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# Financial Inclusion across Muslim- and Non-Muslim-Majority Economies: Evidence on Account Ownership, Access Pathways, and Digital Enablement

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# Financial Inclusion across Muslim- and Non-Muslim-Majority Economies: Evidence on Account Ownership, Access Pathways, and Digital Enablement


## Abstract

**Purpose:** This study compares financial inclusion across Muslim- and non-Muslim-majority lower-middle income economies on three margins: entry into account ownership, the organisation of access through bank-only, mobile-only, and combined pathways among account holders, and digitally enabled account use as a deeper layer of inclusion conditional on ownership.

**Design/Methodology/Approach:** The study is based on the Global Findex Database 2024. The final sample size contains 40,237 adult respondents from a sample of 38 economies. The Muslim-majority subsample spans sixteen economies and the non-Muslim-majority group is made up of twenty-two economies.

**Findings:** The results consistently indicate three associational differences between Muslim- and non-Muslim-majority economies when financial inclusion is examined across multiple margins. First, the likelihood of owning any account is lower in Muslim-majority economies. Second, among account holders, access is more concentrated in bank-only pathways, with mobile-only and combined bank-and-mobile access less prevalent. Third, digitally enabled account use is lower among account holders in Muslim-majority economies, indicating that gaps persist at the level of inclusion depth even after entry into account holding.

**Originality/Value:** The existing literature lacks a study that jointly compares Muslim- and non-Muslim-majority economies across ownership, pathways, and digital enablement within one framework. This study fills this gap with a layered cross-economy assessment that treats majority status as an ecosystem classification and improves interpretability at similar income levels i.e. lower-middle income economies.

**Research Limitations/Implications:** Findings are based on cross-sectional survey data and capture associations rather than causal effects, but they remain informative for understanding institutional patterns and informing comparative financial inclusion policy design.

**Practical Implications:** Findings imply that inclusion gaps reflect institutional and ecosystem conditions, so regulators can benchmark ownership, pathway mix, and digital enablement to identify where interoperability, service reliability, and perceived product fit limit engagement.



**Keywords:** Financial inclusion, Account ownership, Mobile money and banking access pathways, Digital financial enablement


## 1. Introduction

Financial inclusion is best understood as a layered process in which formal participation begins with account ownership but extends to how accounts are accessed and used. Global account ownership reached 79% in 2024, up from 74% in 2021, and rose from 51% in 2011 (Klapper et al, 2025, p. 86). Yet aggregate progress masks large differences across economies at similar income levels, with lower-middle-income economies showing especially wide dispersion. Over

2011-2024, account ownership in low- and middle-income economies increased from about 42% to about 75% (Klapper et al, 2025, p. 86). In 2024, lower-middle-income economies still span roughly 25% to nearly 100% ownership, with many clustered around 40-70% (Klapper et al, 2025, p. 85). This heterogeneity motivates comparative analysis that separates income level from institutional and ecosystem correlates, including differences across Muslim- and non-Muslim-majority economies.

Account ownership is a useful entry indicator, but it is an incomplete proxy for meaningful inclusion. Registration in a bank does not necessarily translate into active engagement, especially when financial services increasingly operate through digital interfaces and account-linked instruments (Kemgou Voptia & Stukalina, 2024). Digital finance can broaden the functions available to new users, but it also introduces frictions and risks that shape whether participation deepens after entry (Mamun & Várallyai, 2025). These considerations support a layered view of inclusion. The extensive margin captures whether an adult holds any account. Beyond that, inclusion is organised through the channels that account holders use to access services, and deepened through digitally enabled use among those who are already inside the formal system.

The organisation of access is analytically important because "having an account" can reflect different rails with different constraints. Bank-based access and mobile money access differ in onboarding, reliability, and how transactions are mediated, so they should not be treated as interchangeable. Evidence indicates that bank and mobile accounts can operate as complements, with joint holding linked to broader payment activity rather than a simple substitution from one channel to the other (Son et al., 2020). At the same time, mobile money can be operationally sensitive to disruptions in agent functionality and liquidity, which affects the practical reliability of an account-based pathway (Mazambani et al., 2018). Socioeconomic gradients in adoption also imply that pathway composition can vary substantially even when overall ownership levels appear similar (Nyoka, 2019). Pathway structure therefore provides a necessary bridge between entry and deeper engagement.

A comparative lens is particularly useful where institutional contexts differ in how financial services are structured, integrated, and perceived as usable. Muslim- and non-Muslim-majority status is treated here as an economy-level classification that can coincide with differences in institutional fit, provider mixes, and ecosystem readiness, without being interpreted as an individual behavioural attribute. Prior evidence links exclusion to perceived misalignment with conventional products, suggesting that uptake can remain lower even when services exist (Sain et al., 2018). Related work shows heterogeneity in demand for Shariah-compliant services across individuals and settings, cautioning against reading religious-majority classifications as direct proxies for personal preferences (Brekke, 2018). What remains limited is comparative evidence that evaluates ownership, access pathways, and digitally enabled use jointly within a unified account-based framework across these economy groups (Ameziane, 2024).

This study contributes a structured assessment of financial inclusion across Muslim- and non-Muslim-majority economies that separates three margins: entry into account ownership, the organisation of access through bank-only, mobile-only, and combined pathways among account holders, and digitally enabled account use as a deeper layer of inclusion conditional on

ownership. By treating these as distinct but connected outcomes, the analysis clarifies how cross-economy differences can arise at multiple points in the inclusion process rather than being inferred from ownership alone. The comparison is relevant because religious-majority status functions as an institutional and ecosystem-level classification that may coincide with differences in provider structures, channel integration, and digital readiness. Existing evidence often treats account ownership as a single outcome or examines digital finance in isolation, leaving limited comparative work that jointly evaluates ownership, pathway composition, and digital enablement within one framework. The study contributes by providing a unified cross-economy assessment across these three margins, improving interpretability of inclusion gaps at comparable income levels.

## 2. Dimensions of Financial Inclusion: Ownership, Digitalization, and Pathways

The country-level weighted average of account ownership across lower-middle-income economies is presented as a heatmap by religious context in Figure 1. It portrays substantial disparities within and across the Muslim-majority economies. Among non-Muslim-majority economies, 17 out of 22 report account ownership above 50 percent, compared with only 5 out of 16 Muslim-majority economies. This indicates that 77 percent of lower-middle-income non-Muslim-majority economies exceed the 50 percent ownership threshold, whereas only 31 percent of lower-middle-income Muslim-majority economies do so.

Among non-Muslim-majority economies, account ownership reaches 90.1 percent in Kenya, 89.0 percent in India, and 81.7 percent in Sri Lanka. Very few non-Muslim-majority economies fall below the 40 percent threshold, with the lowest rates observed in Cambodia at 39.0 percent, Lao PDR at 37.7 percent, and Nicaragua at 23.5 percent. In contrast, among Muslim-majority economies, account ownership reaches 76.5 percent in Senegal, 72.3 percent in the Kyrgyz Republic, and 63.3 percent in Nigeria, while the lowest levels are observed in Mauritania at 27.3 percent, Pakistan at 27.3 percent, and Lebanon at 23.0 percent.

Likewise, Figure 2 presents the weighted heatmap of digitally enabled account ownership by religious context. It also reveals clear disparity within and across Muslim-majority economies. Among non-Muslim-majority economies, 19 out of 22 (86%) report digitally enabled account ownership above 50 percent, compared with only 12 out of 16 (75%) Muslim-majority economies. In non-Muslim-majority economies, digitally enabled account use among account holders reaches 99.2 percent in Kenya, 97.6 percent in Ghana, and 96.6 percent in Zambia. At the lower end of the distribution, digital enablement falls to 29.4 percent in Nepal, 34.9 percent in India, and 42.1 percent in Sri Lanka, indicating substantial variation in the depth of account use despite formal ownership. In contrast, among Muslim-majority economies, digitally enabled account use reaches 96.2 percent in Senegal, 84.0 percent in Nigeria, and 81.8 percent in the Kyrgyz Republic, with Guinea following closely at 81.2 percent. The lowest levels of digital enablement are observed in Tunisia (31.4 percent), Morocco (37.4 percent), and Lebanon (41.2 percent), highlighting persistent gaps in digital engagement among account holders within this group.

