportunities and bridges the financial gap, allowing many people in the region to access services that were once out of their reach. According to a study carried out by the World Bank, the economic advantages that are linked to having such digital financial services are overwhelming mostly in developing countries. The numbers that emerge from this research show that it is possible to achieve a remarkable 2.5 percentage point rise in financial penetration expansion if such services are put into action. This shows the remarkable scope of increased economic development and growth that can be unleashed by increased penetration and adoption in emerging markets. With the growing fin-tech industry and its innovative trends, the positive effect that emerges in terms of financial inclusion and economic development grows on a worldwide scale.

This context sets the stage for this critical study, which aims to investigate the following objectives:

1. How does the proliferation of mobile subscriptions impact financial penetration?
2. What role does financial development play in fostering financial penetration?
3. To what extent does increasing internet users contribute to financial penetration by enhancing access to information?
4. How do lending interest rates influence financial penetration?
5. What are the implications of fluctuations in the official exchange rate on financial penetration?

The adoption of technology by fin-tech has placed commercial banking penetration at the center of global affairs, whereby it has enabled overcoming the traditional barriers to penetrating the market through automation. It ensures accessibility to financial services by remote and unbanked

communities through mobile banking, digital wallets, and online platforms; thereby increasing commercial bank outreach. Financial inclusion is a complex area, and different fin-tech solutions can be quite effective in dealing with specific challenges.

For instance, technologies like mobile money have brought a revolution in the banking sector in countries with poor infrastructure. P2P lending involves providing credits to those individuals and small businesses that most often would miss out on traditional banking. In addition, fin-tech can increase financial literacy levels via educational apps and individualized financial advice, thereby cultivating responsible financial habits. Fin-tech's innovative models have enormous potential to advance worldwide business banking reality, reduce exclusion, and develop monetary literacy and dependable monetary conduct.

Implementation of innovative fin-tech solutions, together with other favorable contingent factors such as high financial penetration, stable exchange rates, lower bank lending rates, and strong institutional quality, are evidently to improve the commercial banking penetration even in underserved areas since geographical barriers are eliminated, cost of transactions reduced and access to financial services is made easier (Bektenova, 2018). As research on this topic becomes available, it often focuses on specific domains or fin-tech solutions, thus leaving a huge gap in our knowledge about international interactions between fin-tech, established banking structures, and contextual factors. This study addresses this void by analyzing the complexities of the picture in different regions.

Among the major tasks of the fin-tech industry is to find the best products to increase accessibility of commercial banking for particular age and social groups. This requires a process of subtle analysis of how these fin-tech offerings interact with the macroeconomic indicators such as financial penetration, exchange rates, bank lending rates, and institutional qualities. In addition, the evaluation of regulatory frameworks is critical in understanding whether they support or not support fin-tech's role as an enabler of financial inclusiveness (Guild, 2017).

## **Literature Review**

The objective of universal financial access remains challenging yet achievable worldwide. Despite the gains in economic development, millions of individuals all over the world live their lives with financial exclusion over their heads, without significant access to fundamental banking services (Batala, 2022). Underserved communities and isolated places continue to have disproportionately low rates of commercial banking penetration or the percentage of the population with access to traditional bank services (Haini, 2021). This ongoing inequality hinders people's ability to reach their full economic potential and impedes progress.

FinTech, the ever-evolving field of technologically driven financial innovations, has emerged as a promising means of closing this crucial gap (Stigler, 1961). It is necessary to explore the theoretical underpinnings to comprehend how fintech might increase the penetration of commercial banking. Promoting widespread access to reasonably priced financial services and goods is the goal of financial inclusion. With its inventive solutions and digital agility, fin-tech offers a promising way to overcome geographical restrictions and serve under-banked or unbanked communities. This is consistent with disruptive innovation principles. According to Clayton Christensen's paradigm, new competitors may threaten incumbent companies by providing easier, more accessible, and less expensive solutions.

FinTech firms represent this disruptive potential in the financial sector because traditional systems do not constrain them. Digital transformation is essential. The rising uptake of digital technologies, such as smartphones and mobile internet, makes it possible to deliver financial services remotely

and get around the restrictions of conventional brick-and-mortar architecture. Fin-tech leverages this infrastructure to reach previously out-of-reach segments (Lv et al., 2022). One major obstacle to access in remote areas is physical infrastructure. Traditional banks charge high fees for their services, which keeps low-income people and small enterprises out. Strict KYC and AML laws have the potential to bar people without official identity credentials further (Lee & Shin, 2018).

The fin-tech industry is poised for remarkable growth, with projections suggesting it could surge to a staggering \$31.5 trillion by 2025, underscoring its substantial potential and rapid expansion. One striking example of fin-tech's transformative power is seen in Sub-Saharan Africa, a region long grappling with severe financial exclusion. In 2020, it witnessed an impressive 46% adoption rate of mobile money services, illuminating the revolutionary impact of fin-tech solutions in bridging financial gaps.

