

Digital Financial Inclusion and Small-Medium Enterprise Growth in Emerging Asian Economies: A Comparative Study of Indonesia and India

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ABSTRACT

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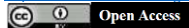
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This study investigates the impact of digital financial inclusion on the growth of small and medium-sized enterprises (SMEs) in two of Asia's largest emerging economies, India and Indonesia, between 2019 and 2024. Drawing on a mixed-methods design that combines survey data from 450 SMEs (250 in India and 200 in Indonesia) with 30 semi-structured interviews of owner-managers, the research applies ordinary least squares regression, partial least squares structural equation modelling (PLS-SEM), and reflexive thematic analysis to evaluate the relationship between digital financial service (DFS) adoption and enterprise performance. Empirical findings indicate that DFS adoption is positively and statistically significantly associated with annual revenue growth ($\beta = 0.342$, $p < 0.001$) and employment expansion ($\beta = 0.218$, $p < 0.01$) after controlling for firm-level characteristics. Financial literacy partially mediates this relationship (indirect effect = 0.087, 95% CI [0.041, 0.139]), and the magnitude of the effect is consistently stronger in Indonesia than in India, particularly for micro-enterprises located outside metropolitan agglomerations. Qualitative analysis identifies four mechanisms through which digitalisation translates into competitive advantage: lowered transaction costs, expanded credit access through alternative data scoring, improved cash-flow visibility, and accelerated market reach via integrated e-commerce platforms. The study contributes to the literature on financial inclusion and entrepreneurship by offering one of the few cross-country comparisons of digital finance effects in South and Southeast Asia, and by foregrounding the contingent role of financial literacy and regulatory quality. The findings imply that policy makers should prioritise complementary investments in digital infrastructure, consumer protection frameworks, and SME-targeted financial education to maximise the inclusive growth dividends of digitalisation.

Keywords: Digital financial inclusion; SME growth; emerging economies; India; Indonesia; financial literacy; fintech adoption

Introduction

Small and medium-sized enterprises (SMEs) are widely acknowledged as the backbone of emerging Asian economies, contributing more than half of total employment and approximately one-third of gross domestic product across the region (Asian Development Bank, 2023). In India, the Ministry of Micro, Small and Medium Enterprises estimated in 2023 that the sector encompassed over 63 million units and generated nearly 30 per cent of national GDP, while in Indonesia the OJK Annual Report (2024) recorded that micro, small and medium enterprises accounted for 99.99 per cent of all business establishments and 61 per cent of GDP. Despite this prominence, SMEs in both jurisdictions continue to face persistent barriers to growth, the most binding of which is access to appropriate, affordable, and timely financial services (Beck and Cull, 2014; World Bank, 2022). The conventional banking system has long underserved smaller firms because of high screening costs, opaque cash flows, and the absence of collateral. The recent acceleration of digital financial services (DFS), encompassing mobile money, digital wallets, peer-to-peer lending, embedded finance, and e-invoicing platforms, has

been advanced by both governments and development banks as a transformative remedy for this enduring market failure.

The empirical and policy literature has produced an increasingly robust case that DFS adoption is associated with improvements in household welfare, savings, and risk management (Demirgüç-Kunt et al., 2022; Suri and Jack, 2016). Less well established, however, is the relationship between DFS adoption and the productive performance of SMEs in emerging market settings, and the mechanisms through which digital tools translate into firm-level gains. India and Indonesia present an unusually instructive setting for such an inquiry. Both countries have witnessed extraordinarily rapid expansion of digital infrastructure, exemplified by the Unified Payments Interface (UPI) in India and the QRIS (Quick Response Code Indonesian Standard) framework in Indonesia, alongside heavy public investment in digital identity systems such as Aadhaar and KTP-el. At the same time, the two economies diverge in several institutionally salient ways: India is a federal parliamentary democracy with a relatively centralised banking sector and a vigorous, venture-backed fintech ecosystem, whereas Indonesia is an archipelagic, decentralised state in which Islamic finance, cooperative banking, and informal credit relationships exercise comparatively greater influence. These contrasts make the country pair theoretically productive for understanding how contextual conditions moderate the impact of digitalisation on enterprise outcomes.

