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Digital Access and Financial Inclusion in India

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ABSTRACT

Global evidence suggests that India has made substantial progress in expanding financial access, with account ownership among adults rising from 35.2 percent in 2011 to 89 percent in 2024. However, this expansion has not been matched by equivalent growth in active digital financial usage, as only 48.5 percent of adults report making or receiving digital payments, and just 42 percent own a personal smartphone (World Bank, 2025). This divergence highlights a critical gap between financial inclusion and effective financial participation, underscoring the importance of digital connectivity in bridging this divide. Against this backdrop, the present study examines the relationship between digital access and financial inclusion in India. Financial inclusion is defined as ownership of a bank or savings account, while digital access is proxied by internet use and mobile phone ownership. The analysis employs a probit regression framework to estimate the likelihood of financial inclusion as a function of digital access, while controlling for key socio-economic and demographic factors, including education, household wealth, caste, religion, age, and sex. In addition, enabling conditions such as Aadhaar identification and access to electricity are incorporated, along with state-level fixed effects to account for regional heterogeneity. Using nationally representative microdata from the National Family Health Survey, the study provides a comprehensive assessment of disparities in digital and financial access across population groups in India. The empirical results indicate that both internet access and mobile phone ownership are positively and significantly associated with the probability of holding a bank account. The findings contribute to the literature on the digital economy and inclusive development by offering micro-level evidence on the role of digital infrastructure in enhancing financial participation. The study suggests that policies aimed at expanding digital connectivity, alongside improvements in digital literacy and affordability, can play a pivotal role in translating access to financial services into meaningful, sustained use.

***Keywords**: Digital Access, Financial Inclusion, Demographic Factors, Household Wealth, Education.*

Introduction

Financial inclusion, commonly defined as access to and use of affordable and appropriate financial services, has long been recognised as a central pillar of inclusive development. It facilitates secure transactions, promotes savings, and enhances households' ability to manage risks and smooth consumption over time (Reserve Bank of India, 2021). In developing economies, expanding financial inclusion is also closely linked to broader objectives such as poverty reduction, gender empowerment, and formalisation of economic activity.

In India, the trajectory of financial inclusion over the past decade has been shaped by a combination of large-scale account expansion and the development of digital public infrastructure. A major policy milestone was the launch of the Pradhan Mantri Jan Dhan Yojana in August 2014, which aimed to provide universal access to banking services through rapid account opening, particularly among previously unbanked populations (Government of India, 2014). Complementing this expansion in account

ownership, the country has developed a robust digital payments ecosystem, most notably through the Unified Payments Interface introduced by the National Payments Corporation of India in 2016, which enables real-time, low-cost transactions across financial institutions.

Global demand-side evidence confirms the magnitude of this transformation. According to the Global Findex database, account ownership among Indian adults increased sharply from about 35 percent in 2011 to 78 percent in 2021, with much of the expansion concentrated in the period following the rollout of Jan Dhan (World Bank, 2022). More recent estimates indicate that account ownership has reached approximately 89 percent by 2024. Despite this remarkable progress, the use of digital financial services remains uneven, with significant gaps in digital payment adoption and access to enabling technologies such as smartphones and internet connectivity (World Bank, 2025).

These trends raise an important empirical question. In a context where formal account ownership is approaching universality, does digital connectivity continue to play a meaningful role in shaping financial inclusion at the margin? While earlier phases of policy focused on expanding access to basic banking services, the current phase increasingly requires attention to the conditions that enable effective and sustained usage of financial systems.

This paper addresses this question by examining the relationship between digital access and financial inclusion in India. Using nationally representative microdata from the National Family Health Survey round five for the period 2019 to 2021, the analysis estimates a probit model of bank account ownership as a function of internet access and mobile phone ownership. The empirical specification controls for key socio-economic and demographic characteristics, including education, household wealth, caste, religion, age, and sex, along with enabling factors such as Aadhaar identification and access to electricity. State-level fixed effects are incorporated to account for regional heterogeneity.