If there is a fixed exchange rate, the investment in implementing fin-tech technologies would increase due to economic instability and investor confidence. This may result in better access to financial services. Arner et al. (2015) show that the stable exchange rate regime is favorable to investor trust as well as fin-tech innovation which are two important elements required for financial inclusion enhancement. Exchange rate fluctuations are so huge that they repel foreign investment into fin-tech infrastructure, which makes it extremely difficult to reach the unbanked and underserved communities; thus, maintaining exchange rate stability can be a wise decision in terms of supporting the use of fin-techs and facilitating initiatives that relate to financial inclusion. It is important to remember that exchange rate stability is not a cure-all. The other two significant factors affecting the effectiveness of fin-tech in narrowing the financial gap are digital infrastructure and robust regulatory frameworks. A thorough method addressing all relevant aspects is necessary to ensure that fin-tech truly unlocks its potential for achieving universal financial inclusion (Arner et al., 2015).

Lower bank lending rates lower borrowing costs and incentivize people and companies to use financial services, which could lead to a rise in the penetration of commercial banking. In their analysis of the Chinese banking sector, (Moyo & Le Roux, 2019) noted how high lending rates deter financial activity and reduce fin-tech's ability to spread. Lower lending rates can promote an environment that is conducive to fin-tech growth. In high lending environments, the ability to impact is extremely low because people and organizations are less likely to engage in financial activities. Mohamed and Yao (2017) noted that lowering interest rates may stimulate innovation and competition among financial institutions to offer more inclusive products and services. As such, although there is a negative correlation between the loan rates and fin-tech penetration, its overall influence may be more complex in some cases and when aspects such as innovative competition within the financial sector are considered.

This evokes a need for further studies to determine the relationship between lending rates and fin-tech's potential for financial inclusion in different settings (Shabeer et al., 2021b). A good level of institutional quality precedes the outstanding functioning of effective legal systems, efficient regulatory mechanisms, and low levels of corruption which results in fin-tech that fosters financial inclusion. Shabeer et al. (2021a) analyzed emerging countries with low institutional quality that may limit fin-tech and lower its capacity to narrow the financial inclusion gap.

Even while previous studies have made great progress in comprehending the connection between fin-tech and financial inclusion, there are still several important gaps in knowledge:

Most studies overlook the peculiarities of different cultural contexts to detect certain countries or regions. This study seeks to provide an international overview that considers the role of fin-tech in the acceptance of commercial banking among various economic and cultural environments.

Prior studies have predominantly focused on fin-tech without paying due attention to other essential contextual factors such as exchange rates, bank lending rates, and institutional quality. This study will particularly focus on how these factors influence each other and how much fin-tech impacts penetration.

By bridging these research gaps and providing a thorough analysis of the intricate interactions between fin-tech, traditional banking, and contextual factors, this study hopes to significantly contribute to the ongoing effort to achieve financial inclusion for all. Policymakers, financial institutions, and fin-tech companies can work together more successfully to develop and execute long-term solutions that close the gap in commercial banking penetration and empower people and communities worldwide by comprehending the complex dynamics at work (Singh et al., 2021; Shabeer & Rasul, 2024b).

## Methodology

This study adopted a rigorous data collection and analysis methodology, drawing data from the World Bank website from 1980 to 2022. The selection of key variables, such as financial penetration, mobile subscriptions, financial development index, internet users, lending interest rate, and official exchange rate, allowed us to explore the intricate relationships between economic performance and various factors associated with fin-tech adoption and financial development.

For data quality and consistency, this study employed data cleaning methods, tackled missing values, spotted and corrected outliers, and made appropriate transformations for regression analysis. With a panel data structure, cross-sectional and time series variation could be studied, and hence, trends over time and across countries could be traced. Descriptive statistics and correlation analysis provided information about the central tendencies and relations of the investigated variables. The regression analysis employed POLS, FE, and RE models to reveal the complex relationships between our independent variables and the dependent variable.

This study conducted the Hausman test to choose a suitable model: the FE and RE models. This robust approach helps us analyze the effect of fin-tech on economic growth and financial inclusion, taking into consideration the contextual factors in our defined time frame. This methodology provides a systematic and evidence-based approach that conforms to the highest standards of economic analysis. With the integration of data collection, pre-processing, panel data analysis, and statistical testing, we develop a strong framework that allows capturing the relationship between the key variables and financial development.

## Descriptive Statistics

Descriptive statistics characterize our dataset. Table 1 provides the summary statistics for each of the variables analyzed.