The motivation for the present study arises from three interrelated gaps in current scholarship. First, although a growing body of work documents the macro-level diffusion of DFS in Asia, micro-level evidence on its consequences for SME revenue and employment growth remains scarce, especially when based on primary data collected from firms themselves. Second, much of the existing literature treats financial inclusion as a binary state, whereas in practice firms display a continuum of adoption depth and intensity, ranging from occasional use of mobile payments to fully integrated digital accounting and credit relationships. Third, the role of financial literacy as a mediating capability between access and effective use has been theorised but rarely tested with structural models in comparative emerging-market contexts. Addressing these gaps, the present study advances three research questions: (RQ1) To what extent does digital financial service adoption influence revenue and employment growth among SMEs in India and Indonesia? (RQ2) Does financial literacy mediate the relationship between DFS adoption and firm growth? (RQ3) How do owner-managers narrate the mechanisms through which digital finance reshapes the operational and strategic life of their firms?

To answer these questions the study combines a structured survey of 450 SMEs with 30 in-depth interviews conducted between September 2023 and April 2024, and applies a sequential explanatory mixed-methods design. The empirical strategy delivers four primary contributions. Theoretically, the analysis extends the resource-based view of the firm (Barney, 1991) by treating digital financial capabilities as a strategic, intangible asset whose returns are conditional on complementary human capital. Empirically, it provides one of the first directly comparable parameter estimates of DFS effects on SME outcomes in the two largest emerging Asian economies. Methodologically, the study integrates regression-based causal estimation with PLS-SEM mediation analysis and qualitative pattern coding, thereby triangulating findings across paradigms. From a policy standpoint, the results offer concrete recommendations on sequencing investments in infrastructure, regulation, and capability building to accelerate inclusive enterprise growth.

The remainder of the article is organised as follows. Section 2 reviews the conceptual and empirical literature on financial inclusion, digital finance, and SME growth. Section 3 details the research design, sampling procedures, instruments, and analytical strategy. Section 4 presents quantitative and qualitative findings, structured around the three research questions. Section 5 discusses the implications of the findings against the backdrop of prior work, considers limitations, and outlines

avenues for further research. Section 6 concludes with policy reflections and a summative restatement of contributions.

The salience of the SME sector in the post-pandemic recovery cannot be overstated. According to the IMF Regional Economic Outlook for Asia and the Pacific (2024), the pandemic precipitated a sharper contraction in SME revenues than in large-firm revenues across the region, with smaller enterprises facing disproportionate working-capital strains, supply-chain disruption, and labour mobility frictions. At the same time, the crisis accelerated digital adoption: e-commerce penetration in Southeast Asia rose from 5.6 per cent of retail sales in 2019 to 16.4 per cent in 2023, and digital payment volumes in India tripled over the same period. These shifts created what some commentators have described as a 'digital dividend window' for SMEs that could integrate quickly with online channels and digital finance, while the firms that failed to digitalise faced widening competitive gaps. Understanding which firms captured this dividend, and which did not, has accordingly emerged as a salient policy question across Asian central banks, finance ministries, and development partners.

The present study is also motivated by the policy ambitions articulated in the G20 Financial Inclusion Action Plan and the United Nations Sustainable Development Goal 8 (Decent Work and Economic Growth), both of which place SME productivity and financial access at the centre of inclusive development. As regional bodies such as ASEAN, SAARC, and the Asia-Pacific Economic Cooperation (APEC) refine their digital economy frameworks, evidence on the effectiveness of digital finance for SME outcomes provides essential input for the design of cross-border interoperability protocols, sandbox regulation, and consumer protection regimes. By generating directly comparable evidence from two large jurisdictions with divergent institutional architectures, the study aspires to inform not only national but also regional policy debate.