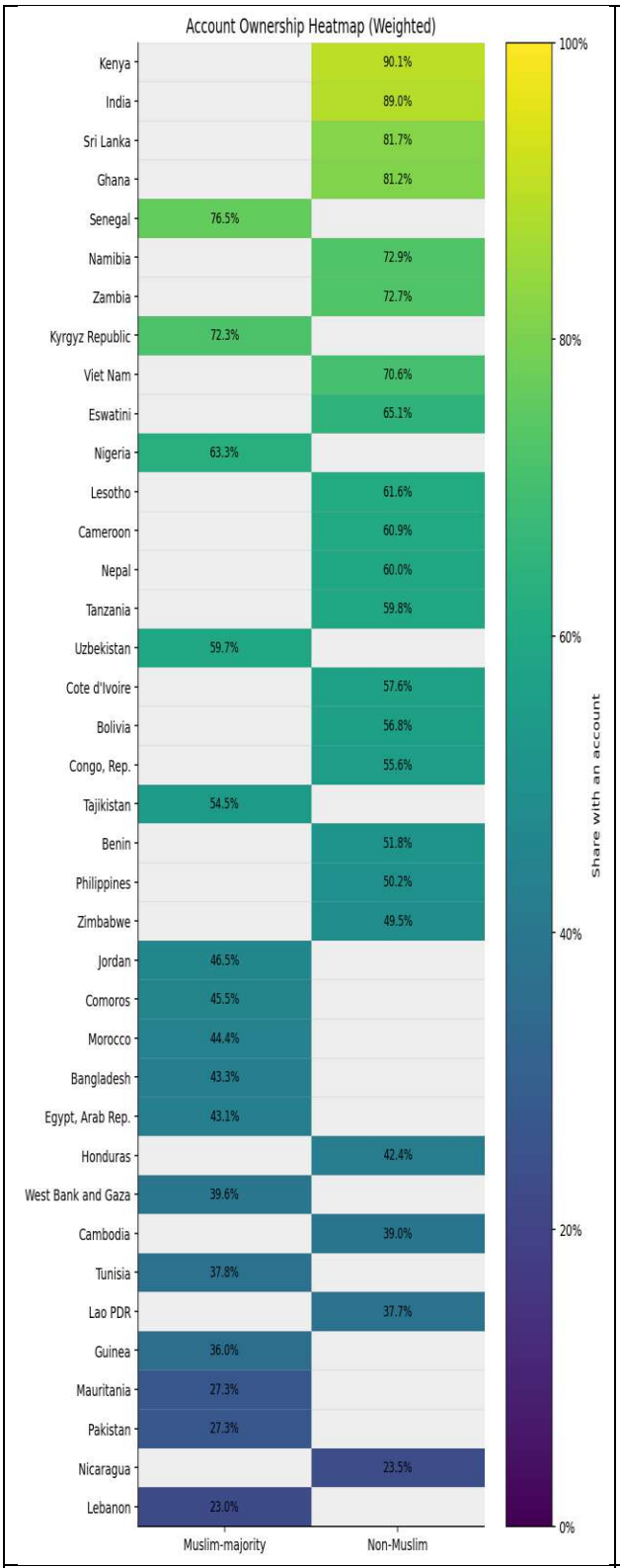


Figure 1. Cross-economy variation in account ownership

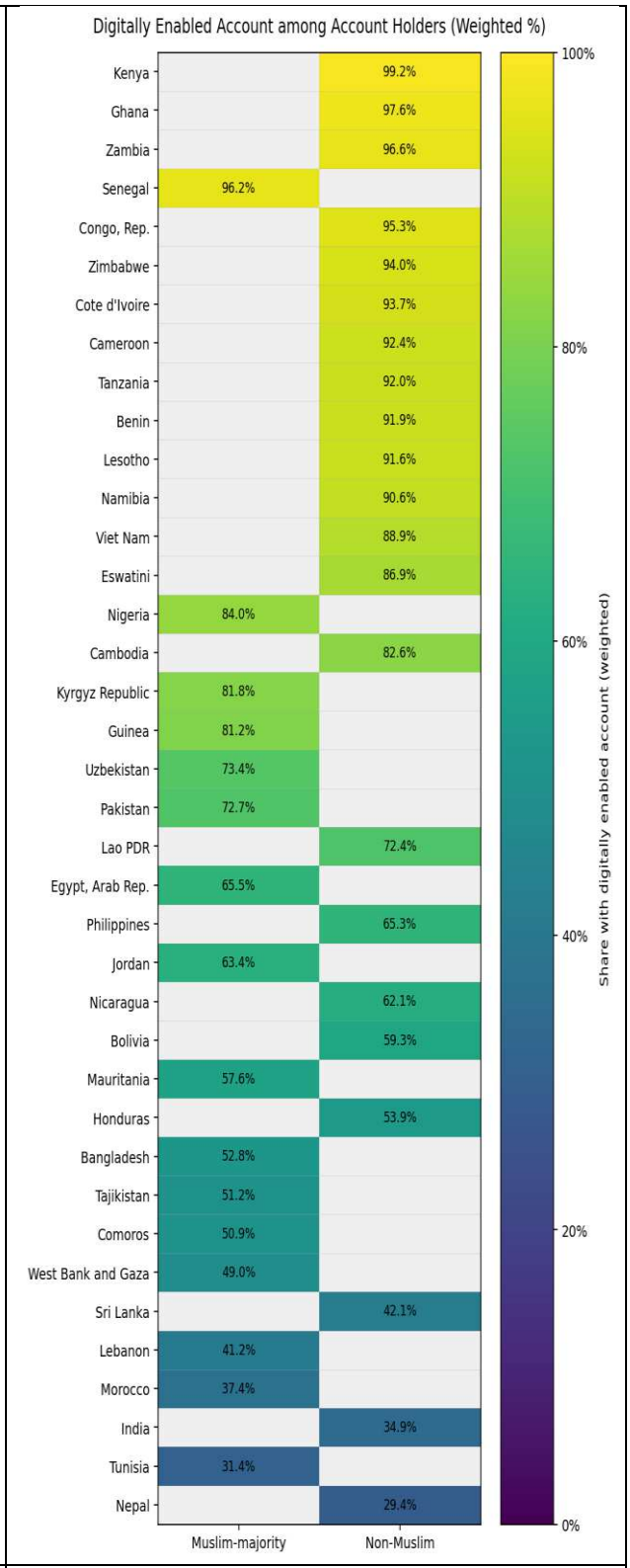


Figure 2. Differences in digital enablement among account holders

Authors' own estimation based on Global Findex Database 2024

Figure 3 shows significant differences in the nature of financial access pathways for account holders from religious majority contexts. In Muslim-majority economies, access to banks-only is predominant in most national profiles. In Tunisia and Lebanon, over 88 percent of account holders use banks only and mobile-only use is lower than 7 percent. A similar trend is seen in Morocco and the West Bank and Gaza, where bank-only shares are more than 84 percent. Even in economies in which usage is more diversified, banks have a central role to play. In Egypt, the proportion of the population who hold accounts and use banks only is 63.8 percent, those who use mobile services only is 18.2 percent, and those who use both channels is 18.0 percent. Pakistan is a more balanced configuration with 32.7 percent, 33.0 percent and 34.2 percent of bank-only, mobile-only and joint usage respectively.

Non-Muslim-majority economies have much greater heterogeneity. In Sri Lanka, 96.3 percent of account holders access only through banks, while in Kenya and Ghana, mobile-only pathways account for almost half of all users at 49.6 percent and 52.3 percent, respectively. Some economies exhibit deep dual pathway integration. Viet Nam has the largest joint usage share of 53.9 percent, followed by Namibia with 52.4 percent and Cambodia with 38.8 percent. In contrast, countries like Congo Republic and the Republic of the Congo are characterised by a predominance of mobile-only (more than 70 percent).

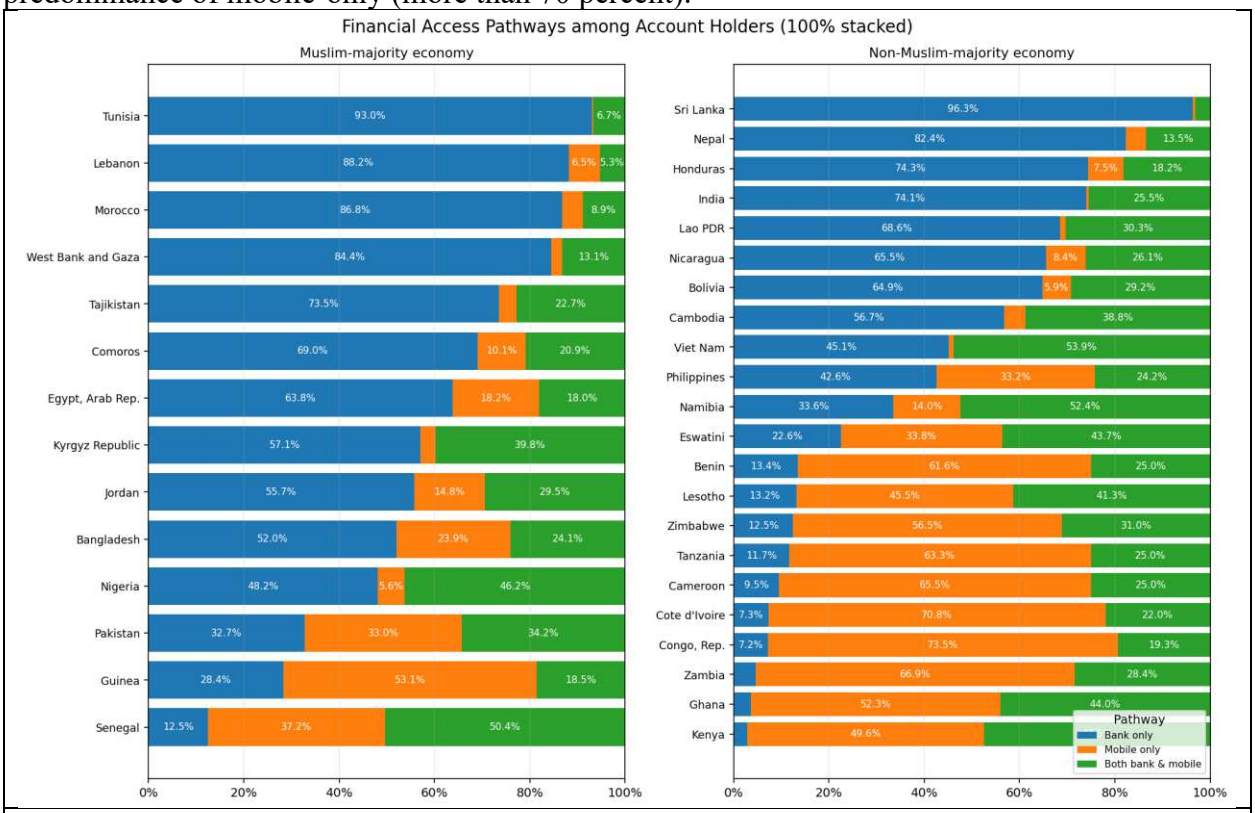


Figure 3. Distribution of financial access pathways

Authors' own estimation based on Global Findex Database 2024

## 3. Literature Review

Financial inclusion is increasingly distinguished between formal access and effective use, because account ownership incompletely captures participation. Mobile money can support

transfers, payments, and consumption smoothing during shocks (Abiona & Koppensteiner, 2022), yet ownership may overstate engagement when fees, agent distance, and liquidity constraints leave disadvantaged users inactive (Hamdan et al., 2022). Despite persistent structural barriers, mobile money may also strengthen women's transactional autonomy and ability to store value, allowing gains along selective rather than comprehensive margins (Kim, 2022). Effective inclusion therefore depends on practical usability, not formal entry alone.

Financial access pathways are similarly layered because bank-based and mobile channels may complement rather than replace one another. In Vietnam, bank account ownership is associated with greater mobile money use and non-cash transactions (Tran Hung Son et al., 2020). However, education and income remain related to mobile banking adoption, indicating unequal capabilities rather than uniform diffusion (Nyoka, 2019). Cross-country evidence distinguishes registered from active mobile money accounts and connects inclusion more strongly with engagement intensity than nominal enrollment (Kemgou Voptia & Stukalina, 2024). Ownership, channel choice, and activity are distinct dimensions.

Digital enablement captures the functionality and reliability of account use. Rural users in Zimbabwe rely heavily on mobile money for remittances but make limited use of savings and credit (Dube et al., 2014). Liquidity and cash-flow disruptions can weaken cash-in and cash-out services, erode trust, and discourage regular usage (Mazambani et al., 2018). In Ghana, scaling and legitimacy depend on coordination between incumbents and entrants rather than platform availability alone (Senyo et al., 2022). When telecom-led services expand faster than legal frameworks, digital accounts may grow without stable access (Chitimira & Torerai, 2021).

At the macro level, inclusion remains commonly measured through account-based indicators despite increasingly digital delivery. Bank penetration is associated with growth, credit availability, and digital connectivity, which shape entry costs and usability (Anifowose & Chummun, 2025). Fintech ecosystems may reduce onboarding frictions and expand account-like services alongside banks (Carè et al., 2025), but mobile money is only one pathway, making digital finance too heterogeneous for undifferentiated treatment (Hasan et al., 2024). Informational, social, and infrastructural divides limit service use despite formal availability (Qureshi, 2020). Regulatory fragmentation, fraud, and cyber risks affect trust and continuity (Mamun & Várallyai, 2025), while peer-mediated support can shape uptake and continued participation (Mpinganjira, 2026).

Religious-majority context adds heterogeneity. Participation in Islamic and conventional finance varies by income, employment, gender, and religious identity, suggesting differentiated institutional fit rather than uniform demand (Siddiqui et al., 2021). Islamic fintech competitiveness reflects ecosystem readiness and inclusion infrastructure (Glavina et al., 2021). Islamic microfinance involves diverse instruments, although empirical coverage remains uneven (Hassan et al., 2021). Comparability is limited because bank, mobile money, and broader digital accounts are often discussed together but measured differently (Pandey, 2025).

Country and sectoral evidence reinforces variation. In Egypt, inclusion is framed through access, use, and financial knowledge, with religion identified as a correlate of uptake (Noureldin Sayed & Shusha, 2019). Among microentrepreneurs, engagement is associated with awareness, formalization, record-keeping, and religion (Tia et al., 2023). Ethnic and religious diversity is associated with greater inclusion conditional on social cohesion (Amin et al., 2023), whereas

participatory banking adoption combines religious compliance with trust and service quality (Nadir & El Arif, 2025).

Alternative institutions broaden inclusion channels. Islamic microfinance institutions combine proximity to excluded groups with social and commercial objectives (Ginanjar & Kassim, 2020). Community-finance models emphasize training, interest-free provision, and recycled contributions (Hagawe et al., 2023), while blended Islamic social finance and microtakāful extend protection to insurance-like services (Shamsudheen & Muneeza, 2024). Crowdfunding and e-wakaf may expand access and transparency (Wahyudi et al., 2025), although governance, legal pluralism, and compliance affect whether digital assets function as inclusion-enhancing instruments (Maruf, 2025; Abdul Hafiz et al., 2025).

Index-based research links Islamic financial inclusion with growth across income groups while emphasizing access and service reach (Ameziane, 2024), but broader Islamic financial development is associated with real-economy externalities that complicate linear narratives (Abduh et al., 2022). Faith-related exclusion persists where interest-based products are considered unusable and Shariah-compliant alternatives remain scarce or poorly visible (Sain et al., 2018), although demand varies with education and religiosity (Brekke, 2018). Digital Islamic finance may reduce costs and improve transparency, yet fragmented standards and regulatory capacity constrain scale (Ben Ltaifa & Derbali, 2025; Ab Razak et al., 2020). Users report divergent views of app performance and security (Rumra et al., 2025), MSME evidence stresses governance, literacy, and fintech (Rokhlinasari et al., 2025), and favorable attitudes alongside low awareness indicate latent demand constrained by information gaps (Kannaiah et al., 2017).