The results indicate that digital access remains significantly associated with financial inclusion even in a high-coverage environment. Internet access is associated with a statistically significant increase of approximately 0.7 percentage points in the probability of owning a bank account, while mobile phone access is associated with a larger increase of around 4.0 percentage points, conditional on controls. Wealth and Aadhaar possession also exhibit positive associations with account ownership, highlighting the role of economic resources and identity infrastructure in reducing access barriers.

Although the estimates are associational and do not imply causality, they are consistent with existing evidence that digital connectivity and enabling institutional frameworks are closely linked to financial inclusion outcomes. The findings suggest that the policy focus must now extend beyond account opening to strengthen digital infrastructure, improve affordability and digital literacy, and ensure consumer protection in an increasingly digital financial ecosystem.

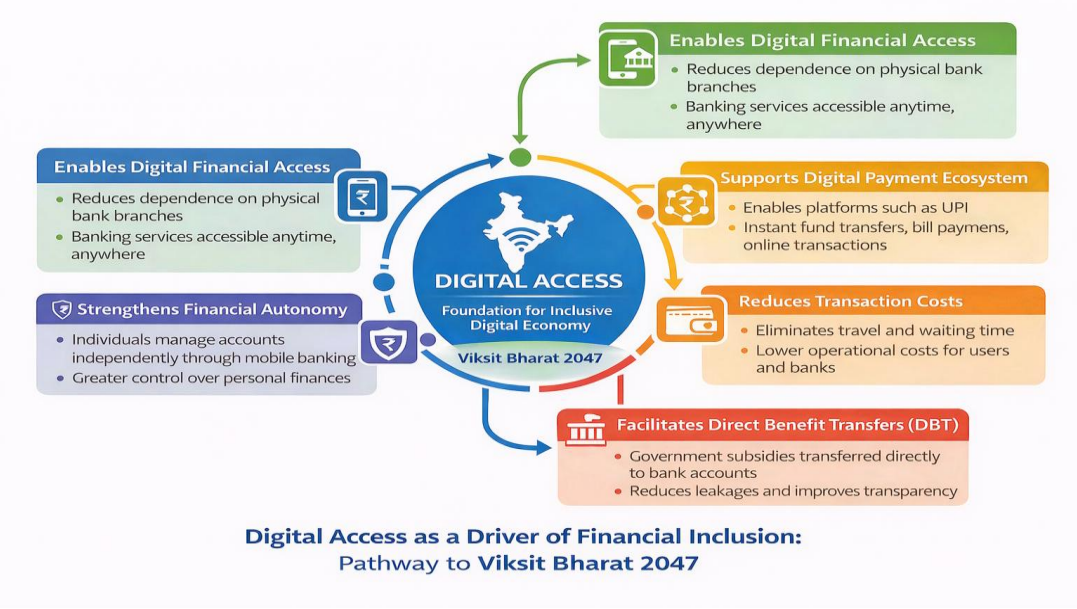
The remainder of the paper is organised as follows. The next section reviews the relevant literature. This is followed by a description of the data and methodology. The subsequent section presents the empirical results, and the final section concludes the paper.

Literature Review

The literature on financial inclusion has evolved along multiple, interrelated strands that examine both access to formal financial services and the conditions that enable their effective use. A first strand focuses on cross-country determinants of account ownership and financial participation. Using Global Findex data, Allen, Demirgüç-Kunt, Klapper, and Martínez Pería (2016) demonstrate that financial inclusion is shaped by a combination of individual characteristics such as income, education, gender, and rural residence, as well as structural features including transaction costs, documentation requirements, and proximity to financial institutions. Their findings consistently show that disadvantaged groups remain systematically excluded, even in contexts where aggregate inclusion levels appear high.

