Journal of
*Risk and Financial Management*

MDPI

*Article*

# Microeconomic Drivers of Financial Inclusion: Evidence from Morocco

**Elmehdi Benider * and Asmae Benthami**

Faculty of Law, Economics and Social Sciences of Sale, Mohammed V University in Rabat, Sale 11000, Morocco; benasmae2002@gmail.com
* Correspondence: elmehdi.benider@um5r.ac.ma

**Abstract**

Financial inclusion is a key policy priority in developing economies, but significant disparities in access to financial services persist. This study examines the microeconomic drivers of financial inclusion in Morocco using data from the Global Findex 2024, based on a sample of 1014 individuals. A probit model is employed to estimate the probability of holding a financial account, complemented by marginal effects and logit estimations for robustness. The results show that education, employment status, income level, and urban residence significantly increase the probability of financial inclusion, while limited financial literacy reduces it. These findings highlight the persistence of socioeconomic disparities and suggest that financial inclusion in Morocco remains uneven across population groups. By providing updated micro-level evidence, this study contributes to the literature by quantifying the role of key determinants and informing policies aimed at improving financial literacy and reducing territorial inequalities.

**Keywords:** financial inclusion; account ownership; microeconomic determinants; probit model; Morocco

## 1. Introduction

Financial inclusion is now widely recognized as a key driver of inclusive and sustainable economic development (Ozili, 2022). It refers to a process that ensures access to and use of formal financial services for all members of an economy, such as savings accounts, payment instruments, credit services, and insurance products (Sarma & Pais, 2011). The economic literature has highlighted that expanding access to financial services helps to reduce financing constraints, improve capital allocation, and stimulate productive investment, thereby promoting economic growth and household well-being (Beck et al., 2007; Demirgüç-Kunt & Klapper, 2013).

Over the past few decades, academic and institutional interest in financial inclusion has grown significantly. Several studies have shown that improving access to financial services can stimulate economic growth and strengthen financial stability (Sahay et al., 2015). From this perspective, financial inclusion goes beyond the traditional objective of integrating unbanked populations into the financial system; it also represents an important instrument for economic and social transformation.

In the empirical literature, a growing number of studies have focused on the determinants of financial inclusion at the individual level. Individual socioeconomic characteristics play a decisive role in access to financial services, with factors such as education level,

Check for updates

Academic Editor: Thanasis Stengos

Received: 23 March 2026
Revised: 2 May 2026
Accepted: 6 May 2026
Published: 9 May 2026

**Copyright:** © 2026 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license.

income, employment status, gender, and geographic location strongly influencing the likelihood of accessing the formal financial system (Allen et al., 2016). Educational attainment, for example, is generally associated with a better understanding of financial products and a greater ability to use financial services. Similarly, differences in income and employment access can create significant disparities in access to financial services among individuals and social groups.

Despite recent progress in expanding financial inclusion globally, several obstacles persist. Factors such as recent economic shocks—notably, the COVID-19 pandemic—as well as income inequalities and gender disparities, continue to limit vulnerable populations' access to appropriate and affordable formal financial services (Guo, 2024).

Identifying the effects of socioeconomic determinants of financial inclusion is essential for designing public policies to reduce financial exclusion and promote more inclusive economic development.

Morocco provides a particularly relevant case study for examining these dynamics. In recent years, Moroccan authorities have undertaken several reforms to strengthen access to financial services and promote financial inclusion, notably through the implementation of a national financial inclusion strategy and the development of digital financial services (BANK AL-MAGHRIB, 2021). Despite these initiatives, disparities in access to and use of financial services persist; according to the Global Findex, 44% of the population reports having a financial account, raising questions about the factors influencing individuals' participation in the formal financial system (Development Research Group, Finance and Private Sector Development Unit, 2025).

Although the determinants of financial inclusion have been extensively studied in the existing literature, several gaps remain, particularly in the context of developing economies such as Morocco. Empirical evidence based on recent microeconomic data remains limited. Furthermore, most studies focus primarily on identifying statistically significant determinants, paying limited attention to the magnitude, distribution, and evolution of socioeconomic disparities. Additionally, the role of financial literacy remains relatively unexplored.

This study aims to address these gaps by providing up-to-date microeconomic data on financial inclusion in Morocco. Beyond identifying the main determinants, it seeks to quantify their marginal effects, examine the structure of socioeconomic disparities, and highlight the extent to which financial inclusion remains partial and uneven across different population groups. This study aims to analyze the microeconomic determinants of financial inclusion in Morocco using individual-level data from the Global Findex 2024 database. The empirical analysis examines the influence of several demographic and socioeconomic characteristics, including age, gender, education level, employment status, income level, area of residence, and financial literacy.

To achieve this objective, the study uses a binary choice estimated using a probit specification to assess the probability of holding a financial account. The results are supplemented by logit estimates and marginal effect calculations to assess the robustness of the findings.

The findings from this study make an important contribution to our understanding of financial inclusion in Morocco by identifying the key socioeconomic factors associated with holding a financial account. The results show that educational attainment, labor market participation, income, and urban residence promote financial inclusion, while limited financial literacy significantly restricts access to formal financial services. These findings provide relevant empirical data for policymakers seeking to reduce financial exclusion and promote a more inclusive financial system in Morocco.

The rest of the paper is organized as follows. Section 2 presents the theoretical framework and a review of the literature on the determinants of financial inclusion. Section 3 describes the data, variables, and econometric methodology used in the empirical analysis. Section 4 presents and discusses the empirical results. Finally, the last section concludes the paper by highlighting the main policy implications of the empirical findings for improving financial inclusion in Morocco.

## 2. Literature Review and Stylized Facts

The literature on financial inclusion highlights a set of explanatory determinants that can be analyzed at different levels. Generally speaking, existing studies distinguish between two main categories of determinants: macroeconomic factors, related to the structural characteristics of financial systems and economies, and microeconomic factors, associated with the socioeconomic characteristics of individuals.

### *2.1. Macroeconomic Determinants of Financial Inclusion*

Several studies have examined the macroeconomic determinants of financial inclusion.

Evans (2015) used an FMOLS model covering the period 2005–2014 to study the effect of a set of determinants on financial inclusion in Africa. The results showed that economic growth has a positive and significant effect on financial inclusion. Similarly, GDP per capita emerges as an important determinant, reflecting the role of income level in access to financial services, and highlights the positive impact of financial development on financial inclusion. The study showed that inflation is negatively associated with financial inclusion. Access to interest, literacy levels, and the presence of Islamic finance were found to be key determinants in Africa.

Eze and Markjackson (2020) examined the determinants of financial inclusion in Nigeria over the period from 2000 to 2018 using data from the World Bank's "World Development Indicators" and the Central Bank of Nigeria. They used ordinary least squares and an error correction model to estimate the effect of GDP per capita, credit extended to the private sector as a percentage of GDP, lending and deposit interest rates, the number of branches per 1000 adults, and the ratio of rural bank deposits to loans on financial inclusion, as measured by the number of depositors at commercial banks. The results showed that domestic credit to the private sector (as a percentage of GDP), the ratio of rural deposits to loans, and the interest rate on loans have a positive and significant impact on financial inclusion. The data further indicated that gross domestic product per capita has a positive but non-significant impact on financial inclusion. The study concluded that domestic credit to the private sector (as a percentage of GDP), the ratio of rural deposits to loans, and the loan interest rate are the determinants of financial inclusion in Nigeria.