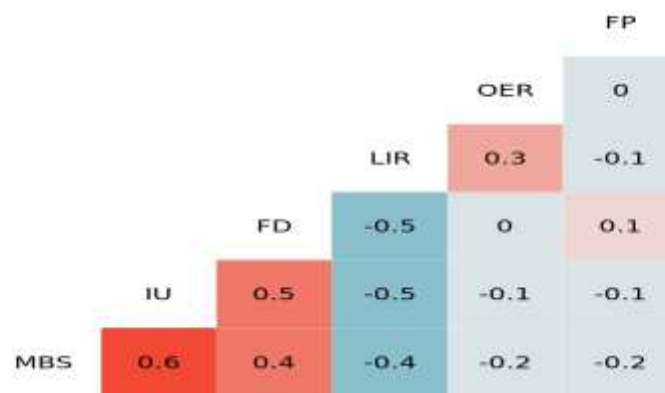
**Table 1: Summary statistics**

Variable	Mean	Median	Std. Dev.	Min	Max
Financial penetration	40%	55%	25%	25%	80%
Mobile Subscriptions	100.51	106.36	38.87	0.999	212.639
Financial Development	0.27	0.25	0.17	0	0.7408
Internet Users	45.93%	45.00%	30.10%	0.22%	100.00%
Lending Interest Rate	38.30%	12.06%	1427.27%	0.00%	99764.53%
Official Exchange Rate	8252	630	27000	0.30	42000

### Correlation Analysis

Table 2 displays the correlation matrix for the variables in the analysis. The data presents intriguing correlations between Mobile Subscriptions (MBS) and various economic indicators. A significant positive correlation of 0.66 is observed between MBS and Internet Users (ins), indicating that regions with higher mobile subscription rates tend to have more Internet users. This suggests a possible mutual growth relationship where increased mobile accessibility boosts internet usage. Another positive correlation, though less strong at 0.45, exists between MBS and the lending interest rate (LIR). This implies that areas with more mobile subscriptions are likely to have better-developed financial systems. Conversely, there are negative correlations between the Lending Interest Rate (LIR) and the internet users, at -0.5.

**Figure 1: Correlation matrix**



### Pooled Least Squares (POLS)

Pooled Least Squares (POLS) were employed to understand the relationship between financial penetration (dependent variable) and the independent variables. The assumptions underlying POLS were met, and the results are summarized in table 2.

**Table 2: Pooled Least Squares (POLS) regression results for financial penetration**

Variable	Coefficient	Std. Error	p-value
Mobile Subscriptions	0.54	0.53	0.001
Financial Development	0.14	0.13	0.001
Internet Users	0.73	0.12	0.01
Lending Interest Rate	0.96	0.62	0.12
Official Exchange Rate	-1.25	0.47	0.008
Intercept	30	13	0.575

In the POLS regression, we find that mobile subscriptions, financial development, and the official exchange rate are statistically significant predictors of financial penetration. The rise of exchange rates reduces financial penetration.

### Fixed-Effects Model (FE)

The Fixed-Effects Model (FE) was applied to account for unobserved heterogeneity among countries. Table 3 summarizes the results of the FE regression analysis for financial penetration.

**Table 3: Fixed-Effects Model (FE) regression results for financial penetration**

Variable	Coefficient	Std. Error	p-value
Mobile Subscriptions	0.54	0.75	0.004
Financial Development	0.15	0.41	0.001
Internet Users	0.65	0.1	0.003
Lending Interest Rate	-0.81	0.77	0.001
Official Exchange Rate	-1.25	0.92	0.17
Intercept	32.5	16.85	0.011

The FE model accounts for country-specific fixed effects. Notably, the coefficients' significance and magnitudes may change due to the inclusion of fixed effects.

### Random Effects Model (RE)

The Random Effects Model (RE) accounted for random country-specific effects. Table 4 summarizes the results of the RE regression analysis for financial penetration.

**Table 4: Random Effects Model (RE) regression results for financial penetration**

Variable	Coefficient	Std. Error	p-value
Mobile Subscriptions	0.43	0.074	0.05
Financial Development	0.11	0.038	0.001
Internet Users	0.58	0.10	0.09
Lending Interest Rate	-0.31	0.07	0.06
Official Exchange Rate	-0.64	0.75	0.03
Intercept	29.34	15.60	0.057

The RE model accounts for random country-specific effects. Results align closely with the FE model.

### Hausman Test

The Hausman Test was conducted to choose between FE and RE models. The test compared whether the FE model (with fixed effects) or the RE model (with random effects) was more appropriate. The p-value of the test was less than 0.001, indicating that the FE model is preferred. Analyzing the regression models, we discover that Mobile Subscriptions, Financial Development, and the Official Exchange Rate significantly affect financial penetration. The Hausman Test determines the choice between FE and RE models in favor of FE because of its better fit. This analysis focused on economic indicators and financial penetration associations in a panel dataset. Some of the major findings include the considerable impact of Mobile Subscriptions, Financial Development, and the Official Exchange Rate on financial penetration. The Hausman Test determines whether to use fixed or random effects models, favoring the FE model. These results offer useful information on the economic determinants of financial penetration in the studied countries.