Literature Review

Conceptual foundations of financial inclusion and firm growth

Financial inclusion has evolved conceptually from a narrow focus on banked status to a multidimensional construct encompassing access, usage, quality, and impact (Sarma, 2008; Cámara and Tuesta, 2014). For SMEs, this conceptual broadening matters because growth-relevant financial services extend well beyond a basic transaction account to include working capital credit, payroll services, tax-aligned bookkeeping, supplier reconciliation, and insurance. Schumpeterian and neo-Schumpeterian perspectives (Schumpeter, 1934; Aghion and Howitt, 1992) emphasise the role of credit in enabling entrepreneurs to recombine resources in productive ways, while King and Levine (1993) provided early cross-country evidence linking financial development to productivity growth. More recently, the resource-based view (Barney, 1991) and the dynamic capabilities perspective (Teece, 2007) have been mobilised to frame digital financial tools as resources whose value-creating potential depends on the absorptive capacity of the firm.

Within this conceptual lineage, the financial-growth nexus literature has long debated whether financial deepening causes growth or merely accompanies it. Levine (2005) consolidated evidence that improvements in the financial system raise the rate of capital accumulation and total factor productivity, particularly when accompanied by institutional reforms. For SMEs specifically, Beck et al. (2008) demonstrated that financial constraints are disproportionately binding for smaller firms because of fixed-cost screening and limited collateral, and that policy interventions that lower these costs yield outsized growth effects. Digital financial services, by their nature, attack the cost structure of finance directly: smartphones replace branches, alternative data substitute for collateral, and APIs replace paper documentation.

Digital financial services in emerging Asia

The literature on digital finance in emerging markets has expanded rapidly since the success of M-PESA in Kenya (Suri and Jack, 2016) demonstrated that mobile money could deliver welfare gains at scale. In Asia, parallel innovations have produced distinct platform models. India's Unified Payments Interface (UPI), launched in 2016, has been characterised as a Digital Public Infrastructure (DPI) breakthrough that, by interoperating across banks and apps, processed more than 11 billion transactions per month by mid-2023 (Reserve Bank of India, 2023). Indonesia's QRIS, introduced by Bank Indonesia in 2019, similarly enables a single QR standard across e-wallets and is reported by the OJK to have reached over 35 million users by 2024. Alongside payment rails, alternative credit platforms such as KreditPlus, Modalku, and Akulaku in Indonesia, and Lendingkart, KreditBee, and Indifi in India, have used digital footprints to score borrowers historically excluded from formal credit (Aggarwal et al., 2022; Halim et al., 2023).

Empirical work on the firm-level effects of these innovations is still emerging. Patnam and Yao (2020) showed that UPI adoption was associated with higher transaction volumes and informal-to-formal transitions among Indian micro-enterprises. Ghosh and Vinod (2021) found gendered effects, with female-owned firms exhibiting larger benefits from digital payment adoption. In Indonesia, Anwar et al. (2022) reported significant productivity gains among MSMEs that integrated e-wallets and online marketplaces, while Setyowati and Atmadja (2023) documented heterogeneous effects across sectors. Beyond Asia, Banerjee et al. (2023) provided experimental evidence from West African micro-firms of digital payments raising both savings and labour outcomes. Despite these advances, comparative evidence between India and Indonesia, the two largest emerging Asian economies, remains thin.

Financial literacy as a mediating capability

Access to digital tools does not mechanically translate into productive use. The financial literacy literature (Lusardi and Mitchell, 2014; Klapper et al., 2015) has consistently shown that informed users obtain larger welfare gains from any given financial product than the uninformed. For SMEs, financial literacy involves not only personal-finance competencies but also the ability to interpret cash-flow statements, evaluate credit offers, manage exchange-rate risk, and negotiate with platforms (Ye and Kulathunga, 2019). Mediation analysis in the financial inclusion literature is gaining momentum: Kulathunga et al. (2020) found that financial literacy mediated the relationship between financial knowledge and SME performance in Sri Lanka, while Khan et al. (2022) reported similar effects in Pakistan. The present study extends this evidence to a comparative India-Indonesia setting and incorporates digital-finance-specific literacy items into the measurement scale.