Nsiah and Tweneboah (2023) analyzed the determinants of financial inclusion in Africa over the period from 2004 to 2020, taking into account factors related to demand and supply, as well as infrastructure, using the generalized method of moments (GMM) and ordinary least squares. The study adopted a panel data approach, utilizing World Bank data for twenty countries. The results showed that gross national income per capita, institutional quality, and domestic credit extended to the private sector are significant determinants of financial inclusion. It also emerged that gross national income per capita, money supply, and institutional quality reduce barriers to financial inclusion on the continent.

Eshun and Kočenda (2025) used dynamic panel data to examine the determinants of financial inclusion in sub-Saharan Africa and in OECD countries, introduced as benchmarks. The estimation was performed using the generalized method of moments for a sample of 31 sub-Saharan African countries and 38 OECD countries over the period 2000–2021. The results demonstrated that trade openness, political stability, banking efficiency, income,

literacy rates, and remittances are the key determinants of financial inclusion. These factors have varying effects on financial inclusion across the regions studied.

Murshed et al. (2023) examined internal conflicts, economic growth, information and communication technologies (ICT), institutional quality, and remittance flows as determinants of financial inclusion in selected South Asian countries between 2004 and 2018. The results of the econometric study revealed that the resolution of internal conflicts, a high rate of mobile subscriptions, and lower levels of corruption are generally associated with greater financial inclusion, while higher economic growth tends to hinder financial inclusion in South Asia. Moreover, the findings indicated that resolving internal conflicts can indirectly support financial inclusion. This occurs through its moderating effect on the relationship between economic growth and financial inclusion, as well as through its mediating role in the link between remittance inflows and financial inclusion.

Muvunyi and Batóg (2025) employed a time-series econometric approach to examine the relationship between financial inclusion and economic development of selected European economies over the period 2014–2023. The study's findings suggest that there is no clear relationship between the level of financial inclusion and economic development within the member states of the European Union. They also indicate that the impact of financial inclusion varies from one European country to another, both before and after the COVID-19 pandemic.

A critical analysis of the macroeconomic literature reveals a relative convergence regarding the key drivers of financial inclusion. Most studies emphasize the positive role of income levels, financial development, and institutional quality in facilitating access to financial services (Evans, 2015; Nsiah & Tweneboah, 2023; Eshun & Kočenda, 2025). These factors are generally due to improved financial infrastructure and reduced barriers to entry into the formal financial system. However, some discrepancies remain among the empirical findings. For example, although economic growth is often positively linked to financial inclusion, its effect appears to be context-dependent and is sometimes statistically insignificant, or even negative, as highlighted by Eze and Markjackson (2020) and Murshed et al. (2023). Similarly, the role of macroeconomic stability variables, such as inflation, remains unclear across different studies. Furthermore, recent data suggest that the relationship between financial inclusion and economic development is not always clear, as its impact can vary across countries and over time (Muvunyi & Batóg, 2025). These inconsistencies reflect differences in methodological approaches, data sources, and regional contexts. Despite these contributions, macroeconomic analyses remain limited in their ability to capture heterogeneity at the individual level and fail to fully explain disparities in access to financial services among population groups.

### *2.2. Microeconomic Determinants of Financial Inclusion*

The microeconomic determinants of financial inclusion have also been explored in several empirical studies.

Abdu et al. (2021) analyzed the microeconomic determinants of financial inclusion in Ethiopia's Afar region using a sample of 384 households and a binary logistic model. The study's results showed that age, use of financial services, financial literacy, and mobile banking are positively and significantly correlated with financial inclusion. Conversely, the study noted that income and barriers to accessing financial services have a negative effect on financial inclusion. The main barriers to financial inclusion in the Afar region are difficulties in accessing credit, lack of collateral, high interest rates, low literacy rates, limited internet access, mistrust of financial institutions, insufficient financial resources, and limited access to bank branches and ATMs.

Karp and Nash-Stacey (2015) examined the case of the United States and noted that, although the United States is considered to have a developed and deep financial system, the financial inclusion of many communities and households poses a challenge for the government. They drew on a database of 4 million data points and used principal component analysis to develop a financial inclusion index for 251 metropolitan statistical areas. The results demonstrated that technology—specifically, access to mobile phones, the internet, and digital accounts—is the most important determinant. They also confirmed that citizenship and inequality are significant determinants.

Akudugu (2013) examined the determinants of financial inclusion in Ghana using a logit model based on a sample of 1000 adults. The results indicated that the percentage of formal financial inclusion does not exceed 40%, and that age, literacy level, wealth, distance from financial institutions, lack of identification documents, mistrust of formal financial institutions, financial insecurity, and social networks (particularly family relationships) are the main determinants of financial inclusion in Ghana.

Camara et al. (2014) proposed a quantitative approach based on a probabilistic model to analyze the determinants of financial inclusion in Peru using data from the World Bank's Global Findex. They presented correlations that help to identify the socio-economic characteristics of households and businesses likely to influence their financial inclusion. The study's results suggested that the most vulnerable groups (women, people living in rural areas, and young people) have lower probabilities of financial inclusion and face the greatest difficulties in accessing the formal financial system. Regarding financial products, loans and mortgages appear to be the most effective levers for financial inclusion. For businesses, formalization and educational attainment are key determinants of financial inclusion. Finally, for individuals excluded from the financial system, factors such as age, gender, educational attainment, and income appear to influence perceptions of barriers to financial inclusion.

Berguiga and Adair (2024) examined the determinants of financial inclusion among youth in MENA countries using Global Findex data for the periods before (2014) and (2017) and during (2021) the COVID-19 pandemic. The authors employed probit models to analyze two dimensions of financial inclusion: account ownership and the use of digital financial services. The results indicate that employment status, income, education, gender, and age are key determinants of financial inclusion. However, the study finds that gender has no effect on the financial inclusion of young employees before and during the pandemic. The study also highlights that the impact of these factors may vary over time and across population groups, particularly in the context of economic shocks such as the COVID-19 pandemic.

Khan and Sahu (2024) employed a nonlinear autoregressive distributed lag (NARDL) model using time-series data from 1996 to 2022 to examine the effects of socioeconomic and macroeconomic variables on financial inclusion, proxied by the number of bank branches and ATMs per 100,000 adults. The results indicate that remittance inflows, income distribution, and GDP per capita growth positively influence financial inclusion, with their effects becoming significant mainly in the long run.

Jallow and Tajmouati (2025) examined the determinants of financial and digital inclusion in West and Central Africa using the World Bank Global Findex 2021 data. The analysis shows that gender, education, income, and place of residence are generally significant determinants of financial inclusion. However, the results reveal that gender becomes non-significant in the Central African subsample, highlighting regional heterogeneity in the role of socioeconomic factors.

A comparative review of the microeconomic literature reveals a general consensus regarding the key determinants of financial inclusion, notably education, income, age, and

access to financial technologies. However, some inconsistencies remain across studies. For example, the impact of income varies depending on contextual factors, while the role of gender appears to be variable and sometimes insignificant in certain contexts. Furthermore, certain determinants only become significant in the long term, highlighting temporal dynamics. These inconsistencies reflect differences in data, methodologies, and regional contexts. Despite these contributions, most studies focus on identifying significant determinants without providing a precise quantification of their effects, while the role of financial literacy constraints remains insufficiently explored.