Existing research often treats account ownership as a single outcome, even though ownership can overstate inclusion when engagement is constrained by costs and ecosystem frictions (Hamdan et al., 2022). Studies on mobile and digital finance frequently analyse adoption or usage in isolation, despite evidence that sustained use depends on service reliability and institutional readiness (Mazambani et al., 2018; Ab Razak et al., 2020). Work on channel structure also indicates complementarity between bank and mobile access, so ownership alone does not reveal how inclusion is organised (Son et al., 2020). Crucially, the literature contains no study that jointly compares Muslim- and non-Muslim-majority economies across ownership, pathways, and digital enablement within one framework. This study fills that gap with a layered cross-economy assessment that treats majority status as an ecosystem classification and improves interpretability at similar income levels.

## 4. Conceptual Framework and Hypotheses

Religious-majority context is treated as a macro-institutional setting that can coincide with systematic differences in how households assess the legitimacy and usability of formal financial services. In this framing, the relevant channel is not doctrine per se, but how widely shared norms interact with product features, provider reputation, and perceived compliance. Evidence on faith-linked exclusion highlights that some consumers remain outside formal finance when conventional products are viewed as misaligned with religious requirements, even where services are physically available (Sain et al., 2018; Siddiqui et al., 2021). Demand-side heterogeneity within Muslim populations further suggests that acceptance of formal services can vary with the salience of religious identity and related preferences (Brekke, 2018).

The extensive margin is captured by 'any account ownership.' Ownership reflects threshold participation, but it bundles together different entry routes and different meanings of "use" (as presented in Figure 4). Where perceived fit is low, account adoption may remain comparatively lower, or shift toward segments of the formal system that better match prevailing expectations. In settings where Islamic finance is positioned as an inclusion-relevant alternative, the conceptual linkage runs through perceived compatibility, trust, and willingness to engage with formal contracts rather than the presence of banking infrastructure alone (Siddiqui et al., 2021; Ameziane, 2024). This motivates modelling account ownership as a comparative association across Muslim- and non-Muslim-majority economies, conditional on standard covariates.

The structural margin concerns sorting among access pathways for those who are already account holders. Bank-only access often reflects dependence on branch-based or bank-mediated channels, while mobile-only access reflects reliance on telecom-linked or agent-mediated rails. The relative attractiveness of mobile channels is frequently tied to fewer documentation requirements and lower procedural burdens, whereas bank channels remain more intensive in compliance and onboarding (Chitimira & Torerai, 2021). At the same time, mobile money ecosystems can be constrained by agent liquidity and operational disruptions, which can affect the stability of access and the practical benefits of holding an account through that route (Mazambani et al., 2018). Joint bank-and-mobile access represents a structurally distinct mode in which users combine rails, often consistent with complementarities between mobile money and bank accounts rather than substitution (Son et al., 2020).

The intensive margin is digitally enabled account access among account holders. Digital enablement is treated as a deeper layer of inclusion because it reflects engagement with account functions through digital interfaces and remote transactions, not simply possession of an account credential. Movement from ownership to digital use depends on capability, service reliability, and confidence in the channel. Studies on digital Islamic finance and banking applications emphasise trust, transparency, and customer experience as practical conditions for adoption and continued use, alongside constraints related to literacy and uneven digital readiness (Ltaifa & Derbali, 2025). Evidence from Islamic banking app reviews similarly indicates that user sentiment clusters around performance, security, and service continuity, implying that digital enablement can stall even after account adoption (Rumra et al., 2025).

Comparability across bank and mobile channels remains a central interpretive issue. "Account ownership" aggregates products with different registration processes, activity thresholds, and service bundles. Mobile money accounts and financial institution accounts can be jointly held, and their observed associations with digital transaction behaviour depend on how each channel is measured and how recent activity is captured (Son et al., 2020). Pathway analysis therefore serves as a structural decomposition of inclusion among account holders, while digital enablement is modelled conditional on ownership to reflect depth of engagement rather than redefining inclusion through a single channel. This structure aligns with a logit model for any account, a multinomial logit model for pathway choice, and a logit model for digital enablement among account holders. Within this framework, three hypotheses are specified:

**H1:** Account ownership is expected to differ across Muslim- and non-Muslim-majority economies.

**H2:** Among account holders, bank-only access, mobile-only access and combined bank-and-mobile access are expected to be less prevalent in Muslim-majority economies than in non-Muslim-majority economies.

**H3:** Among account holders, digitally enabled account access is expected to be less prevalent in Muslim-majority economies than in non-Muslim-majority economies.

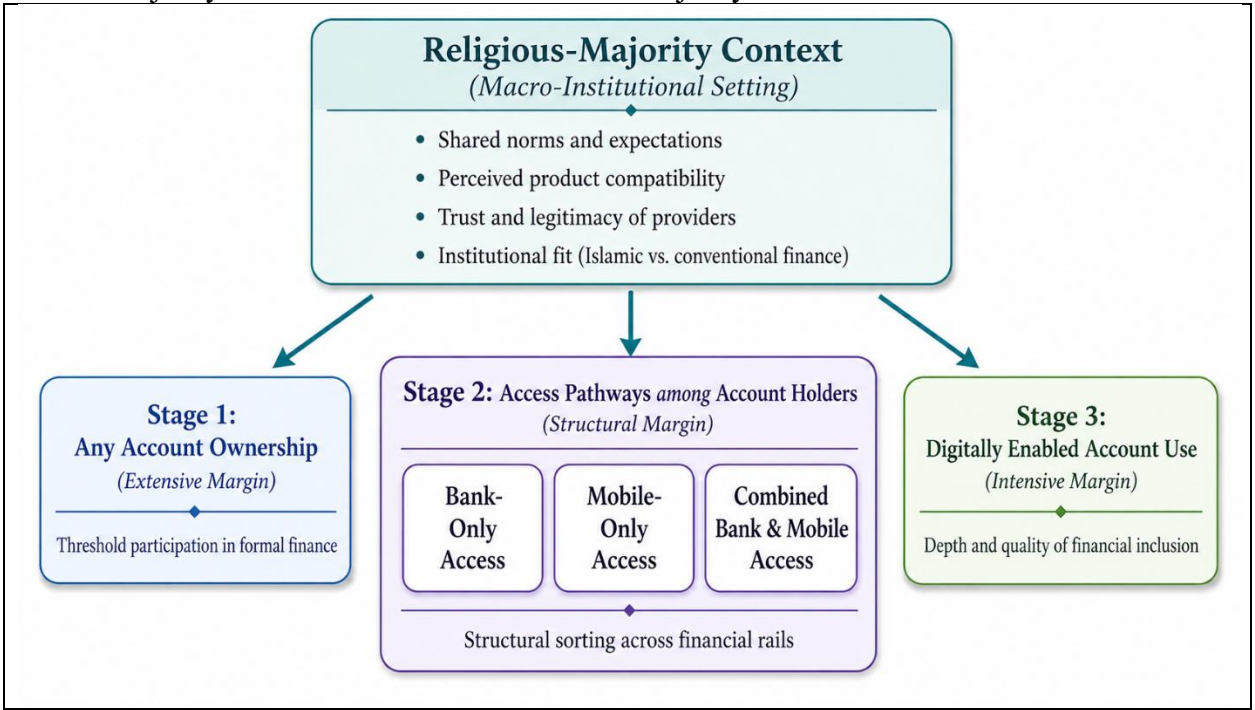


Figure 4. Conceptual framework of margins of financial inclusion

## 5. Data and Methodology

### *5.1 Data Sources and Sample Construction*

The study is based on the Global Findex Database 2024 available at the website of the World Bank. This survey can be used to gain harmonized, individual-level information on financial access and use across global economies. In order to achieve comparability in terms of macroeconomic conditions and the maturity of the financial system, the study limits the sample to lower middle-income countries. After restricting the dataset to lower-middle income economies, the final sample size contains 40,237 adult respondents from a sample of 38 economies. The survey also given the sampling weights to maintain national representative estimates and to avoid distortions that could be caused by cross-country differences in sample size.

In the sample size of 40,237 adults, 24,206 observations (60.16 percent) relate to non-Muslim majority economies, while 16,031 observations (39.84 percent) relate to Muslim majority economies. The Muslim-majority subsample spans sixteen economies and each individual economy contribute on average one thousand observations, including Bangladesh, Egypt, Pakistan, Nigeria, and Senegal. The non-Muslim-majority group is made up of twenty-two economies, with broadly similar sample sizes for each country, except for India, which

contributes 3000 observations. This balanced structure limits the impact of any one country and helps to interpret differences in financial inclusion outcomes as cross-economy differences, rather than the result of uneven sampling.

### *5.2 Econometric Framework*

This study uses three econometric models to examine and compare the outcomes of financial inclusion in Muslim and non-Muslim majority economies as stated in the three hypotheses. Each model represents a particular aspect of financial inclusion: account ownership, access pathway choice and digitally enabled account use. The modelling strategy is intended to allow for comparisons to be drawn between the outcome probabilities in religious context in a manner that controls for observable characteristics.

To analyse whether an individual owns an account in a formal financial institution, a binary logistic regression model is employed. The dependent variable is equal to one if an individual has any account and zero otherwise. The model is specified as:

$$\Pr(Account_i = 1) = \text{Logit}^{-1}(\alpha + \beta_1 MuslimMajority_i + \mathbf{X}_i'\boldsymbol{\gamma}) \quad (1)$$

where $Account_i$ is the account ownership of individual $i$, $MuslimMajority_i$ is an indicator for residence in a Muslim-majority economy and $\boldsymbol{X}_i$ is a vector of control variables. The description of the outcome, key variable and control variable is presented in Table 1. The log of odds ratio of the Logistic regression model is converted into average marginal effects to facilitate in the comparison of the predicted probabilities between groups.

To analyze the access of financial services by the account holders, a multinomial logistic regression model is estimated. The outcome variable reflects three mutually exclusive non-overlapping access pathways such as: bank only, mobile money only, and both bank and mobile access. Taking bank only access as the reference category, the model is expressed as:

$$\Pr(Pathway_i = j) = \frac{\exp(\alpha_j + \beta_{1j} MuslimMajority_i + \mathbf{X}_i'\boldsymbol{\gamma}_j)}{\sum_{k=1}^{3} \exp(\alpha_k + \beta_{1k} MuslimMajority_i + \mathbf{X}_i'\boldsymbol{\gamma}_k)} \quad (2)$$

for $j = \{$mobile only,both bank and mobile$\}$. This specific makes it possible to compare the relative likelihood of access structures over the religious-majority contexts.

Finally, in order to measure the level of financial inclusion in terms of digitally enabled financial account, a binary logistic regression analysis is estimated for digitally enabled account use among account holders. The dependent variable is equal to one if an account holder uses digital channels and equal to zero otherwise. The model is specified as:

$$\Pr(DigitalAccount_i = 1) = \text{Logit}^{-1}(\alpha + \beta_1 MuslimMajority_i + \mathbf{X}_i'\boldsymbol{\gamma}) \quad (3)$$

Where $DigitalAccount_i$ captures digital engagement among individuals who already hold an account.

### *5.3. Descriptive statistics*

Table 1 indicates that 60.0% of respondents own an account, but ownership is lower in Muslim-majority economies than in non-Muslim-majority economies (50.8% versus 66.1%). Access structures also differ. Likewise, Bank-only accounts dominate in Muslim-majority settings (56.4% versus 38.3%), whereas mobile-only access is less common (13.8% versus 28.4%). Combined bank and mobile access is slightly lower in Muslim-majority economies (29.8% versus 33.3%). Moreover, digital account ownership shows a similar contrast, reaching 33.7% in Muslim-majority economies and 49.0% elsewhere, compared with 42.9% in the full sample.

In Table 1, the two groups are closely matched in age and gender, with a mean age of about 37.5 years and women comprising roughly 55% of each sample. However, Muslim-majority economies are more urban (43.1% versus 31.5%) and have somewhat higher tertiary education, while non-Muslim-majority economies have a larger primary-educated share. On the other hand, income distributions are broadly similar, although the highest quintile is slightly more represented in non-Muslim-majority economies. It also shows that phone and internet access is higher in Muslim-majority settings (63.8% versus 55.8%), whereas phone-only access is more prevalent elsewhere (27.8% versus 23.5%). The econometric analysis examines whether these observed differences remain after accounting for observable characteristics.