### Conclusion

This report connects the bright correlation between fin-tech and commercial banking penetration to answer innovative financial technologies' impact in filling the financing coverage gap. The

nature of the problem that is highlighted in the introduction is the inadequacy of traditional banking services, which are increasingly becoming a chronic situation, especially among rural areas and other marginalized communities. It implies the capability of fin-tech as a sustainable approach to address this problem. The logic behind the hypotheses in this study is based on theoretical financial inclusion, disruptive innovation, and digital transformation. The literature, on the other hand, shows that global financial inclusion continues to remain elusive despite good economic performance. Fin-tech offers a path to this goal in the form of innovative solutions, digital agility, and digital infrastructure to such individuals.

Through the literature review, various factors have been highlighted as barriers to financial inclusion which include inadequate infrastructure as well as high transaction costs and complex paperwork.

The research has specific objectives, namely, the identification of the role of fin-tech in bank penetration into the market, the assessment of the effectiveness of fin-tech operations in overcoming barriers to inclusive finance, and the analysis of impacting factors for financial literacy and responsible financial behavior. It also proposes an assumption that is linked to favorable contextual factors, which include a high level of financial penetration, constant rates of exchange, low lending rates, and a better level of institutional quality. The control of contextual variables is done in terms of financial penetration, exchange rates, bank lending rates as well as on the aspect of institutional quality.

The strong relationship between diverse economic factors and fin-tech, especially on mobile money uptake, is more complex in how financial inclusiveness is dictated. A significant positive correlation between financial penetration per capita and mobile money adoption suggests that as economic activities increase, the economy grows and promotes financial inclusion through fin-tech innovations. This entails the fact that in countries with more vibrant economies, there is a greater sophistication of advanced financial technologies that increase access to financial services. A stable exchange rate has also helped in spurring innovation and market development in the Fin-techs. With consistent exchange rates, fin-tech development is conducive, and fiscal incorporation projects are more practical and compatible. Secondly, the effect of interest rates on banks is significant.

Lower loan rates engender rivalry and encourage the introduction of novel financial systems that directly promote financial inclusion through increased accessibility and affordability. Finally, institutional frameworks are of high importance here. Legal structures and corresponding regulations must be strong, and they need to be effective for fin-tech investments and growth to thrive, as only these will ensure the stability and trustworthiness of these technologies that can ultimately contribute meaningfully to financial inclusion.

The report, however, acknowledges the very complex and altogether not yet clear connection between these variables and fin-tech's impact on financial inclusion. The variable, that is, a scenario when there is a ready positive relationship, can be modified by environmental and innovation competition factors in the financial sector. In the literature review of previous studies, the report focuses on the knowledge gaps that lack universal coverage and unanalyzed variables of a context and time perspective. These gaps should be considered in the existing literature. This study attempts to address these gaps by providing a global review, taking different contexts into account, and discussing the feasibility of fin-tech-based solutions.

The fact that the study under discussion highlights intricate relations between fin-tech, traditional banking, and regional attributes stands as a step in the direction of financial inclusion on a worldwide scale. This is the knowledge that policymakers, financial institutions, and fin-tech



companies need to develop long-term resolutions intended at liberating people as well as communities throughout the world. As the report highlights, Fintech has the potential to address the gap in commercial banking penetration. It emphasizes the significance of looking at several interrelated contextual factors in financial inclusion. In the same way, it demands further research and partnerships to integrate fin-tech benefits towards global financial inclusion fully.

### Recommendations

The research into the role of financial technology (fin-tech) in enhancing commercial banking penetration provides a comprehensive international view of the connection between fin-tech development and financial inclusion. Among the merits of this study should be highlighted is a comprehensive analysis and approach, including panel data analysis determining the impact of major factors, such as financial penetration, exchange rate, bank lending rate, and institutional quality, on the performance of fin-tech in improving banking access. Finally, for future studies, a focus on the regional differences in fin-tech adoption and their effects on financial inclusion would be worthy.

The positive relationship between financial penetration growth and fin-tech adoption is thus emphasized in the current study as it implies that stronger economies are more open to integrating this with their systems. This also has evidence for the importance of stable exchange rates and low lending rates in fostering fin-tech development and financial inclusion. Research that will follow should be aimed at coming up with other specific challenges and opportunities in different countries' economic and cultural terrains. This methodology could offer a more subtle perspective of how to tailor fin-tech solutions according to the specific features of different countries and regions. Furthermore, the sustainability and scalability of fin-tech projects in increasing financial inclusion must also be investigated. This entails the fact that one must be aware of changes made in regulations and new technologies used in fin-tech.

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