### *2.3. Development of the Research Hypotheses*

Based on existing empirical research, this study examines the influence of several socioeconomic characteristics on the likelihood of holding a financial account in Morocco. The literature suggests that educational attainment, income, and employment status are positively associated with financial inclusion, while certain inequalities related to gender or place of residence may limit access to financial services. From this perspective, the following hypotheses are formulated:

**H1:** *Educational attainment positively influences the probability of holding a financial account.*

**H2:** *Income level is positively associated with financial inclusion.*

**H3:** *Individuals who are employed are more likely to hold a financial account.*

**H4:** *Gender disparities influence the probability of financial account ownership.*

**H5:** *Individuals living in urban areas are more likely to hold a financial account.*

**H6:** *Individuals who are unable to use financial services without assistance are less likely to hold a financial account.*

### *2.4. Stylized Facts*

An empirical analysis of the determinants of financial inclusion in Morocco requires an initial presentation of the stylized facts, in order to provide a clear illustration of the evolution of the various indicators. With this in mind, this section presents a descriptive analysis of Global Findex data for 2017, 2021, and 2024 to highlight recent trends in financial inclusion in Morocco.

These waves are selected because they correspond to the most recent and comparable survey rounds available for Morocco in the Global Findex database, ensuring consistency in definitions and measurement across time.

The objective is to identify the key trends characterizing individuals' access to and use of financial services, particularly through the holding of financial accounts, the use of mobile financial services, and borrowing and savings behaviors. Beyond the overall trends in these indicators, particular attention is paid to their variations with respect to certain socioeconomic characteristics of individuals, such as age, education level, gender, and employment status. This descriptive approach thus aims to identify the main empirical patterns that will serve as the basis for the econometric analysis of the microeconomic determinants of financial inclusion in Morocco.

#### 2.4.1. Recent Trends in Financial Inclusion in Morocco (2017–2024)

Financial inclusion encompasses various indicators. The World Bank's Global Findex database provides a set of indicators related to access (holding a financial account) and

usage (borrowing), with particular attention given to the adoption of mobile financial services. Figure 1 illustrates the trends in financial inclusion indicators in Morocco.

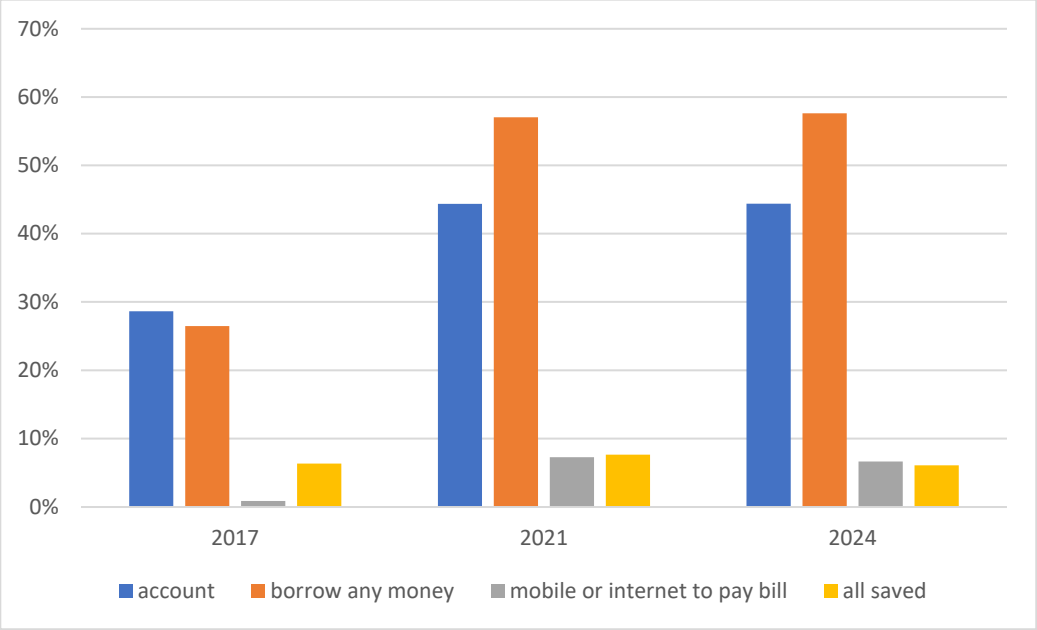



**Figure 1.** Trends in financial inclusion indicators. Source: Global Findex database, World Bank. Note: "All saved" indicates whether the individual has saved money. "Borrow any money" indicates whether the individual borrowed money.

The proportion of adults holding a financial account increased from approximately 29% in 2017 to around 44% in both 2021 and 2024, indicating a substantial improvement in access to financial services.

This uptrend reflects the gradual expansion of financial infrastructure, as well as increased efforts to promote financial inclusion.

The use of credit increased significantly over the same period, rising from about 26% in 2017 to nearly 57% in 2021, and reached approximately 58% in 2024. This trend suggests a growing reliance on borrowing mechanisms, which may reflect improved access to credit as well as rising demand for financing from households.

The adoption of digital financial services, as measured by mobile or online payments, has increased but remains limited in absolute terms. The share of individuals using these services rose from a very low baseline in 2017 to about 7% in 2021 and 2024, indicating that digital financial inclusion is still in its early stages.

In contrast, saving behavior has remained relatively modest and largely stagnated during this period. After a slight increase between 2017 and 2021, the proportion of individuals reporting that they save declined slightly in 2024, remaining at around 6%. This suggests that, despite improvements in access to and use of credit, the ability or willingness to save within the formal financial system remains limited.

Overall, these trends indicate a gradual improvement in financial inclusion in Morocco, driven primarily by the increase in the number of account holders and the greater use of credit. However, uneven progress across different dimensions indicates that financial inclusion remains partial and unbalanced—more advanced in terms of access and borrowing than in terms of savings and the use of digital financial services.

As a result, an aggregate analysis may mask significant heterogeneities within the population. A more detailed examination of socioeconomic disparities is therefore necessary to better understand the structural determinants and distribution patterns of financial inclusion in Morocco.

2.4.2. Socio-Economic and Regional Disparities in Financial Inclusion

While a comprehensive analysis of these indicators provides an overall view of financial inclusion trends, limiting the analysis to this overview alone is reductive; various insights can be drawn from the distribution of financial inclusion indicators by age, education level, gender, and employment status. Figure 2 presents socioeconomic disparities in financial inclusion in Morocco.