A second strand examines the evolution of financial inclusion in India, with particular emphasis on the role of policy and institutional design. Early contributions highlight the importance of supply-side interventions. Burgess and Pande (2005) provide causal evidence that the expansion of rural bank branches contributed to poverty reduction, indicating that physical access to financial services can have significant welfare effects. Extending this perspective, Chakravarty and Pal (2013) develop an axiomatic index of financial inclusion and document substantial variation across Indian states, linking differences in inclusion outcomes to variations in banking penetration and policy regimes. Complementary micro-level and qualitative studies further underscore that formal access does not necessarily translate into effective

inclusion, as social hierarchies, informational barriers, and local institutional constraints continue to shape financial behaviour in rural contexts.



Digital Access as a Driver of Financial Inclusion:
Pathway to **Viksit Bharat 2047**

A third and more recent strand shifts attention toward the role of digital technologies in transforming financial inclusion. The emergence of digital public infrastructure, including mobile banking, biometric identification, and real-time payment systems, has altered the mechanisms through which individuals interact with financial institutions. Digital access reduces reliance on physical bank branches, enables anytime and anywhere transactions, and lowers both monetary and non-monetary transaction costs. As illustrated conceptually in Figure 1, digital connectivity facilitates multiple channels of inclusion by enabling digital payments, reducing transaction frictions, strengthening individual financial autonomy, and improving the delivery of government transfers through direct benefit transfer systems. These pathways suggest that digital access is not merely complementary to traditional banking infrastructure but increasingly central to inclusive financial systems.

A fourth strand critically examines the political economy and risks associated with digital financial inclusion. Gabor and Brooks (2017) conceptualise digital inclusion as embedded within broader digital ecosystems that generate and utilise data on individual behaviour, raising concerns about surveillance, governance, and the distribution of benefits. Related empirical work highlights that while digital finance can expand access, it may also increase vulnerability through over-indebtedness and exposure to poorly regulated financial products. This strand emphasises that inclusion must be evaluated not only in terms of access but also in terms of outcomes, including financial stability and consumer welfare.

Finally, policy-oriented contributions provide a normative framework for inclusive and responsible financial development. The G20 High-Level Principles for Digital Financial Inclusion emphasise the importance of coordinated public and private sector efforts, robust regulatory frameworks, and targeted interventions for vulnerable populations. In the Indian context, the Reserve Bank of India's National Strategy for Financial Inclusion (2019–2024) articulates a comprehensive approach that extends beyond access to include usage, quality, and affordability of financial services. This framework recognises that sustainable inclusion requires an enabling ecosystem encompassing digital infrastructure, financial literacy, consumer protection, and institutional capacity.

Taken together, the literature suggests that financial inclusion is a multidimensional process shaped by the interaction of individual capabilities, institutional structures, and technological change. While earlier work emphasised physical access and banking infrastructure, recent contributions highlight the growing importance of digital connectivity as a driver of inclusion. At the same time, the emerging

evidence on risks and inequalities underscores the need for balanced policy approaches that combine technological expansion with safeguards and capability enhancement.

Data Source

The empirical analysis is based on nationally representative microdata from the fifth round of the National Family Health Survey (NFHS-5), conducted during 2019 to 2021 under the stewardship of the Ministry of Health and Family Welfare, Government of India. NFHS-5 forms part of the Demographic and Health Surveys programme and provides comprehensive information on population, health, and socio-economic characteristics across all states and union territories of India.

This study utilises the household member dataset (PR file), which contains individual-level information for all usual residents of sampled households. The dataset is particularly suitable for the present analysis as it captures a wide range of demographic attributes, socio-economic indicators, and information on access to digital technologies and financial services.

Following standard data preparation procedures, relevant sample restrictions and cleaning protocols were applied to ensure consistency and reliability of the analytical sample. After these steps, the final sample comprises 2,843,917 individuals. The large sample size and national representativeness of NFHS-5 enable a robust and comprehensive examination of disparities in digital access and financial inclusion across diverse population groups. It also permits the incorporation of detailed controls for demographic, socio-economic, and regional heterogeneity, thereby strengthening the empirical analysis.