These patterns of descriptive statistics suggest asymmetry in the outcomes of financial inclusion across religious-majority contexts. The contrasts are strongest for digital engagement in financial account and access pathways as opposed to basic demographic composition. These stylized facts are the motivation for the next step of the econometric analysis, which explores whether these gaps remain when observable characteristics are considered.

Table 1. Descriptive statistics (means) for whole, Muslim-majority, and Non-Muslim-majority samples

| **Variable** | **Outcome / Category** | **Whole sample** | **Muslim-majority** | **Non-Muslim-majority** |
|---|---|---|---|---|
| *Outcome variables:* | | | | |
| Account ownership | No | 0.400 | 0.492 | 0.339 |
| | Yes | 0.600 | 0.508 | 0.661 |
| Financial pathway | Bank only | 0.439 | 0.564 | 0.383 |
| | Mobile only | 0.239 | 0.138 | 0.284 |
| | Both bank and mobile | 0.322 | 0.298 | 0.333 |
| Digital account | No | 0.571 | 0.663 | 0.510 |
| | Yes | 0.429 | 0.337 | 0.490 |
| *Key variable:* | | | | |
| Religious composition | Non-Muslim-majority | 0.602 | - | - |
| | Muslim-majority | 0.398 | - | - |
| *Other covariates:* | | | | |
| Age | Years | 37.46 | 37.47 | 37.45 |
| Gender | Female | 0.548 | 0.543 | 0.550 |
| | Male | 0.452 | 0.457 | 0.450 |
| Residence | Rural | 0.639 | 0.569 | 0.685 |

| | | | | |
|---|---|---|---|---|
| | Urban | 0.361 | 0.431 | 0.315 |
| Education | Primary | 0.392 | 0.350 | 0.419 |
| | Secondary | 0.512 | 0.535 | 0.497 |
| | Tertiary | 0.096 | 0.115 | 0.083 |
| Income quintile | Q1 | 0.168 | 0.171 | 0.166 |
| | Q2 | 0.174 | 0.178 | 0.172 |
| | Q3 | 0.190 | 0.194 | 0.187 |
| | Q4 | 0.208 | 0.208 | 0.209 |
| | Q5 | 0.259 | 0.249 | 0.266 |
| Digital readiness bundle | Neither phone nor internet | 0.120 | 0.097 | 0.135 |
| | Internet only (no phone) | 0.029 | 0.030 | 0.029 |
| | Phone only (no internet) | 0.261 | 0.235 | 0.278 |
| | Phone and internet | 0.590 | 0.638 | 0.558 |

### *5.4 Descriptive Patterns of Financial Inclusion*

Figure 5a gives a quick comparison of the results for financial inclusion in Muslim and non-Muslim majority economies. The 45-degree line is a line of parity between the two groups, so the deviations from it can be interpreted as relative advantages or shortfall. Account ownership falls below the parity line, reflecting a lower level of account ownership in Muslim-majority economies, where slightly more than half of adults have an account compared with slightly more than two-thirds of adults in non-Muslim-majority economies. This gap at the extensive margin is the frame for the differences of inclusion that have been observed in other dimensions.

The divergence is greater if access pathways are taken into account. Bank-only access seems to be more common in Muslim-majority economies, which puts this outcome above the parity line. By contrast, access solely through mobile devices and the use of digital means of account accessibility are far below parity. In particular, the proportion of those on mobile-only pathways is less than half what is found in non-Muslim majority economies and even here digitally enabled account use is substantially lower. These patterns suggest that the differences in inclusion are not confined to whether or not individuals are connected to the formal financial system, but apply to how they engage with it.

On the other hand, Figure 5b shows a combined view of financial inclusion profiles for Muslim- and non-Muslim-majority economies. It points to obvious quantitative contrasts between these dimensions. Account ownership stands at an average of about 66 percent in non-Muslim-majority economies, as against around 51 percent in Muslim-majority economies, a fairly large difference in the broad margin of inclusion.

Differences are more significant applying the mode of access. Bank-only routes in the Muslim world are about 56 percent of inclusion in Muslim-majority economies, whereas in non-Muslim-majority economies, they represent about 38 percent. This contrast suggests a greater reliance on traditional banking channels in Muslim-majority settings. In contrast, only 14 percent of inclusion in Muslim-majority economies is mobile-only access, less than half of the 28

percent for non-Muslim-majority economies. Combined bank and mobile access has less divergence with shares concentrated around 30 to 33 percent in both groups. The biggest gap opens up in digital enablement. Digitally enabled account use is at almost 49 percent in non-Muslim majority economies and closer to 34 percent in Muslim majority economies. This gap reflects the weaker presence of mobile-based pathways and implies that variations in inclusion reflect more of a difference in digital engagement than access to formal accounts.

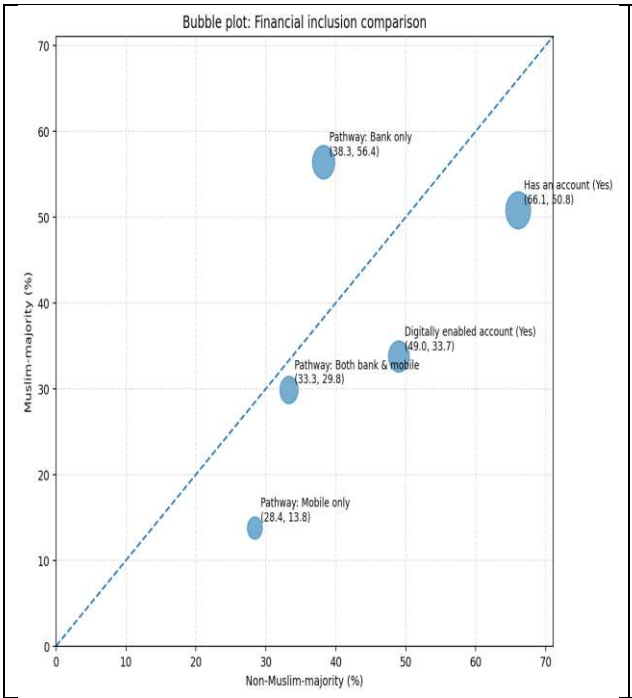


Figure 5a. Comparative Financial Inclusion Outcomes across Muslim- and Non-Muslim-Majority Economies

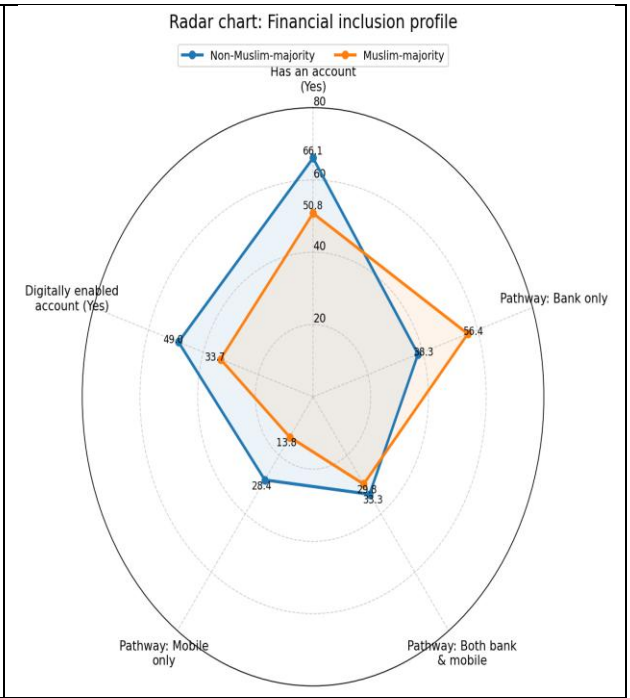


Figure 5b. Financial Inclusion Profiles by Religious-Majority Context

Authors' own estimation based on Global Findex Database 2024

Figure 6 shows the structure of financial access pathways among account holders in a ternary structured way (i.e., it is possible to assess the relative balance between bank-only, mobile-only, and combined access at the same time). The distribution of observations is very different between Muslim and non-Muslim-majority economies, suggesting that inclusion varies not only in degree, but also in configuration. In Muslim majority economy, most of the observations are near the bank only vertex signifying a strong concentration of account holders who are mostly dependent on traditional banking channels. In a number of cases, bank-only access contributes 70 to 90 percent of observed pathways and mobile-only access is low. Combined bank and mobile access exists but is generally in a secondary position and is rarely more than 30 percent of the access mix. This clustering indicates the relatively narrow structure of the pathways, with limited diversification in the direction of mobile based financial services.

Non-Muslim-majority economies are shown more spread out in the ternary space. While access to banks only is important, many economies move significantly towards the mobile access only and combined access dimensions. In some cases, mobile-only pathways account for 40 to 60 percent of access among account holders, and bank and mobile use are often combined and

exceed 25 percent. The distribution of the points away from the bank-only corner is indicative of a more heterogeneous and digitally integrated access structure. The contrast between the two panels brings out a systematic difference in the way account holders interact with financial services. Muslim-majority economies are characterised by concentrated access via banks, whereas the non-Muslim-majority economics are characterised by greater diversified combinations of pathways to access that include mobile and hybrid modes. This structural divergence strengthens the descriptive evidence of earlier figures, pointing to observed inclusion gaps being closely related to differences in access composition and digital integration rather than account ownership itself.

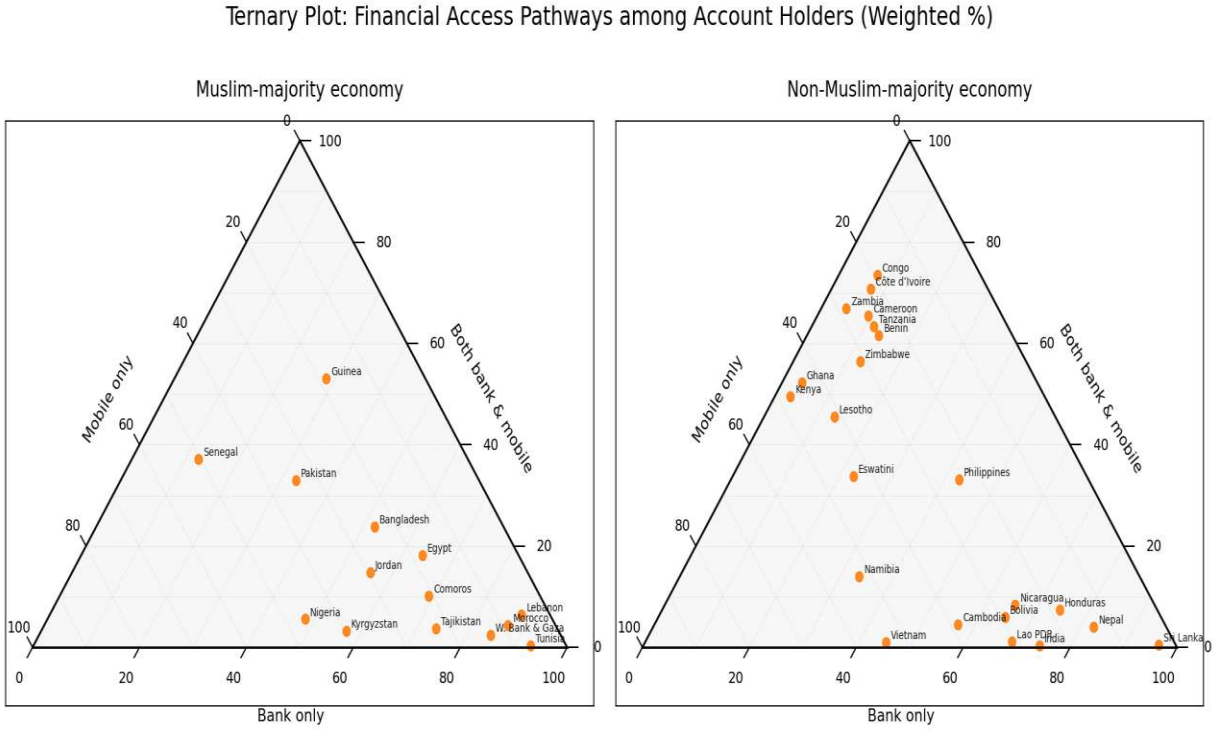


Figure 6. Structure of Financial Access Pathways among Account Holders

Authors' own estimation based on Global Findex Database 2024

## 6. Results and Discussion

### *6.1. Account ownership across Muslim- and Non-Muslim-Majority Economies*

Table 2 presents the estimation of five nested specifications that provides a transparent check on robustness and a disciplined way to examine how the Muslim-majority association behaves as conceptually relevant covariate blocks are introduced. M1 establishes the unconditional difference across Muslim- and non-Muslim-majority economies. M2 adds demographics to account for compositional differences in age and gender. M3 introduces urban residence as a spatial access correlate. M4 further conditions on schooling and income to capture socioeconomic gradients that are tightly linked to formal financial participation. M5 then adds digital readiness bundles to separate ownership gaps from differential access to phones and internet. Interpreting the sequence is informative because any substantial attenuation would indicate that the baseline gap is partly aligned with these observed characteristics rather than persisting net of them.