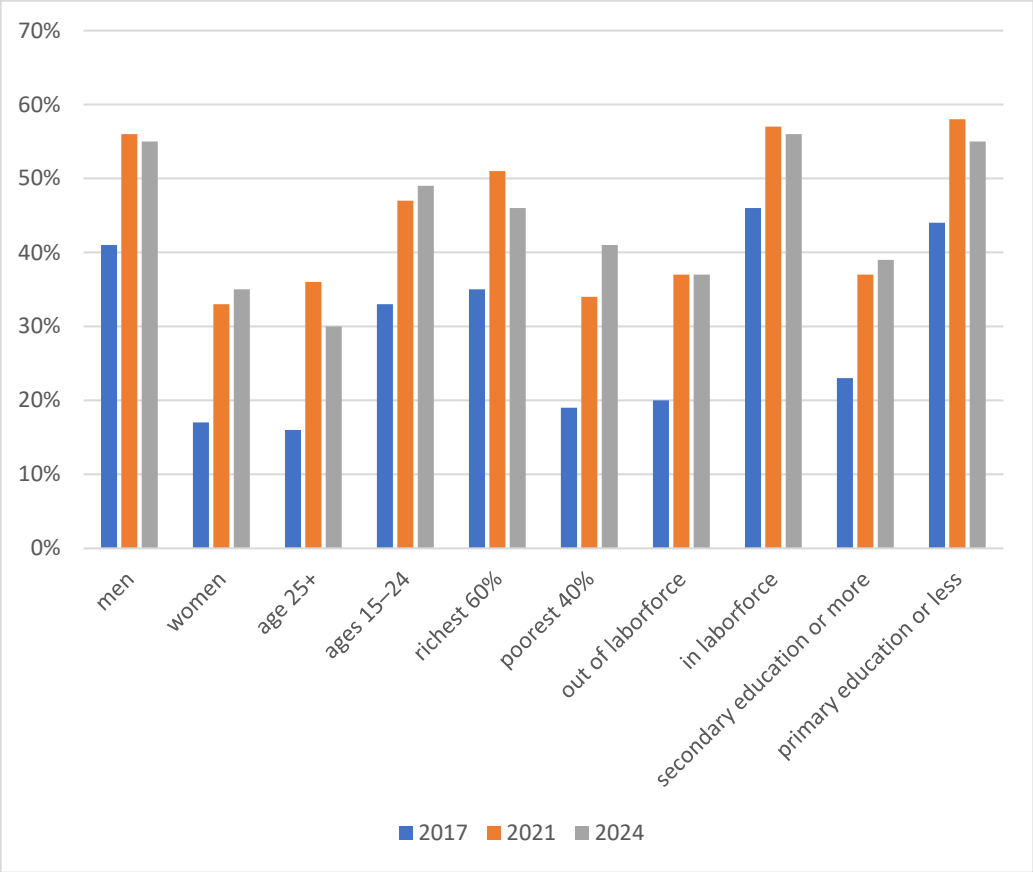



**Figure 2.** Socioeconomic disparities in financial inclusion in Morocco. Source: Global Findex database, World Bank.

The data highlight significant socioeconomic disparities in financial account ownership in Morocco, revealing structurally unequal financial inclusion based on individual characteristics.

In terms of gender, the gap between men and women is significant, although it has been narrowing over the years. In fact, in 2017, the account ownership rate stood at 41% for men, compared to only 17% for women, a gap of 24 percentage points. This gap narrows to 23 percentage points in 2021, then to 20 percentage points in 2024 (55% versus 35%), reflecting a gradual but still insufficient improvement in women's financial inclusion.

Age-related disparities evolve dynamically over time. In 2017, people aged 15 to 24 had a higher account ownership rate than those aged 25 and older (33% versus 16%), suggesting faster adoption of financial services among young people. However, this relationship reverses over time: by 2024, those aged 25 and older reached 49%, compared to 30% among younger people, reflecting greater integration into the financial system with age, likely due to labor market participation and income stability.

Disparities by income level, while persistent, are narrowing. In 2017, those in the top 60% had a rate of 35%, compared to 19% for the bottom 40% (a 16-point gap). By 2024,

this gap narrows to 5 percentage points (46% versus 41%), reflecting a form of relative convergence due to faster improvements among low-income groups.

In contrast, disparities related to labor market participation remain high and relatively stable. Employed individuals consistently exhibit higher levels of inclusion (46% versus 20% in 2017; 56% versus 37% in 2024), representing a persistent gap of approximately 19 percentage points. This underscores the central role of employment and income in accessing formal financial services.

Finally, disparities related to educational attainment remain significant, although they follow a more consistent trend. In 2017, individuals with secondary education or more had a significantly higher account ownership rate (44%) than those with lower educational attainment (23%). This gap persists in 2024, with 55% for those with secondary education or more compared to 39% for those with lower education, highlighting the role of human capital in facilitating financial inclusion.

Overall, the evolution of these gaps highlights a partial reduction in inequalities, particularly based on income and gender, but also the persistence of structural divides, especially those related to employment and demographic characteristics.

In the Moroccan context, these results reflect both the positive effects of national financial inclusion strategies and the structural constraints associated with labor market informality, gender inequalities, and unequal access to economic opportunities. They suggest that, despite the progress observed, financial inclusion remains incomplete and socially differentiated.

These empirical results naturally highlight the need for an econometric analysis aimed at quantifying the effect of these individual characteristics on the probability of accessing financial services and identifying the microeconomic determinants of financial inclusion.

## 3. Empirical Methodology

This study aims to identify the microeconomic determinants of financial account ownership. The dependent variable used in the analysis is a binary variable indicating whether or not the individual holds an account with a formal financial institution. The analysis is based on cross-sectional data from the most recent Global Findex wave (2024), with a sample of 1014 individuals. All variables are measured at the same point in time.

The explanatory variables include a set of demographic and socioeconomic characteristics commonly used in the literature on financial inclusion; notably, gender, age, labor market participation, education level, income level, and residential area. Income level is measured using income quintiles, which allow for the distinction of individuals belonging to different income distribution groups.

In addition, variables related to individuals' financial behavior are also included; notably, the use of credit and the ability to use financial services without assistance.

Given that the dependent variable is binary, a nonlinear probability model is required. In this context, the probit model is employed as it assumes a normal cumulative distribution function, ensuring that predicted probabilities lie within the [0, 1] interval.

Compared to the linear probability model, the probit specification avoids issues related to heteroskedasticity and predicted probabilities outside the admissible range. Furthermore, the probit model allows for a more realistic representation of the nonlinear relationship between explanatory variables and the probability of financial inclusion.

The choice of the probit model is also consistent with a large body of empirical literature on financial inclusion, which frequently relies on binary choice models such as probit and logit (Allen et al., 2016; Nyakurukwa et al., 2025).

The probit regression used in this research is as follows:

$$P(account_i = 1|Xi) = \Phi(X'i\beta) = \int_{-\infty}^{X'i\beta} \frac{1}{\sqrt{2\pi}} e^{\frac{-t^2}{2}} dt$$

Accordingly, the empirical specification of the model is given by[1]:

$$\begin{aligned} P(account_i = 1) \quad &= \Phi(\beta 0 + \beta 1\, gender_i + \beta 2\, age_i + \beta 3\, age_i^2 + \beta 4\, employed_i \\ &+ \beta 5\, urban_i + \beta 6\, education_i + \beta 7\, income_i + \beta 8\, borrowed_i \\ &+ \beta 9\, noassistance_i + \varepsilon_i) \end{aligned}$$

where age$^2$ is introduced to capture the nonlinear effect of age on the probability of financial inclusion.

Income quintiles are introduced as dummy variables to capture differences between income groups.

Table 1 below details the measurement definitions for the dependent and independent variables.

**Table 1.** Definition of variables.

| Dependent Variables | Measurements |
|---|---|
| account | a binary variable indicating whether the individual has an account (1 = yes, 0 = no) |
| **Independent variables** | |
| Gender | gender of the individual (1 = male, 0 = female) |
| Age | age of the individual |
| Age$^2$ | square of age (nonlinear effect) |
| Employed | labor force participation (1 = employed, 0 = unemployed) |
| Urban | place of residence (1 = urban, 0 = rural) |
| Education | higher educational attainment (1 = yes, 0 = no) |
| Income | income quintile (1 = poorest, 5 = richest) |
| Borrowed | individual who has previously borrowed (1 = yes, 0 = no) |
| No assistance | inability to use financial services without assistance (1 = yes, 0 = no) |

## 4. Results and Discussion

### *4.1. Probit Model Estimation*

Table 2 below presents the descriptive statistics, including the mean, median, minimum, maximum, and standard deviation.