Methodology

This study examines the relationship between digital access and financial inclusion in India. Financial inclusion is conceptualised as access to formal banking services and is proxied by a binary indicator of whether an individual has a bank account. Given the dichotomous nature of the dependent variable, a probit regression model is employed to estimate the probability of financial inclusion as a function of digital access and other socio-economic characteristics.

The empirical model estimates the likelihood that an individual holds a bank account, conditional on digital connectivity, mobile phone ownership, and a set of control variables that capture demographic, socio-economic, and enabling factors.Formally, the model is specified as:

$$P(Account_{i=1}) = \alpha_i + \phi(\beta_{1i} Internet_i + \beta_{2i} Mobile_i + \beta_{3i} X_i + \varepsilon_i)$$

where i indexes individuals, $\phi(\cdot)$ denotes the cumulative distribution function of the standard normal distribution, $Internet_i$ is a binary indicator of internet access, and $Mobile_i$ is a binary indicator of mobile phone access. The vector X_i includes control variables, and ε_i isthe error term.

The key explanatory variables are digital access indicators. Internet access is interpreted as a measure of an individual's ability to connect to online platforms and digital services, while mobile phone access captures ownership or availability of a mobile device, which is central to participation in digital financial ecosystems. Both variables are expected to have a positive association with financial inclusion, as they reduce information barriers, facilitate transactions, and enhance interaction with formal financial institutions.

The control variables are selected in line with the standard determinants framework in the financial inclusion literature. These include education, measured as years of schooling, and the household wealth index, which captures socio-economic status and the capacity to engage with formal financial systems. Caste and religion are included as categorical variables to account for social stratification and historically rooted inequalities in access. Aadhaar card possession and access to electricity serve as enabling factors, reflecting identity infrastructure and basic service availability that can lower entry barriers to financial services. Demographic characteristics such as age and sex are also included, given their potential influence on financial behaviour and access. State-level fixed effects are incorporated to control for regional heterogeneity in institutional development, policy implementation, and infrastructure.

The expected signs of the coefficients are largely positive for internet access, mobile access, education, wealth, Aadhaar possession, and electricity access, reflecting their role in facilitating inclusion. The effects of caste, religion, age, and sex are theoretically ambiguous and are determined empirically. Details about the variables are mentioned in Table 1.

All estimations are conducted using robust standard errors to account for potential heteroskedasticity. The results are interpreted in terms of marginal effects, providing an estimate of the change in the probability of financial inclusion associated with changes in the explanatory variables.

Table 1: Variable Description

Variable	Type	Expected sign
Bank account ownership	Binary	
Internet access	Binary	+
Mobile access	Binary	+
Education	Continuous	+
Wealth index	Index	+
Caste / religion	Categorical	Ambiguous
Aadhaar Card	Binary	+
Electricity	Binary	+
Age	Continuous	Ambiguous
Sex	Binary	Ambiguous

Results and Discussions

The empirical results from the probit estimation indicate a statistically significant association between digital access and financial inclusion in India. Both key explanatory variables, internet access and mobile phone access, exhibit positive and economically meaningful effects on the probability of holding a bank account, after controlling for a comprehensive set of socio-economic, demographic, and enabling factors.

Internet access is associated with an increase of approximately 0.7 percentage points in the probability of bank account ownership. Although modest in magnitude, this effect is statistically significant and suggests that internet connectivity plays a complementary role in facilitating access to formal financial services. By reducing information asymmetries and enabling interaction with digital financial platforms, internet access enhances individuals' ability to engage with the banking system.