The Muslim-majority coefficient is stable in sign and remains large across all models. In AME terms, adults in Muslim-majority economies are associated with a 15.3 percentage point lower probability of owning an account in the bivariate model (M1). This difference is essentially unchanged after adding demographics (-15.4 in M2) and becomes slightly larger once urban residence is included (-16.2 in M3). The gap widens further after conditioning on education and income (-17.0 in M4) and reaches -17.8 percentage points in the fully adjusted model with digital readiness (M5). The stepwise pattern indicates that the ownership difference is not explained away by observable demographic, spatial, socioeconomic, or digital-access factors included in the table; if anything, conditioning on these covariates reveals a slightly larger adjusted difference.

Turning to the other covariates, the demographic gradients are positive and precisely estimated. Age is associated with a higher likelihood of account ownership, moving from 0.1 percentage points per year in M2-M3 to 0.2 percentage points per year in M4-M5. Male adults have a higher probability of owning an account, but the AME attenuates as socioeconomic and digital factors enter the model, from 9.3-9.4 percentage points (M2-M3) to 7.2 (M4) and 5.8 (M5). Urban residence shows a similar attenuation, falling from 6.8 percentage points in M3 to 2.1 in M4 and 1.3 in M5, consistent with part of the urban gradient aligning with education, income, and digital readiness. Education and income display monotonic patterns. Relative to primary schooling, secondary education is associated with 16.8 percentage points higher ownership in M4 and 12.7 in M5, while tertiary education is associated with 32.2 in M4 and 26.7 in M5. Relative to the poorest quintile, the AMEs rise stepwise from Q2 to Q5, with the richest quintile linked to 15.1 percentage points higher ownership in M5. Digital readiness shows the strongest stepwise associations: compared with having neither phone nor internet, internet-only is linked to 9.9 percentage points higher ownership, phone-only to 19.8, and phone plus internet to 25.8 in M5. The modest decline in observations from 40,237 to 39,055 across models is consistent with missingness in the added covariate blocks rather than changes in the underlying sampling frame.

Table 2. Marginal effects of Logistic regression model on outcome of account ownership

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | M1: Key var | M2: +Demog | M3: +Urban | M4: +Educ+Inc | M5: +Digital |
| Muslim majority | -0.153*** | -0.154*** | -0.162*** | -0.170*** | -0.178*** |
| | (0.005) | (0.005) | (0.005) | (0.005) | (0.005) |
| Age | | 0.001*** | 0.001*** | 0.002*** | 0.002*** |
| | | (0.000) | (0.000) | (0.000) | (0.000) |
| Male | | 0.093*** | 0.094*** | 0.072*** | 0.058*** |
| | | (0.005) | (0.005) | (0.005) | (0.005) |
| Urban | | | 0.068*** | 0.021*** | 0.013*** |
| | | | (0.005) | (0.005) | (0.005) |
| Education: | | | | | |
| Primary (base) | | | | | |
| Secondary | | | | 0.168*** | 0.127*** |
| | | | | (0.005) | (0.006) |
| Tertiary | | | | 0.322*** | 0.267*** |

| | | | | | |
|---|---|---|---|---|---|
| | | | | (0.008) | (0.009) |
| Income quintile: | | | | | |
| Q1 poorest (base) | | | | | |
| Q2 | | | | 0.060*** | 0.050*** |
| | | | | (0.008) | (0.008) |
| Q3 | | | | 0.086*** | 0.068*** |
| | | | | (0.008) | (0.008) |
| Q4 | | | | 0.130*** | 0.104*** |
| | | | | (0.008) | (0.008) |
| Q5 richest | | | | 0.182*** | 0.151*** |
| | | | | (0.008) | (0.008) |
| Digital readiness bundles: | | | | | |
| Neither phone nor internet (base) | | | | | |
| Internet only | | | | | 0.099*** |
| | | | | | (0.016) |
| Phone only | | | | | 0.198*** |
| | | | | | (0.009) |
| Phone and internet | | | | | 0.258*** |
| | | | | | (0.008) |
| Observations | 40,237 | 40,237 | 40,219 | 39,066 | 39,055 |

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 3 quantifies these subgroup differences in AME terms and aligns closely with the visual evidence. In the baseline specification, living in a Muslim-majority economy is associated with a 17.8 percentage point lower probability of owning an account. The corresponding differences are nearly the same in rural and urban subsamples, at 17.7 and 18.3 percentage points, respectively, indicating limited heterogeneity by residence. Gender heterogeneity is more pronounced. The Muslim-majority association is larger among females at 21.5 percentage points and smaller among males at 13.5 percentage points, consistent with the wider visual gap for women in Figure 7. Across the heterogeneous regressions, the broader covariate patterns remain monotonic in the expected sense: higher education, higher income positions, and stronger digital readiness bundles are consistently linked to higher probabilities of account ownership within each subgroup, even though the magnitudes vary.

Table 3. Marginal effects of Logistic regression model on outcome of account ownership across heterogenous sample

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | Baseline | Rural | Urban | Female | Male |
| Muslim majority | -0.178*** | -0.177*** | -0.183*** | -0.215*** | -0.135*** |
| | (0.005) | (0.006) | (0.008) | (0.007) | (0.007) |
| Urban | 0.013*** | | | 0.005 | 0.022*** |
| | (0.005) | | | (0.007) | (0.007) |
| Age | 0.002*** | 0.003*** | 0.002*** | 0.002*** | 0.003*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |

| | | | | | |
|---|---|---|---|---|---|
| Male | 0.058*** | 0.044*** | 0.082*** | | |
| | (0.005) | (0.006) | (0.008) | | |
| Education: | | | | | |
| Primary (base) | | | | | |
| Secondary | 0.127*** | 0.144*** | 0.093*** | 0.126*** | 0.129*** |
| | (0.006) | (0.007) | (0.010) | (0.008) | (0.008) |
| Tertiary | 0.267*** | 0.301*** | 0.210*** | 0.258*** | 0.274*** |
| | (0.009) | (0.011) | (0.014) | (0.012) | (0.012) |
| Income quintile: | | | | | |
| Q1 poorest (base) | | | | | |
| Q2 | 0.050*** | 0.053*** | 0.044*** | 0.060*** | 0.038*** |
| | (0.008) | (0.010) | (0.016) | (0.011) | (0.012) |
| Q3 | 0.068*** | 0.073*** | 0.055*** | 0.069*** | 0.066*** |
| | (0.008) | (0.010) | (0.015) | (0.011) | (0.012) |
| Q4 | 0.104*** | 0.101*** | 0.108*** | 0.096*** | 0.114*** |
| | (0.008) | (0.010) | (0.014) | (0.011) | (0.012) |
| Q5 richest | 0.151*** | 0.147*** | 0.152*** | 0.144*** | 0.158*** |
| Digital readiness bundles: | (0.008) | (0.010) | (0.014) | (0.011) | (0.011) |
| Neither phone nor internet (base) | | | | | |
| Internet only | 0.099*** | 0.105*** | 0.109*** | 0.092*** | 0.120*** |
| | (0.016) | (0.021) | (0.027) | (0.020) | (0.028) |
| Phone only | 0.198*** | 0.185*** | 0.237*** | 0.176*** | 0.243*** |
| | (0.009) | (0.010) | (0.017) | (0.011) | (0.014) |
| Phone and internet | 0.258*** | 0.241*** | 0.299*** | 0.220*** | 0.323*** |
| | (0.008) | (0.010) | (0.016) | (0.010) | (0.014) |
| Observations | 39,055 | 24,723 | 14,332 | 21,289 | 17,766 |

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Figure 7 shows a clear and consistent gap in predicted account ownership between non-Muslim-majority and Muslim-majority economies across all panels. In each subgroup, the predicted probability is higher in non-Muslim-majority economies, and the confidence intervals separate sufficiently to suggest the difference is not driven by sampling noise. The baseline panel mirrors this pattern in aggregate, while the rural and urban panels indicate that the gap is visible within both location types rather than reflecting compositional differences in where people live. The rural and urban panels also appear broadly similar in direction and spacing, implying that the ownership differential is not confined to one settlement context. A parallel pattern emerges by gender. The female panel displays a wider separation in predicted probabilities than the male panel, indicating a larger ownership gap for women.

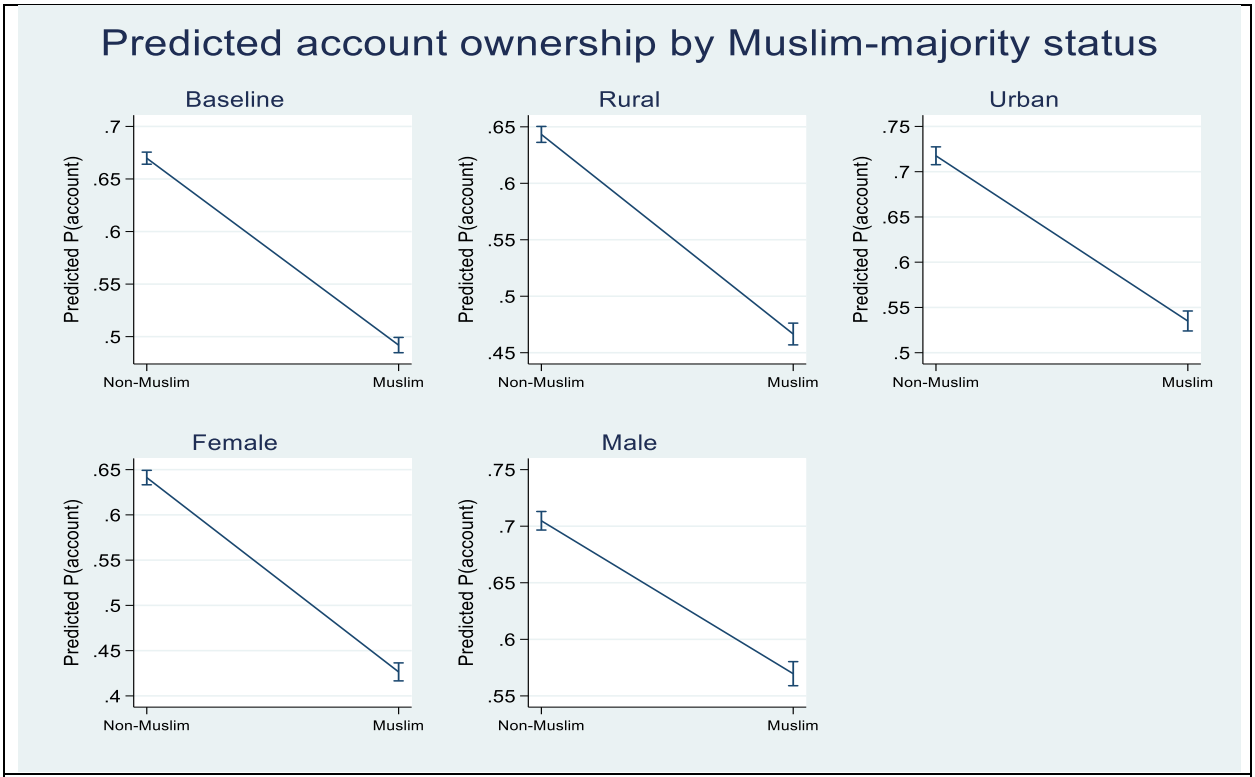


Figure 7. Marginal plot of account ownership across heterogenous sample

### *6.2. Financial Access Pathways in Muslim- and Non-Muslim-Majority Economies*

Table 4 highlights how covariates are associated with a reallocation of account holders across access pathways rather than changes in overall inclusion. Muslim-majority economy status is linked to a marked shift toward bank-only access. Holding other factors constant, the probability of relying on a bank-only pathway is higher by 17.8 percentage points, while the probabilities of mobile money only and combined bank-and-mobile access are lower by 12.0 and 5.8 percentage points, respectively. Because the three outcomes are mutually exclusive and sum to one, this pattern should be read as a compositional difference in how account holders access services. It indicates that, relative to non-Muslim-majority economies, access among account holders in Muslim-majority economies is more concentrated in bank-only channels and less concentrated in mobile-inclusive channels.