**Table 2.** Descriptive statistics.

| Variable | Mean | Median | Minimum | Maximum | SD |
|---|---|---|---|---|---|
| Account | 0.479 | 0 | 0 | 1 | 0.500 |
| Gender | 0.448 | 0 | 0 | 1 | 0.498 |
| Age | 42.777 | 41 | 15 | 100 | 17.738 |
| Employed | 0.366 | 0 | 0 | 1 | 0.482 |
| Urban | 0.551 | 1 | 0 | 1 | 0.498 |
| Education | 0.0811 | 0 | 0 | 1 | 0.274 |
| Income | 3.139 | 3 | 1 | 5 | 1.463 |
| Borrowed | 0.570 | 1 | 0 | 1 | 0.495 |
| No assistance | 0.278 | 0 | 0 | 1 | 0.448 |

Source: Authors' calculations using Stata 17.

The average age of the individuals in the sample is 42.8 years, indicating that the sample consists primarily of individuals of working age.

Approximately 44.8% of individuals are men, while 55.1% live in urban areas. Regarding financial inclusion, 47.9% of individuals report having a financial account, reflecting a moderate level of access to formal financial services. Furthermore, 57% of individuals report having taken out a loan, indicating some interaction with financial institutions.

Concerning education, only 8.11% of the individuals are classified as having higher educational attainment, reflecting a relatively low level of educational attainment within the sample. The mean income quintile is 3.139, while the median is 3, suggesting a relatively balanced distribution of individuals across different income categories. Finally, approximately 27.8% of individuals report being unable to use financial services without assistance, highlighting the existence of financial literacy constraints within the population.

Table 3 presents the correlation matrix between the explanatory variables used in the empirical analysis. Overall, the correlation coefficients remain relatively low, suggesting that multicollinearity is not a major issue in the econometric model.

**Table 3.** Correlation matrix.

| Variables | Age | Gender | Employed | Urban | No Assistance | Borrowed | Income | Education |
|---|---|---|---|---|---|---|---|---|
| Age | 1 | | | | | | | |
| Gender | 0.009 | 1 | | | | | | |
| Employed | −0.062 | 0.350 *** | 1 | | | | | |
| Urban | 0.065 ** | 0.015 | 0.006 | 1 | | | | |
| No assistance | −0.210 *** | 0.030 | −0.028 | −0.002 | 1 | | | |
| Borrowed | −0.021 | 0.129 *** | 0.122 *** | −0.043 | 0.019 | 1 | | |
| Income | 0.018 | 0.074 ** | 0.107 *** | 0.232 *** | −0.050 | −0.028 | 1 | |
| Education | −0.173 *** | 0.068 ** | −0.021 | 0.114 *** | 0.003 | −0.047 | 0.100 *** | 1 |

Note: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$. Source: Authors' calculations using Stata 17.

The highest correlation is observed between employment status and gender, indicating that men are more likely to be active in the labor market. Furthermore, the income quintile shows a positive correlation with urban area and education level, reflecting the socioeconomic disparities associated with access to financial services.

Table 4 presents the results of the probit model estimation. The results indicate that several socioeconomic variables significantly influence the probability of holding a financial account. The gender variable is positive and statistically significant, indicating that men are more likely to hold a financial account. Age has a positive effect on the probability of financial inclusion, while the quadratic term for age is negative, suggesting a nonlinear relationship between age and account ownership.

Individuals who are active in the labor market are significantly more likely to be financially included. Similarly, individuals living in urban areas are more likely to hold a financial account.

Furthermore, a high level of education has a positive and significant effect on the probability of financial inclusion. The results also show that individuals who have previously used credit are more likely to be financially included.

Finally, the variable reflecting the inability to use financial services independently has a significant negative effect, suggesting that difficulties in using financial services constitute a major barrier to financial inclusion.

The estimation results provide empirical evidence regarding the hypotheses formulated in the previous section. Table 5 summarizes the hypothesis testing results.

**Table 4.** Results from the probit regression model.

| Variable | Coefficient | Standard Error | *p*-Value |
|---|---|---|---|
| Gender | 0.646 *** | 0.110 | 0.000 |
| Age | 0.028 ** | 0.014 | 0.047 |
| $Age^2$ | −0.00027 * | 0.00015 | 0.070 |
| Employed | 0.361 *** | 0.110 | 0.001 |
| Urban | 0.282 *** | 0.100 | 0.005 |
| No assistance | −2.323 *** | 0.183 | 0.000 |
| Borrowed | 0.305 *** | 0.100 | 0.002 |
| Income Q1 | 0.363 ** | 0.164 | 0.027 |
| Income Q2 | 0.193 | 0.153 | 0.207 |
| Income Q3 | 0.014 | 0.154 | 0.926 |
| Income Q4 | 0.479 *** | 0.147 | 0.001 |
| Education | 0.554 *** | 0.140 | 0.000 |
| Constant | −1.260 *** | 0.341 | 0.000 |
| Observations | 1014 | | |
| Pseudo $R^2$ | 0.353 | | |
| Wald $Chi^2$ | 218.80 | | |

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. Income quintiles are introduced as dummy variables, with the highest income quintile used as the reference category. Source: Authors' calculations using Stata 17.

**Table 5.** Summary of hypothesis testing.

| Hypothesis | Expected Relationship | Empirical Result | Conclusion |
|---|---|---|---|
| H1 | Education → Financial inclusion (+) | Positive and significant | Supported |
| H2 | Income → Financial inclusion (+) | Significant for higher income groups | Partially supported |
| H3 | Employment → Financial inclusion (+) | Positive and significant | Supported |
| H4 | Gender disparities | Positive and significant | Supported |
| H5 | Urban residence → Financial inclusion (+) | Positive and significant | Supported |
| H6 | Inability to use financial services without assistance → Financial inclusion (−) | Difficulties in using financial services significantly reduce account ownership | Supported |

Source: Authors. Note: (+) indicates a positive relationship, while (−) indicates a negative relationship.

### *4.2. Analysis of Marginal Effects and Heterogeneities*

#### 4.2.1. Nonlinear Effect of Age on Financial Inclusion

Figure 3 shows the trend in the predicted probability of holding a financial account as a function of age. The results indicate the existence of a nonlinear relationship between age and financial inclusion, characterized by an inverted U shape.

The probability of financial inclusion increases gradually during the early stages of working life, reflecting greater participation in the labor market and increased use of financial services. The curve shown suggests that this probability peaks around 52 years of age, which corresponds to the model's estimated turning point. This value reflects the central point of the interval where the maximum predicted probability is observed. Beyond this threshold, the probability of holding a financial account gradually decreases.

This result suggests that the level of financial inclusion is higher for middle-aged individuals, which is consistent with financial behaviors associated with individuals' economic life cycles.

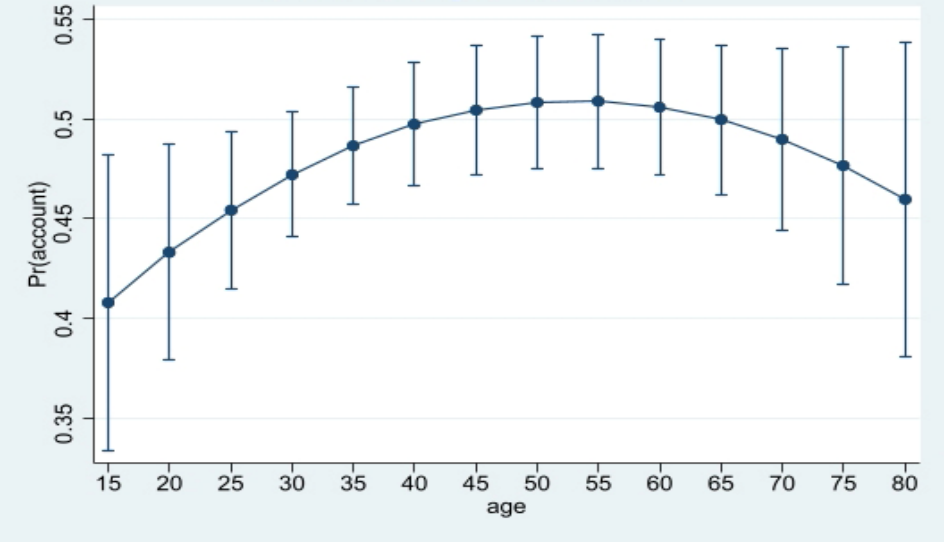



**Figure 3.** Trend in the predicted probability of holding a financial account as a function of age. Source: Authors' calculations using Stata 17.