Table 2 : Probit Regression Results

Probit Model Results		
VARIABLES	Coefficients	Marginal effects
Internet Access	0.092***	0.007***
	(0.003)	(0.00)
Mobile access	0.445***	0.04***
	(0.005)	(0.00)
Education	0.001***	0.001***
	(0.000)	(0.009)
Wealth	0.097***	0.007***
	(0.001)	(0.00)
Aadhar crd holder	0.176***	0.015***
	(0.005)	(0.00)
Age	-0.000***	-0.000***
	(0.000)	(0.000)
Sex (Female as compared with male)	0.007**	0.0005**
	(0.003)	(0.02)
Access to electricity	0.172***	0.015***
	(0.006)	(0.00)
Constant	0.933***	
	(0.013)	
Observations	2,843,917	2,843,917
Robust standard errors in parentheses		
*** p<0.01, ** p<0.05, * p<0.1		

Mobile phone access, in contrast, demonstrates a substantially larger effect. The estimated marginal effect indicates that individuals with access to a mobile phone are approximately 4.0 percentage points more likely to possess a bank account. This finding is consistent with the central role of mobile devices in India's digital financial ecosystem, particularly in enabling real-time transactions, authentication, and access to banking services through mobile-based applications.

Among the control variables, education and household wealth are strong, statistically significant predictors of financial inclusion. Higher levels of education are associated with an increased likelihood of account ownership, reflecting both enhanced financial literacy and improved economic opportunities. Similarly, individuals from wealthier households are more likely to be financially included, indicating that economic capacity remains a key determinant of access to formal financial systems.

Enabling infrastructure variables also play an important role. Possession of an Aadhaar identification number is positively associated with bank account ownership, highlighting the importance of identity systems in reducing documentation barriers and facilitating account opening. Access to electricity is similarly significant, suggesting that basic infrastructure is a prerequisite for participation in digital and formal financial systems.

The effects of demographic variables such as age and sex, as well as social characteristics such as caste and religion, are more heterogeneous and context-dependent. While some categories exhibit statistically significant differences, the direction and magnitude of these effects vary, indicating persistent social and demographic disparities in financial inclusion outcomes. State-level controls further confirm the presence of regional heterogeneity, reflecting differences in policy implementation, infrastructure, and institutional development across states.

Overall, the results are robust to the inclusion of multiple controls and are estimated using robust standard errors, ensuring reliability in the presence of potential heteroskedasticity.

Conclusion

This study provides micro-level evidence on the role of digital access in shaping financial inclusion in India within a context of near-universal account ownership. The findings indicate that digital connectivity, particularly access to mobile phones and the internet, remains a significant determinant of financial inclusion.The results suggest that while policy initiatives such as large-scale account opening programmes have successfully expanded formal access, the next phase of financial inclusion depends critically on strengthening digital infrastructure and connectivity. Mobile access, in particular, appears to be a key enabler of financial participation, reflecting its central role in facilitating transactions, reducing costs, and improving accessibility.At the same time, the continued significance of socio-economic variables such as education and wealth underscores that digital access alone is not sufficient. Financial inclusion remains embedded within broader structural inequalities, and disparities in resources and capabilities continue to influence access outcomes. The positive role of Aadhaar and electricity further highlights the importance of complementary institutional and infrastructural conditions in enabling effective inclusion.

These findings carry important policy implications. First, expanding affordable and reliable digital connectivity, especially in underserved regions, should remain a priority. Second, efforts to improve digital literacy and user capability are essential to ensure that individuals can effectively utilise available financial services. Third, strengthening consumer protection frameworks is necessary to mitigate potential risks associated with increased digitisation, including fraud and over-indebtedness.

In analytical terms, the study reinforces the view that financial inclusion should not be assessed solely in terms of account ownership. Even in a high-coverage environment, digital access continues to play a meaningful role in shaping participation in formal financial systems. A comprehensive approach that integrates infrastructure, capability, and institutional safeguards is therefore essential for achieving inclusive and sustainable financial development in India.

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