Other covariates show systematic but more compact patterns. Urban residence is associated with substitution between single-channel pathways, with lower bank-only and higher mobile-only access, and no meaningful change in combined access. Age is linked to a gradual tilt toward bank-only access and away from mobile reliance. Gender differences primarily reflect a redistribution between bank-only and combined access, with males less likely to be bank-only and more likely to hold combined access. Education and income display a consistent gradient away from single-channel reliance toward combined bank-and-mobile access, strongest at tertiary education and higher income quintiles. Digital readiness shows the largest reallocations: phone ownership, and especially phone plus internet access, is associated with sharply lower bank-only reliance and higher probabilities of mobile-only and, more strongly, combined access.

These results directly address the study's second objective by showing that cross-context differences are expressed in the structure of access among account holders, not only in whether an account is held. The strong alignment between digital readiness and combined access also sets up the subsequent analysis of digital enablement as a deeper margin of inclusion conditional on pathway choice.

Table 4. Marginal effects of Multinomial Logistic regression model on outcome of pathway

| | (1) | (2) | (3) |
|---|---|---|---|
| VARIABLES | Bank only | Mobile money only | Both bank and mobile money |
| Muslim majority | 0.178*** | -0.120*** | -0.058*** |
| | (0.007) | (0.006) | (0.006) |
| Urban | -0.040*** | 0.040*** | 0.000 |
| | (0.006) | (0.006) | (0.006) |
| Age | 0.007*** | -0.006*** | -0.001*** |
| | (0.000) | (0.000) | (0.000) |
| Male | -0.079*** | 0.006 | 0.073*** |
| | (0.006) | (0.005) | (0.006) |
| Education: | | | |
| Primary (base) | | | |
| Secondary | -0.082*** | -0.020*** | 0.102*** |
| | (0.008) | (0.007) | (0.007) |
| Tertiary | -0.039*** | -0.183*** | 0.222*** |
| | (0.011) | (0.008) | (0.011) |
| Income quintile: | | | |
| Q1 poorest (base) | | | |
| Q2 | -0.024** | 0.009 | 0.015 |
| | (0.012) | (0.010) | (0.012) |
| Q3 | -0.043*** | 0.015 | 0.028** |
| | (0.012) | (0.010) | (0.011) |
| Q4 | -0.070*** | 0.000 | 0.070*** |
| | (0.011) | (0.010) | (0.011) |
| Q5 richest | -0.090*** | -0.026*** | 0.116*** |
| | (0.011) | (0.009) | (0.010) |
| Digital readiness bundles: | | | |
| Neither phone nor internet (base) | | | |
| Internet only | -0.088*** | -0.006 | 0.094*** |
| | (0.024) | (0.017) | (0.020) |
| Phone only | -0.329*** | 0.209*** | 0.120*** |
| | (0.013) | (0.011) | (0.011) |
| Phone and internet | -0.339*** | 0.060*** | 0.279*** |
| | (0.013) | (0.011) | (0.010) |
| Observations | 22,351 | 22,351 | 22,351 |

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 5 shows a consistent reallocation of account holders across access pathways associated with Muslim-majority economies. In the baseline sample (N = 22,351), Muslim-majority status is associated with a 17.8 percentage point higher probability of using a bank-only pathway. This is offset by lower probabilities of relying on mobile money only (-12.0 percentage points) and of using both bank and mobile channels (-5.8 percentage points). Because the three outcomes are mutually exclusive, these AMEs should be read jointly as a shift in pathway composition rather than a change in overall account holding. All three differences are precisely estimated and significant at the 1 percent level, indicating a robust pattern within the observed covariate structure.

The same direction of reallocation appears across heterogeneous subsamples, with meaningful variation in magnitudes. The shift away from mobile-only access is stronger in urban areas (-13.8 percentage points) than in rural areas (-10.5 percentage points), while the reduction in combined access is slightly larger in rural settings (-6.4) than in urban settings (-4.8), alongside broadly similar increases in bank-only access (18.6 urban versus 17.0 rural). Gender differences are more nuanced. Among females, Muslim-majority status is associated with a larger reduction in mobile-only access (-14.1) but a smaller reduction in combined access (-3.7). Among males, the reduction in mobile-only access is smaller (-10.0) while the reduction in combined access is larger (-7.8). These heterogeneous patterns speak directly to the pathway objective by showing that differences in how account holders access services vary across location and gender rather than taking a single uniform form.

Table 5. Marginal effects of MLogistic regression model on outcome of pathway across heterogenous sample

| **Models** | **(Bank-only)** | **(Mobile-only)** | **(Both bank & mobile)** | **N** |
|---|---|---|---|---|
| Baseline | 0.178*** | -0.120*** | -0.058*** | 22,351 |
| | (0.007) | (0.006) | (0.006) | |
| Rural | 0.170*** | -0.105*** | -0.064*** | 13,690 |
| | (0.009) | (0.007) | (0.008) | |
| Urban | 0.186*** | -0.138*** | -0.048*** | 8,661 |
| | (0.010) | (0.009) | (0.010) | |
| Female | 0.177*** | -0.141*** | -0.037*** | 11,210 |
| | (0.010) | (0.008) | (0.009) | |
| Male | 0.178*** | -0.100*** | -0.078*** | 11,141 |
| | (0.009) | (0.008) | (0.009) | |

### *6.3. Digitally Enabled Account Access across Religious Contexts*

Table 6 presents the estimates of five nested specifications to assess whether the Muslim-majority association with digitally enabled account access is sensitive to successive blocks of observable characteristics. M1 captures the unconditional gap among account holders. M2 adds demographics to account for compositional differences in age and gender. M3 introduces urban residence, which proxies differences in connectivity, service availability, and exposure to digital channels. M4 then conditions on education and income to absorb socioeconomic gradients that are closely linked to digital capability and engagement. M5 adds digital readiness bundles to separate digitally enabled use from differential access to phones and internet. The sequence is

informative for robustness and attenuation. It does not support causal interpretation, but it clarifies whether the observed gap persists net of these correlated factors.

Across all models, Muslim-majority economy status is associated with a lower probability of having a digitally enabled account among those who already hold an account. The AME is -7.7 percentage points in M1 and narrows to -6.2 percentage points once demographics are included (M2). It then becomes more negative after adding urban residence and socioeconomic controls, moving to -6.9 in M3 and -7.4 in M4. In the fully adjusted model, the gap widens to -8.7 percentage points (M5) after conditioning on digital readiness bundles. The lack of attenuation in later models, and the strengthening in M5, suggests that differences in phone and internet access as captured by the readiness bundles do not account for the Muslim-majority gap in digitally enabled use. Instead, the conditional difference remains, indicating that the association is not reducible to observed demographics, location, education, income, or measured digital access.

Other covariates show clear gradients in digitally enabled use among account holders. Age is negatively associated with digital enablement, with the AME moving from about -0.7 percentage points per year in early models to -0.5 percentage points per year in the fully adjusted specification, indicating lower digital use at older ages even after controls. Males exhibit higher probabilities of digital enablement, though the gender difference attenuates with added covariates, consistent with part of the gap aligning with socioeconomic position and digital readiness. Urban residence is positively associated with digital enablement, but its magnitude declines as education, income, and digital readiness are added, implying that some of the urban advantage overlaps with these factors. Education and income show monotonic increases in digital enablement, with tertiary education and higher income quintiles linked to notably higher probabilities than the baseline categories. The strongest associations are for digital readiness bundles, which display a clear stepwise pattern. Relative to having neither phone nor internet, internet-only is linked to higher digital enablement, phone-only shows a much larger difference, and phone plus internet is largest. The observation count declines from 24,138 to 23,340 across models, consistent with missingness in the added covariates.

Table 6. Marginal effects of Logistic regression model on outcome of digitally enabled account ownership

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | M1: Key var | M2: +Demog | M3: +Urban | M4: +Educ+Inc | M5: +Digital |
| | | | | | |
| Muslim majority | -0.077*** | -0.062*** | -0.069*** | -0.074*** | -0.087*** |
| | (0. 006) | (0.006) | (0.006) | (0.006) | (0.006) |
| Age | | -0.007*** | -0.007*** | -0.006*** | -0.005*** |
| | | (0.000) | (0.000) | (0.000) | (0.000) |
| Male | | 0.068*** | 0.068*** | 0.057*** | 0.041*** |
| | | (0.006) | (0.006) | (0.006) | (0.006) |
| Urban | | | 0.056*** | 0.030*** | 0.022*** |
| | | | (0.006) | (0.006) | (0.006) |
| Education: | | | | | |
| Primary (base) | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Secondary | | | | 0.152*** | 0.110*** |
| | | | | (0.007) | (0.007) |
| Tertiary | | | | 0.185*** | 0.129*** |
| | | | | (0.010) | (0.010) |
| Income quintile: | | | | | |
| Q1 poorest (base) | | | | | |
| Q2 | | | | 0.036*** | 0.028*** |
| | | | | (0.011) | (0.011) |
| Q3 | | | | 0.057*** | 0.039*** |
| | | | | (0.011) | (0.010) |
| Q4 | | | | 0.092*** | 0.067*** |
| | | | | (0.010) | (0.010) |
| Q5 richest | | | | 0.130*** | 0.097*** |
| | | | | (0.010) | (0.010) |
| Digital readiness bundles: | | | | | |
| Neither phone nor internet (base) | | | | | |
| Internet only | | | | | 0.083*** |
| | | | | | (0.026) |
| Phone only | | | | | 0.293*** |
| | | | | | (0.014) |
| Phone and internet | | | | | 0.351*** |
| | | | | | (0.014) |
| Observations | 24,138 | 24,138 | 24,129 | 23,348 | 23,340 |

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 7 quantifies these visual gaps as percentage-point differences in predicted probability. In the baseline sample, Muslim-majority status is associated with an 8.7 percentage point lower likelihood of having a digitally enabled account among account holders. The magnitude differs across subsamples in a way that mirrors Figure 8. The gap is smaller in rural areas at 7.5 percentage points and larger in urban areas at 10.3 percentage points. Gender heterogeneity is also evident. The association is smaller among females at 6.9 percentage points and stronger among males at 10.4 percentage points. All reported coefficients are statistically significant at the 1 percent level, supporting the interpretation that the differences are robust within the modelled covariate structure. The combination of Figure 8 and Table 7 therefore indicates that heterogeneity in digital enablement across religious-majority contexts is not uniform across location and gender.