4.2.2. Effect of Income on Financial Account Ownership

Figure 4 illustrates the probability of holding a financial account by income quintile. The findings suggest a generally positive relationship between income level and financial inclusion.

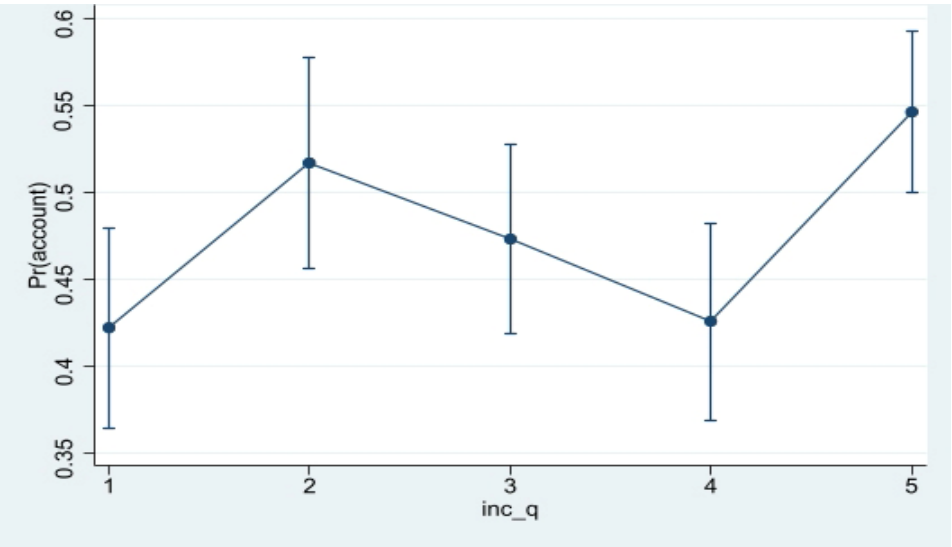



**Figure 4.** Predictive margins of financial account ownership across income quintiles. Source: Authors' calculations using Stata 17.

Individuals with higher income quintiles are more likely to hold a financial account; for example, the predicted probability reaches 54.6% for the highest income quintile, compared to 42.2% for the poorest quintile.

These findings suggest that economic constraints such as income may play an important role in financial inclusion or exclusion, as households with higher incomes are better able to access formal financial services.

4.2.3. Heterogeneity by Place of Residence

Figure 5 examines the relationship between income level and urbanity. The results show that people living in urban areas are consistently more likely to hold a financial

account than those living in rural areas. For people in the lowest income quintile, the probability of having a financial account is approximately 45.5% in urban areas, compared to 38.1% in rural areas. This gap holds true for most income levels.

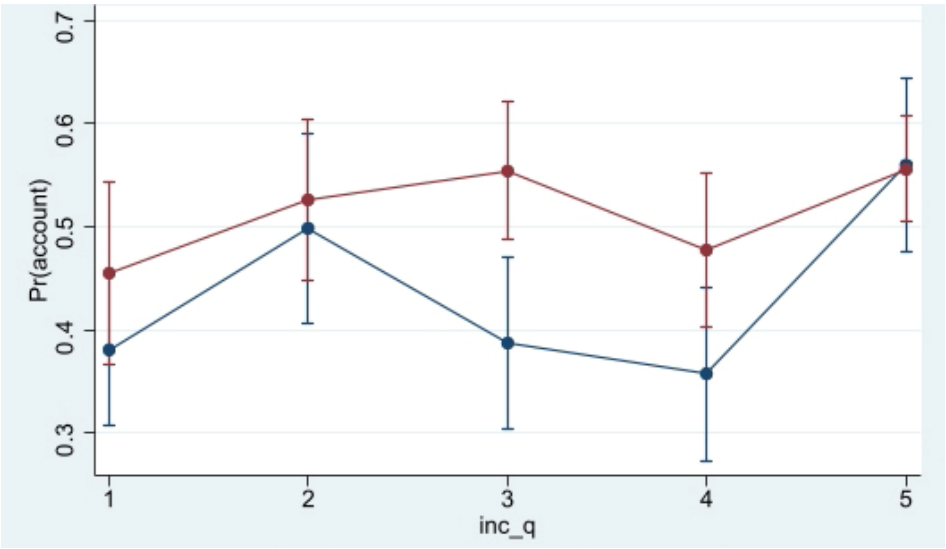



**Figure 5.** Predicted probability of financial account ownership by income quintile and area of residence. Source: Authors' calculations using Stata 17. The blue line represents individuals living in rural areas (milieu = 0), whereas the red line represents individuals living in urban areas (milieu = 1).

These results suggest that financial infrastructure and the availability of banking services play a decisive role in financial inclusion, with urban areas generally benefiting from better access to financial institutions.

4.2.4. Interaction Between Income and Education Level

Figure 6 presents an analysis of the interaction between income level and education level, showing that education significantly amplifies the effect of income on financial inclusion.

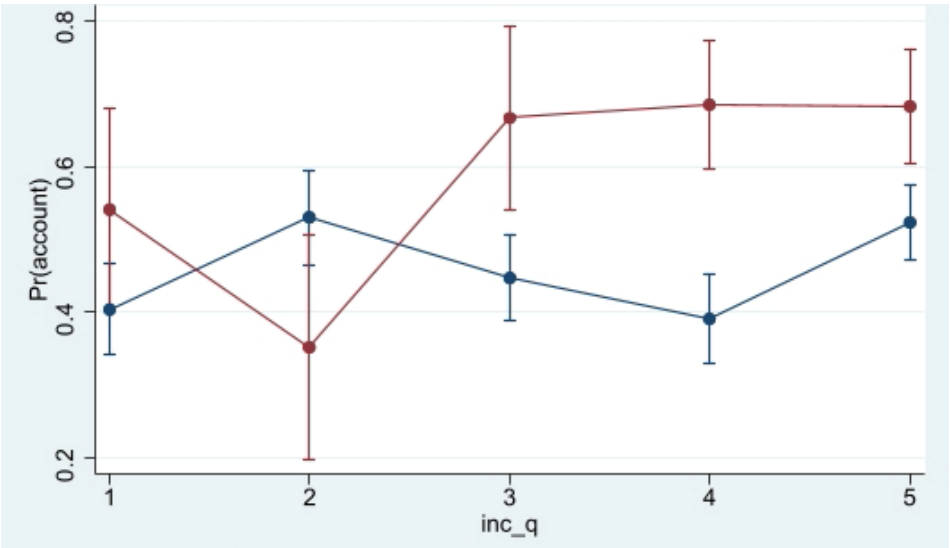



**Figure 6.** Predicted probability of financial account ownership by income quintile and education level. Source: Authors' calculations using Stata 17. The blue line represents individuals with lower educational attainment (educ_high = 0), whereas the red line represents individuals with higher educational attainment (educ_high = 1).

At the same income level, individuals with higher educational attainment are significantly more likely to hold a financial account; for example, in the third income quintile, the probability of financial inclusion reaches approximately 66.6% for individuals with a higher educational attainment, compared to 44.7% for those with lower educational attainment.

This finding underscores the fundamental role of human capital in the adoption and use of financial services, as education facilitates the understanding and use of formal financial instruments.

### *4.3. Robustness Check*

To verify the robustness of the empirical results, the model was re-estimated using a logit specification, which is a commonly used alternative for estimating binary choice models. This approach allowed us to verify whether the conclusions obtained with the probit model remain stable when the error distribution function is modified.

The results of the logit estimation generally confirm the findings obtained with the probit model. First, the gender variable retained a positive and statistically significant effect on the probability of holding a financial account, indicating that men have a significantly higher probability of being financially included than women.

The nonlinear relationship between age and financial inclusion was also confirmed in the logit specification. The coefficient for age is positive and significant, while the quadratic term for age is negative, suggesting the existence of an inverted U-shaped relationship between age and financial account ownership.

Similarly, the active variable remained positive and statistically significant, indicating that labor market participation increases the probability of financial inclusion. The place of residence also retains a significant positive effect, suggesting that individuals living in urban areas are more likely to hold a financial account.

Furthermore, the education variable remained positive and highly significant, confirming the central role of human capital in access to financial services. Similarly, individuals who had previously taken out a loan (borrowed) have a higher probability of being financially included.

In contrast, the no assistance variable, which captures individuals' inability to use financial services independently, had a significant negative effect in both models. This result indicates that difficulties related to the use of financial services constitute a major barrier to financial inclusion.

The marginal effects estimated from the logit model also confirm the robustness of the results; for example, being male increases the probability of holding a financial account by approximately 17 percentage points, while living in an urban area increases this probability by approximately 8 percentage points. Similarly, a higher level of education increases the probability of financial inclusion by approximately 14 percentage points.

Finally, a comparison of the two models revealed that the signs, levels of significance, and order of magnitude of the marginal effects remain largely comparable between the probit and logit specifications. These results suggest that the study's empirical conclusions are robust to the choice of econometric specification, which strengthens the robustness of the empirical findings. Table 6 presents the robustness analysis results.

**Table 6.** Robustness analysis: probit vs. logit estimates.

| Variable | Probit | Logit |
|---|---|---|
| Age | 0.028 ** | 0.051 ** |
| $Age^2$ | −0.00027 * | −0.00048 * |
| Employed | 0.361 *** | 0.597 *** |
| Urban | 0.282 *** | 0.563 *** |

**Table 6.** *Cont.*

| Variable | Probit | Logit |
|---|---|---|
| Borrowed | 0.305 *** | 0.499 *** |
| No assistance | −2.323 *** | −4.302 *** |
| Q1 income | 0.363 ** | 0.559 ** |
| Q2 income | ns | ns |
| Q3 income | ns | ns |
| Q4 income | 0.479 *** | 0.816 *** |
| Education | 0.554 *** | 0.988 *** |
| Gender | 0.646 *** | 1.191 *** |

Note: *** $p < 0.01$; ** $p < 0.05$; * $p < 0.10$. Source: Authors' calculations using Stata 17.

In addition, the model's predictive performance was evaluated using the ROC (Receiver Operating Characteristic) curve. For binary classification models, the ROC curve provides a comprehensive assessment of classification performance by analyzing the trade-off between correctly predicted positive results and incorrectly predicted negative results at different probability thresholds. As Cameron and Trivedi (2005) pointed out, the ROC curve represents the proportion of correctly classified results relative to the proportion of misclassified observations, and the area under the curve reflects the model's overall predictive ability. Figure 7 presents the predictive performance of the model through the ROC curve.

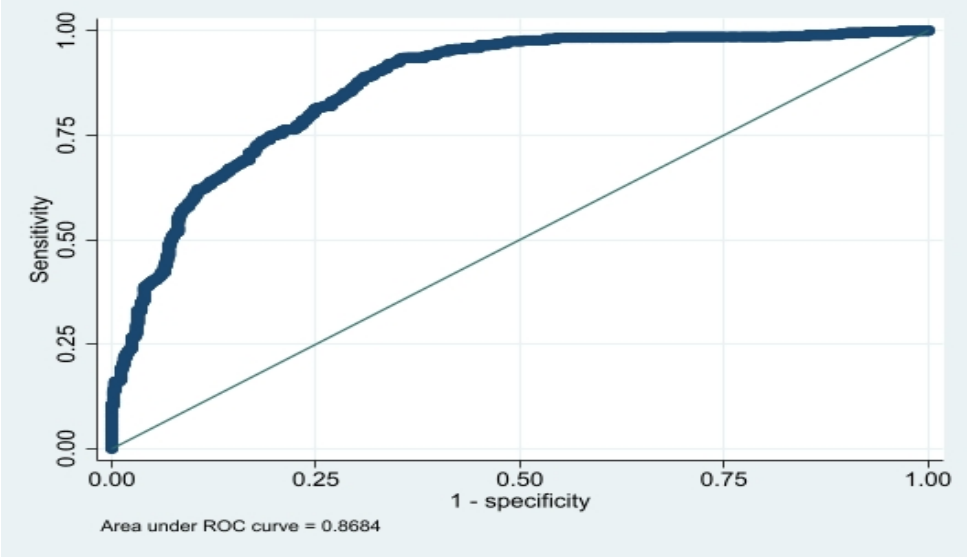



**Figure 7.** Predictive performance of the model. Source: Authors' calculations using Stata 17. The diagonal line represents random classification, while the ROC curve reflects the model's predictive performance.

The estimated area under the curve (AUC = 0.8684) indicates a strong discriminatory capacity, suggesting that the model accurately distinguishes between individuals who hold a financial account and those who do not.

## 5. Conclusions

This study analyzed the microeconomic determinants of financial account ownership using a probit model applied to individual-level data. The empirical results suggest that several socioeconomic characteristics play a significant role in access to financial services in Morocco, based on data from the World Bank's Global Findex 2024.

First, demographic variables are key determinants of financial inclusion. Indeed, the econometric results indicate that gender significantly influences the probability of holding a financial account, with men having a higher probability of financial inclusion than women. This finding is consistent with the existing literature, which shows that women are often less integrated into financial systems in many emerging economies.

Second, regarding the effect of age on the probability of holding a financial account, the empirical results show a nonlinear effect of age. Estimates show that the probability of financial inclusion increases with age up to a certain threshold—52 years old, in our case study—before beginning to decline. This result suggests that financial inclusion is higher among individuals in the middle of their economic life cycle, which is consistent with the findings of certain empirical studies.

Third, individuals' economic characteristics play a fundamental role. The results from our model indicate that income level has a positive effect on the probability of holding a financial account, which supports the idea that individuals with higher economic resources are more likely to use financial services. This positive relationship between income and financial inclusion is well documented in the empirical literature on developing economies.

Fourth, the level of education also emerges as a significant determinant of financial inclusion. Individuals with a higher educational attainment are more likely to have access to financial services, which is consistent with various empirical studies.

Fifth, the no assistance variable, used as a proxy for financial literacy, yields important insights. Being unable to use financial services independently significantly reduces the probability of being financially included, suggesting that financial education represents a key determinant of financial inclusion in Morocco.