Table 7. Marginal effects of Logistic regression model on outcome of digitally enabled account ownership across heterogenous sample

| | (1) | (2) | (3) | (4) | (5) |
|---|---|---|---|---|---|
| VARIABLES | Baseline | Rural | Urban | Female | Male |
| Muslim majority | -0.087*** | -0.075*** | -0.103*** | -0.069*** | -0.104*** |
| | (0.006) | (0.008) | (0.009) | (0.009) | (0.008) |

| | | | | | |
|---|---|---|---|---|---|
| Urban | 0.022*** | | | 0.015* | 0.027*** |
| | (0.006) | | | (0.008) | (0.008) |
| Age | -0.005*** | -0.005*** | -0.006*** | -0.005*** | -0.005*** |
| | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Male | 0.041*** | 0.034*** | 0.050*** | | |
| | (0.006) | (0.007) | (0.008) | | |
| Education: | | | | | |
| Primary (base) | | | | | |
| Secondary | 0.110*** | 0.120*** | 0.091*** | 0.112*** | 0.110*** |
| | (0.007) | (0.009) | (0.011) | (0.010) | (0.010) |
| Tertiary | 0.129*** | 0.130*** | 0.122*** | 0.130*** | 0.130*** |
| | (0.010) | (0.014) | (0.015) | (0.015) | (0.013) |
| Income quintile: | | | | | |
| Q1 poorest (base) | | | | | |
| Q2 | 0.028*** | 0.027** | 0.033 | 0.033** | 0.023 |
| | (0.011) | (0.013) | (0.020) | (0.015) | (0.015) |
| Q3 | 0.039*** | 0.036*** | 0.048** | 0.042*** | 0.036** |
| | (0.010) | (0.013) | (0.019) | (0.015) | (0.015) |
| Q4 | 0.067*** | 0.062*** | 0.080*** | 0.070*** | 0.063*** |
| | (0.010) | (0.012) | (0.018) | (0.014) | (0.014) |
| Q5 richest | 0.097*** | 0.095*** | 0.105*** | 0.091*** | 0.100*** |
| | (0.010) | (0.012) | (0.017) | (0.014) | (0.013) |
| Digital readiness bundles: | | | | | |
| Neither phone nor internet (base) | | | | | |
| Internet only | 0.083*** | 0.128*** | 0.002 | 0.083*** | 0.086* |
| | (0.026) | (0.032) | (0.043) | (0.032) | (0.044) |
| Phone only | 0.293*** | 0.313*** | 0.244*** | 0.334*** | 0.235*** |
| | (0.014) | (0.017) | (0.028) | (0.018) | (0.024) |
| Phone and internet | 0.351*** | 0.365*** | 0.313*** | 0.374*** | 0.309*** |
| | (0.014) | (0.017) | (0.028) | (0.018) | (0.024) |
| Observations | 23,340 | 14,315 | 9,025 | 11,797 | 11,543 |

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Figure 8 shows a consistent gap in predicted digitally enabled account ownership between non-Muslim-majority and Muslim-majority economies across all panels. In each subsample, the predicted probability is lower in Muslim-majority economies, and the confidence intervals separate sufficiently to indicate that the difference is unlikely to be driven by sampling variation. The baseline panel reflects this pattern in aggregate among account holders. The rural and urban panels indicate that the gap persists within both settlement types rather than being attributable to rural–urban composition. The urban panel displays a visibly wider separation than the rural panel, suggesting a stronger difference in digital enablement in urban settings. By gender, both female and male panels show lower predicted digital enablement in Muslim-majority economies, with the separation appearing larger for males. These differences are

observed conditional on holding an account, so they reflect divergence in the depth of inclusion among account owners rather than selection into ownership.

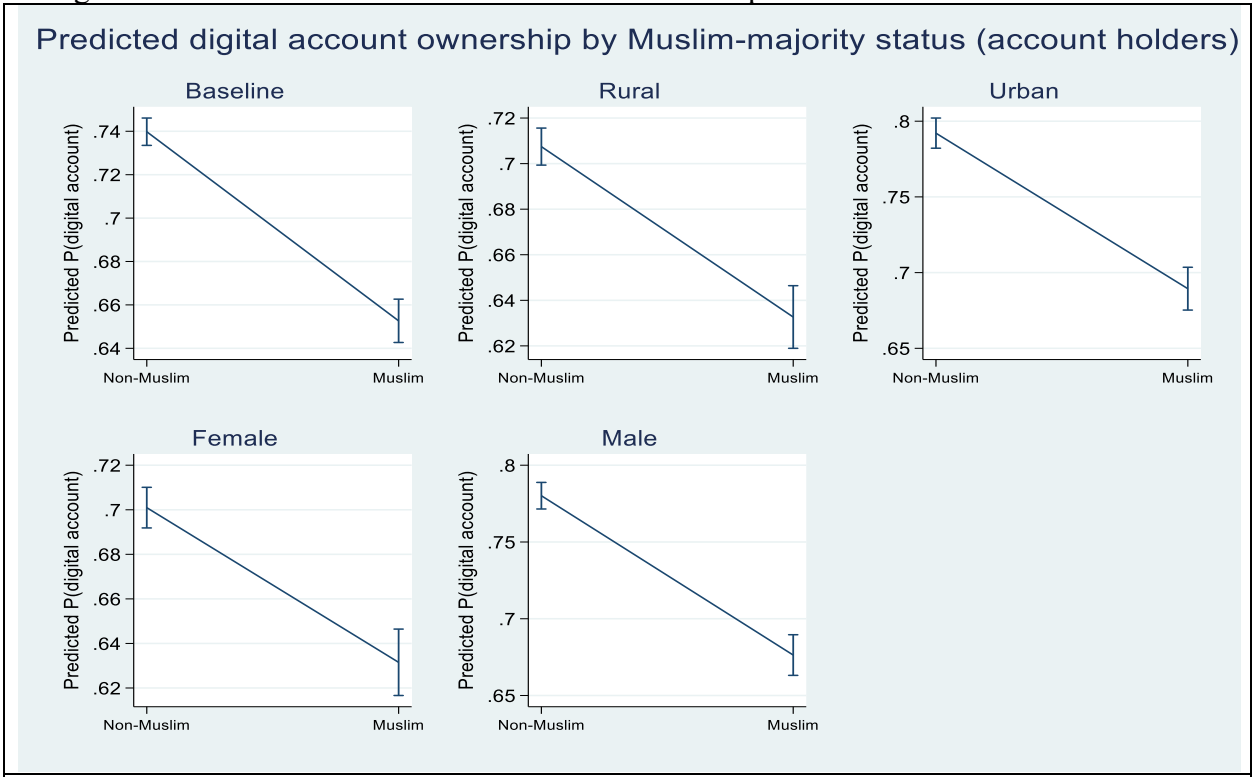


Figure 8. Marginal plot of digitally enabled account access across heterogenous sample

## 7. Discussion

The negative marginal effects in Table 3 indicate that, among adults, residence in a Muslim-majority economy is consistently associated with a lower probability of owning an account, and this gap remains visible across rural, urban, female, and male subsamples. This pattern is consistent with evidence that formal account uptake is shaped by institutional fit and perceived product usability, not only by income or access costs. Where conventional interest-based products are viewed as misaligned with prevailing requirements, exclusion can persist even when services exist (Sain et al., 2018). Related micro evidence shows that participation in Islamic versus conventional provision is stratified across socioeconomic groups, implying that account ownership can reflect differentiated alignment between users and provider offerings rather than a single uniform adoption process (Siddiqui et al., 2021).

The persistence of the negative association within rural and urban subsamples, and within gender groups, points toward structural correlates that operate across population segments rather than being driven by subgroup composition alone. Work that treats Islamic fintech competitiveness as a multidimensional capability set emphasizes ecosystem readiness and the institutional infrastructure needed for inclusion-oriented delivery (Glavina et al., 2021). Evidence on Shariah-compliant fintech regulation similarly highlights that fragmented or lagging oversight can constrain the scale and credibility of digital financial services (Ab Razak et al., 2020). More broadly, regulatory mismatches between evolving digital finance models and existing

frameworks have been documented as a constraint on the reliability and expansion of account-based systems (Chitimira & Torerai, 2021).

These findings do not contradict evidence that mobile and digital finance can widen functional access. Instead, they reinforce the importance of separating entry into account ownership from the channels through which account holders engage. Mobile money is often described as expanding access to services without requiring the same onboarding pathway as banks, while remaining sensitive to constraints that limit sustained participation (Qureshi, 2020). Evidence also shows that bank and mobile accounts can be jointly held, indicating complementarities that complicate any single-channel reading of "ownership" (Son et al., 2020). At the same time, operational frictions such as agent liquidity disruptions can weaken the practical value of mobile-linked access, even when accounts exist (Mazambani et al., 2018). Against this backdrop, Table 3 supports the paper's broader design that treats ownership as an extensive margin and then examines pathways and digital enablement as distinct layers of inclusion depth.

The pathway reallocation in Table 5, where account holders in Muslim-majority economies are more likely to rely on bank-only access and less likely to use mobile-inclusive pathways, is consistent with an ecosystem interpretation of inclusion. Account-based participation can be shaped by legacy banking structures and how formal intermediation is organised, while the diffusion of mobile finance depends on the operational and regulatory compatibility of telecom-led or agent-mediated models with existing oversight. Evidence from Zimbabwe highlights that when digital finance expands through agent networks, liquidity constraints and disruptions can limit the reliability of mobile money as a functional access channel, which can reinforce reliance on bank-centred pathways among those already holding accounts (Mazambani et al., 2018). Regulatory mismatches between evolving digital services and incumbent frameworks are also documented as shaping the feasibility and stability of mobile platforms (Chitimira & Torerai, 2021).

Lower prevalence of mobile-only and combined bank-and-mobile access aligns with evidence that mobile finance does not uniformly substitute for banking, and that complementarity depends on ecosystem maturity. In Vietnam, mobile money use is linked to bank account ownership, consistent with multi-rail participation rather than a clean shift from banks to mobile channels (Son et al., 2020). At the same time, mobile money is often discussed as widening functional access outside traditional banking, but adoption and continued use remain sensitive to infrastructural separations and service constraints that can limit deep integration with formal accounts (Qureshi, 2020). Within this framing, weaker combined access in Muslim-majority economies is more plausibly read as a difference in the depth of platform integration and onboarding architectures than as a simple difference in individual willingness to adopt.

The fact that the pathway pattern is observed across rural and urban subsamples and across gender subsamples points to broad structural correlates rather than localized exclusion. Evidence from Ghana underscores that financial inclusion outcomes in mobile money contexts are shaped by ecosystem practices and relationships among providers and intermediaries, suggesting that pathway composition reflects supply-side organisation as much as user characteristics (Senyo et al., 2022). More generally, the results reinforce the importance of treating account ownership as heterogeneous in how it is accessed. Pathway differentiation

among account holders is necessary for interpreting inclusion, because an “account” can represent materially different access technologies with different reliability and integration, which in turn conditions how later digital engagement can be understood (Kemgou Voptia & Stukalina, 2024).

The negative association in Table 7 indicates that, among adults who already hold an account, residence in a Muslim-majority economy is linked to lower digitally enabled account use. This is consistent with evidence that digital finance requires more than account access and depends on the maturity of supporting infrastructure and service delivery. Work on fintech ecosystems emphasizes that inclusion through digital channels is shaped by the practices and interdependencies among providers, platforms, and intermediaries, which condition whether digital transactions become routine rather than episodic (Senyo et al., 2022). Evidence from mobile money systems also highlights operational fragilities, including disruptions around agent functionality and liquidity, which can limit the reliability of digital rails for frequent use even when accounts exist (Mazambani et al., 2018).

The persistence of this pattern across rural and urban subsamples and across gender subsamples suggests that the underlying correlates operate at the ecosystem level rather than being confined to particular population segments. Regulatory and institutional arrangements are repeatedly discussed as central to whether digital finance scales beyond basic access, especially where oversight frameworks lag behind the operational realities of telecom-led or platform-mediated services (Chitimira & Torerai, 2021). In the specific context of Islamic financial services, fragmented or underdeveloped Shariah-compliant fintech regulation is framed as a constraint on coherent digital delivery, which can affect the integration of services and the credibility of digital channels (Ab Razak et al., 2020). A related comparative indicator approach treats Islamic fintech competitiveness as a multidimensional capability set tied to ecosystem readiness and infrastructural depth, which aligns with the idea that digital enablement reflects more advanced inclusion conditions than ownership alone (Glavina et al., 2021).

These findings underscore that digitally enabled account use represents a deeper margin of inclusion, conditional on ownership, and should not be conflated with pathway composition. Evidence that bank and mobile money accounts can be jointly held reinforces that digital engagement often emerges through complementary channel use rather than a single-channel pathway (Son et al., 2020). At the same time, mobile money is described as expanding functional access, yet it is also portrayed as sensitive to infrastructural separations that can constrain sustained digital engagement (Qureshi, 2020). Against this backdrop, Table 7 complements the pathway results by showing that even when account holders are observed within the system, cross-context differences remain at the level of digitally enabled use, supporting the paper’s layered approach to inclusion measurement.