Robustness analyses conducted using a logit model confirm the stability of the results obtained with the probit model. The estimated coefficients retain the same signs and levels of significance, suggesting that the identified empirical relationships are robust.

Overall, the empirical results confirm that financial inclusion is closely linked to individual socioeconomic characteristics, including income, education level, age, employment status, financial literacy, and gender. These results are consistent with recent empirical studies highlighting the importance of individual factors in access to formal financial services in emerging and developing economies.

This study relies on cross-sectional data, which limits the ability to establish causal relationships; therefore, the results should be interpreted as statistical associations.

From a policy perspective, the results suggest that improving financial literacy, strengthening financial infrastructure in rural areas, and promoting inclusive digital financial services could significantly enhance financial inclusion in Morocco. Targeted policies aimed at reducing socioeconomic disparities in access to financial services may therefore play a key role in fostering inclusive economic development.

These findings are closely aligned with the objectives of Morocco's National Financial Inclusion Strategy, particularly in reducing socioeconomic and territorial disparities, and improving financial literacy among underserved populations.

**Author Contributions:** Conceptualization, E.B.; methodology, E.B. and A.B.; software, E.B.; validation, A.B.; formal analysis, E.B.; investigation, E.B.; resources, E.B.; data curation, E.B.; writing—original draft preparation, E.B.; writing—review and editing, E.B. and A.B.; visualization, E.B. and A.B.; supervision, A.B.; project administration, E.B.; funding acquisition, E.B. All authors have read and agreed to the published version of the manuscript.

**Funding:** The corresponding author received financial support from the National Centre for Scientific and Technical Research (CNRST-Morocco) for this article's research and/or publication. https://www.cnrst.ma/fr/ (accessed on 17 December 2025).

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Not applicable.

**Data Availability Statement:** The data used in this study are available from the World Bank Global Findex database: https://microdata.worldbank.org/index.php/catalog/7949 (accessed on 22 March 2026), and the analysis was conducted using Stata 17.

**Conflicts of Interest:** The authors declare no conflicts of interest.

## Notes

[1] The "no assistance" variable serves as a proxy for financial literacy.

## References


Abdu, E., Adem, M., & McMillan, D. (2021). Determinants of financial inclusion in Afar Region: Evidence from selected woredas. *Cogent Economics & Finance*, *9*(1), 1920149–1920149. [CrossRef]

Akudugu, M. (2013). The determinants of financial inclusion in Western Africa: Insights from Ghana. *Research Journal of Finance and Accounting*, *4*, 1–9.

Allen, F., Demirguc-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(C)*, 1–30. [CrossRef]

BANK AL-MAGHRIB. (2021). *Bank Al-Maghrib annual report 2021*. BANK AL-MAGHRIB. Available online: https://www.bkam.ma/en/Press-releases/Press-releases/2022/Bank-al-maghrib-annual-report-2021 (accessed on 22 March 2026).

Beck, T., Demirgüç-Kunt, A., & Levine, R. (2007). Finance, inequality and the poor. *Journal of Economic Growth*, *12*(1), 27–49. [CrossRef]

Berguiga, I., & Adair, P. (2024). Determinants of youth financial inclusion in MENA countries: Account holding versus the use of digital services. *Journal of Financial Reporting and Accounting*, *23*(2), 550–574. [CrossRef]

Camara, N., Pena, X., & Tuesta, D. (2014). *Factors that matter for financial inclusion: Evidence from Peru* (Working Papers, Article 1409). BBVA Bank, Economic Research Department. Available online: https://ideas.repec.org//p/bbv/wpaper/1409.html (accessed on 22 March 2026).

Cameron, A., & Trivedi, P. (2005). *Microeconometrics: Methods and applications*. Cambridge University Press. [CrossRef]

Demirgüç-Kunt, A., & Klapper, L. (2013). Measuring financial inclusion: Explaining variation in use of financial services across and within countries. *Brookings Papers on Economic Activity*, *2013*(1), 279–340. [CrossRef]

Development Research Group, Finance and Private Sector Development Unit. (2025). *The global Findex database 2025: Connectivity and financial inclusion in the digital economy*. World Bank, Development Data Group. [CrossRef]

Eshun, S. F., & Kočenda, E. (2025). Determinants of financial inclusion in sub-Saharan Africa and OECD countries. *Borsa Istanbul Review*, *25*(1), 34–56. [CrossRef]

Evans, O. (2015). *The effects of economic and financial development on financial inclusion in Africa*. Available online: https://ideas.repec.org/p/pra/mprapa/81325.html (accessed on 22 March 2026).

Eze, G., & Markjackson, D. (2020). Determinants of financial inclusion in Nigeria. *IOSR Journal of Economics and Finance*, *11*(1), 14–22.

Guo, L. (2024). Global financial inclusion: Mechanisms, regional disparities, and recommendations for improvement. *Journal of Applied Economics and Policy Studies*, *7*, 39–44. [CrossRef]

Jallow, I. A., & Tajmouati, S. (2025). Determinants of financial and digital inclusion in West and Central Africa: Evidence from binary models with cross-validation. *arXiv*, arXiv:2511.12179. [CrossRef]

Karp, N., & Nash-Stacey, B. (2015). *Technology, opportunity & access: Understanding financial inclusion in the U.S.* (Working Papers, Article 1525). BBVA Bank, Economic Research Department. Available online: https://ideas.repec.org//p/bbv/wpaper/1525.html (accessed on 22 March 2026).

Khan, I., & Sahu, M. (2024). Enhancing financial inclusion in India: The impact of socioeconomic and macroeconomic factors. *Journal of Financial Economic Policy*, *17*(2), 270–294. [CrossRef]

Murshed, M., Ahmed, R., Al-Tal, R. M., Kumpamool, C., Vetchagool, W., & Avarado, R. (2023). Determinants of financial inclusion in South Asia: The moderating and mediating roles of internal conflict settlement. *Research in International Business and Finance*, *64*, 101880. [CrossRef]

Muvunyi, E., & Batóg, J. (2025). Financial inclusion and sustainability of economic development: Empirical results from selected EU member states. *Sustainability*, *17*(18), 8237. [CrossRef]

Nsiah, A. Y., & Tweneboah, G. (2023). Determinants of financial inclusion in Africa: Is institutional quality relevant? *Cogent Social Sciences*, *9*(1), 2184305. [CrossRef]

Nyakurukwa, K., Seetharam, Y., & Chipeta, C. (2025). Disaggregating digital financial inclusion in Africa: Explaining within- and between-country variance. *Finance Research Letters*, *84*, 107776. [CrossRef]

Ozili, P. K. (2022). *Financial inclusion, sustainability and sustainable development* (SSRN Scholarly Paper No. 4185735). Social Science Research Network. [CrossRef]

Sahay, M. R., Cihak, M. M., N'Diaye, M. P. M., Barajas, M. A., Mitra, M. S., Kyobe, M. A. J., Mooi, Y. N., & Yousefi, M. S. R. (2015). *Financial inclusion: Can it meet multiple macroeconomic goals?* (IMF Staff Discussion Notes, IMF Staff Discussion Notes, Article 2015/017). International Monetary Fund. Available online: https://ideas.repec.org//p/imf/imfsdn/2015-017.html (accessed on 22 March 2026).

Sarma, M., & Pais, J. (2011). Financial inclusion and development. *Journal of International Development*, *23*(5), 613–628. [CrossRef]

**Disclaimer/Publisher's Note:** The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.