## 8. Conclusion

The results consistently indicate three associational differences between Muslim- and non-Muslim-majority economies when financial inclusion is examined across multiple margins. First, the likelihood of owning any account is lower in Muslim-majority economies. Second, among account holders, access is more concentrated in bank-only pathways, with mobile-only and combined bank-and-mobile access less prevalent. Third, digitally enabled account use is lower

among account holders in Muslim-majority economies, indicating that gaps persist at the level of inclusion depth even after entry into account holding. These patterns are best interpreted as reflecting institutional and ecosystem-level differences in how financial services are organised, integrated, and operationalised, rather than individual religious behaviour.

Policy should therefore target the full inclusion sequence rather than account opening alone. Regulators in Muslim-majority economies should improve perceived product fit through transparent terms, clearly communicated Shariah-compliant options, and consistent consumer-protection standards. Interoperable bank–mobile systems, coordinated onboarding, shared payment interfaces, and enforceable agent-liquidity requirements could reduce reliance on bank-only pathways and support multi-channel use. Digital-inclusion strategies should also prioritise platform reliability, cybersecurity, complaint resolution, and coordination among banks, telecom operators, fintech firms, and regulators (Senyo et al., 2022; Chitimira & Torerai, 2021). Because ownership gaps are larger for women and digital gaps are wider in urban and male subsamples, monitoring and outreach should be disaggregated by gender and residence. Because the evidence is cross-sectional, these measures should be piloted and evaluated rather than treated as established causal remedies.

**References**


Ab Razak, M. I., Dali, N. A. M., Dhillon, G., & Manaf, A. W. (2020). Fintech in Malaysia: an appraisal to the need of shariah-compliant regulation. *Pertanika Journal of Social Science and Humanities*, *28*(4), 3223-3233. https://doi.org/10.47836/pjssh.28.4.40

Abduh, M., Buys, W. A., & Aziz, S. A. (2022). Exploring the relationship between Islamic financial development, energy consumption, and environmental quality. *International Journal of Energy Economics and Policy*, *12*(2), 426-430. https://doi.org/10.32479/ijeep.11943

Abiona, O., & Koppensteiner, M. F. (2022). Financial inclusion, shocks, and poverty: Evidence from the expansion of mobile money in Tanzania. *Journal of Human Resources*, *57*(2), 435-464. https://doi.org/10.3368/jhr.57.2.1018-9796R1

Ameziane, M. (2024). Islamic Financial Inclusion And Economic Growth In OIC Countries: Panel Quantile Regression Analysis. *Journal of Islamic Monetary Economics and Finance*, *10*(3), 609-630. https://doi.org/10.21098/jimf.v10i3.2150

Amin, S., Yasin, I., & Rutkowska-Ziarko, A. (2023). Diversity-inclusion nexus: assessing the role of ethnic and religious diversity in financial inclusion; a global perspective. *Economic research-Ekonomska istraživanja*, *36*(1), 1205-1225. https://doi.org/10.1080/1331677X.2022.2083648

Anifowose, O. L., & Chummun, B. Z. (2025). A Panel data analysis of determinants of financial inclusion in Sub-Saharan Africa (SSA) countries from 1999 to 2024. *Journal of Risk and Financial Management*, *18*(5), 275. https://doi.org/10.3390/jrfm18050275

Brekke, T. (2018). Halal Money: Financial inclusion and demand for Islamic banking in Norway. *Research & Politics*, *5*(1), 2053168018757624. https://doi.org/10.1177/2053168018757624

Carè, R., Boitan, I. A., Stoian, A. M., & Fatima, R. (2025). Exploring the landscape of financial inclusion through the lens of financial technologies: A review. *Finance Research Letters*, *72*, 106500. https://doi.org/10.1016/j.frl.2024.106500

Chitimira, H., & Torerai, E. (2021). The nexus between mobile money regulation, innovative technology and the promotion of financial inclusion in Zimbabwe. *Potchefstroom Electronic Law Journal/Potchefstroomse Elektroniese Regsblad*, *24*(1). https://doi.org/10.17159/1727-3781/2021/v24i0a10739

Ginanjar, A., & Kassim, S. (2020). Can Islamic microfinance alleviates poverty in Indonesia? An investigation from the perspective of the microfinance institutions. *Journal of Islamic Monetary Economics and Finance*, *6*(1), 77-94. https://doi.org/10.21098/jimf.v6i1.1203

Glavina, S., Aidrus, I., & Trusova, A. (2021). Assessment of the competitiveness of Islamic Fintech implementation: A composite indicator for cross-country analysis. *Journal of Risk and Financial Management*, *14*(12), 602. https://doi.org/10.3390/jrfm14120602

Hafiz, A., Napisah, N., Jalili, I., Armasito, A., & Solihu, A. K. H. (2025). Crypto Currency Investment from an Islamic Law Perspective: An Overview of Guidelines and Considerations. *Nurani: jurnal kajian syari'ah dan masyarakat*, *25*(1), 200-218. https://doi.org/10.19109/nurani.v25i1.26315

Hagawe, H. M., Mobarek, A., Hanuk, A., & Jamal, A. (2023). A unique business model for microfinance institution: the case of Assadaqaat Community Finance (ACF). *Cogent Business & Management*, *10*(1), 2135202. https://doi.org/10.1080/23311975.2022.2135202

Hamdan, J. S., Lehmann-Uschner, K., & Menkhoff, L. (2022). Mobile money, financial inclusion, and unmet opportunities: Evidence from Uganda. *The Journal of Development Studies*, *58*(4), 671-691. https://doi.org/10.1080/00220388.2021.1988078

Hasan, M., Hoque, A., Abedin, M. Z., & Gasbarro, D. (2024). FinTech and sustainable development: A systematic thematic analysis using human-and machine-generated processing. *International review of financial analysis*, *95*, 103473. https://doi.org/10.1016/j.irfa.2024.103473

Hassan, M. K., Alshater, M. M., Hasan, R., & Bhuiyan, A. B. (2021). Islamic microfinance: A bibliometric review. *Global Finance Journal*, *49*, 100651. https://doi.org/10.1016/j.gfj.2021.100651

Kannaiah, D., Masvood, Y., & Lokesh, C. Y. (2017). Growth of Islamic banking in India: discriminant analysis approach. *Banks & bank systems, 12*(4), 175-188. https://doi.org/10.21511/bbs.12(4-1).2017.06

Kemgou Voptia, E. B., & Stukalina, Y. (2024). Financial Inclusion in Sub-Saharan Africa: The Case of Mobile Money. *Economics/Ekonomika*, *103*(4). https://doi.org/10.15388/Ekon.2024.103.4.5

Kim, K. (2022). Assessing the impact of mobile money on improving the financial inclusion of Nairobi women. *Journal of Gender Studies*, *31*(3), 306-322. https://doi.org/10.1080/09589236.2021.1884536

Klapper, Leora, Dorothe Singer, Laura Starita, and Alexandra Norris. 2025. *The Global Findex Database 2025: Connectivity and Financial Inclusion in the Digital Economy*. Washington, DC: World Bank. https://doi.org/10.1596/978-1-4648-2204-9

Ltaifa, M. B., & Derbali, A. M. S. (2025). How Can Financial Technology be Applied to Improve Customer Experience and Expand Access to Islamic Financial Services. *Journal of Cultural Analysis and Social Change, 10*(2), 4837-4851. https://doi.org/10.64753/jcasc.v10i2.2351

Mamun, A. Y., & László, V. (2025). Advancing sustainability through financial inclusion and sustainable finance: a systematic literature review. *Digital Finance, 7*, 853-870. https://doi.org/10.1007/s42521-025-00142-7

Maruf, A. O. (2025). Comparative Study of Islamic and Secular Economic Law in Nigeria: Implications for Policy Making. *Jurnal Ilmiah Mizani: Wacana Hukum, Ekonomi Dan Keagamaan*, *12*(1), 33-49. https://doi.org/10.29300/mzn.v12i1.5340

Mazambani, L., Rushwaya, T. J., & Mutambara, E. (2018). Financial inclusion: Disrupted liquidity and redundancy of mobile money agents in Zimbabwe. *Investment Management and Financial Innovations*, *15*(3), 131-142. https://doi.org/10.21511/imfi.15(3).2018.11

Mpinganjira, M. (2026). Mapping customer-to-customer helping behaviour in financial services and digital platforms: a bibliometric and content analysis. *International Journal of Bank Marketing*, *44*(1), 56-76. https://doi.org/10.1108/IJBM-04-2025-0295

Nadir, S., & El Arif, F. Z. (2025). Attractiveness of Participatory Banks in Morocco: Challenges and Perspectives. *International Journal of Islamic Finance and Sustainable Development*, *17*(4), 54-77. https://doi.org/10.55188/ijifsd.v17i4.1165

Nyoka, C. (2019). Education level and income disparities: implications for financial inclusion through mobile money adoption in South Africa. *Comparative Economic Research. Central and Eastern Europe*, *22*(4), 129-142. http://doi.org/10.2478/cer-2019-0036

Pandey, D. K. (2025). FinTech literature reviews: A hybrid approach. *Finance Research Letters*, 107249. https://doi.org/10.1016/j.frl.2025.107249

Qureshi, S. (2020). Why data matters for development? Exploring data justice, micro-entrepreneurship, mobile money and financial inclusion. *Information Technology for Development*, *26*(2), 201-213. https://doi.org/10.1080/02681102.2020.1736820

Rokhlinasari, S., Widagdo, R., & Irwandi, S. A. (2025). Ethical finance and MSME resilience: Shariah banking contribution to Indonesia's economic growth. *Banks and Bank Systems*, *20*(3), 91-104. https://doi.org/10.21511/bbs.20(3).2025.07

Rumra, A., Sandy, T. A., Sarif, A., Wibawa, K. D., Darman, Alwi, A. C., & Septianto, T. (2025). Exploring public sentiment toward Islamic banking apps: A case study of BSI mobile in Indonesia. *Multidisciplinary Science Journal*, *8*(6), 2026385. https://doi.org/10.31893/multiscience.2026385

Sain, M. R. M., Rahman, M. M., & Khanam, R. (2019). Financial exclusion and the role of Islamic finance in Australia: a case study in Queensland. *Australasian Accounting, Business and Finance Journal*, *12*(4), 23-43. https://doi.org/10.14453/aabfj.v12i4.3

Sayed, M. N., & Shusha, A. (2019). Determinants of financial inclusion in Egypt. *Asian Economic and Financial Review*, *9*(12), 1383-1404. https://doi.org/10.18488/journal.aefr.2019.912.1383.1404

Senyo, P. K., Karanasios, S., Gozman, D., & Baba, M. (2022). FinTech ecosystem practices shaping financial inclusion: The case of mobile money in Ghana. *European Journal of Information Systems*, *31*(1), 112-127. https://doi.org/10.1080/0960085X.2021.1978342

Shamsudheen, S. V., & Muneeza, A. (2024). Blended Islamic Social Finance-Microtakāful Model. *International Journal of Islamic Finance and Sustainable Development*, *16*(3), 151-169. https://doi.org/10.55188/ijifsd.v16i3.906

Siddiqui, T., Naushad, M., & Farooque, M. (2021). A study on Islamic finance as an approach for financial inclusion in India. *Accounting*, *7*(2), 487-496. https://doi.org/10.5267/j.ac.2020.11.001

Son, T. H., Liem, N. T., & Khuong, N. V. (2020). Mobile money, financial inclusion and digital payment: the case of Vietnam. *International Journal of Financial Research*, *11*(1), 417-424. https://doi.org/10.5430/ijfr.v11n1p417

Tia, J., Kuunibe, N., & Nkegbe, P. K. (2023). Drivers of financial inclusion in Ghana: Evidence from microentrepreneurs in the Wa Municipality of the Upper West Region. *Cogent Economics & Finance*, *11*(2), 2267854. https://doi.org/10.1080/23322039.2023.2267854

Wahyudi, H., Wisandani, I., Saputra, C., Lestari, W. R., & Leny, S. M. (2025). Digitalisation of Islamic Finance in the Era of Industrial Revolution 5.0: The Contribution of Crowdfunding and e-Wakaf to Islamic Fintech. *International Journal of Economics and Financial Issues*, *15*(2), 46-53. https://doi.org/10.32479/ijefi.17480

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