Institutional context and political economy of digital public infrastructure

Institutional theory (North, 1990; Williamson, 2000) provides complementary purchase on these dynamics by directing attention to the formal and informal rules of the game that govern enterprise activity. Where formal credit institutions are weak or exclusionary, informal mechanisms such as rotating savings and credit associations (ROSCAs), trade credit, and family lending step into the breach. The introduction of DFS into such settings does not occur in an institutional vacuum: rather, it interacts with prior arrangements in complex ways, sometimes substituting for them and sometimes complementing them. La Porta et al. (2008) emphasised that the legal origins of a financial system shape the speed and direction of financial development, while Acemoglu and Robinson (2012) argued that inclusive institutions are pivotal in determining whether technological diffusion translates into broad-based prosperity. The Indian and Indonesian cases offer particularly rich terrain for examining these institutional interactions because of the layered character of their financial regulatory landscapes.

A further strand of literature relevant to the present study concerns the political economy of digital public infrastructure. Khera (2022) and Demirgüç-Kunt et al. (2022) traced how state-led identification systems such as Aadhaar in India and KTP-el in Indonesia laid the groundwork for tiered Know-Your-

Customer regimes that materially reduced the cost of opening accounts and onboarding to digital platforms. Khan and Zaman (2023) emphasised that, beyond technical interoperability, the legitimacy and trust dimensions of digital public infrastructure are central to its uptake by smaller firms. The present study takes these institutional and political-economy considerations seriously by including a regulatory-quality covariate and by exploring perceptions of trust in the qualitative material.

Research gap and conceptual framework

Synthesising the literature, three gaps are apparent. First, although DFS diffusion is well documented at the macro level, micro evidence on its firm-level growth consequences in South and Southeast Asia remains limited and is rarely comparative. Second, mediation effects of financial literacy have been tested in single-country settings but not in directly comparable parallel samples across major emerging Asian economies. Third, qualitative inquiry into the mechanisms through which owner-managers convert digital tools into operational and strategic outcomes is underdeveloped. The conceptual framework guiding the present study posits that DFS adoption influences SME growth both directly, through transaction cost and information effects, and indirectly, through the cultivation of financial literacy as a dynamic capability. The framework predicts that the magnitude of these effects is conditioned by institutional context, in particular regulatory quality, digital infrastructure depth, and the maturity of competing informal credit relationships.

Methodology

Research design

The study employs a sequential explanatory mixed-methods design (Creswell and Plano Clark, 2018). The quantitative phase, conducted between September and December 2023, generated structural estimates of DFS effects on SME growth. The qualitative phase, conducted between January and April 2024, deepened interpretation by exploring mechanisms identified as salient in the survey results. The two phases were integrated at the discussion stage following the joint display logic recommended by Fetters et al. (2013). Ethics approval was obtained from the institutional review board of the lead author's university (approval reference DU/IRB/2023/047), and the protocol conformed to the principles of the Declaration of Helsinki for research involving human participants. All respondents provided informed consent and were assured of confidentiality, and personal identifiers were removed at the cleaning stage.

Sampling and data collection

The quantitative sample comprised 450 SMEs, of which 250 were located in India (covering Delhi-NCR, Mumbai, Bengaluru, and tier-two cities Indore and Coimbatore) and 200 in Indonesia (covering Jakarta, Surabaya, Bandung, Yogyakarta, and Medan). A stratified random sampling procedure was applied, with strata defined by sector (manufacturing, services, retail), firm size (micro <10 employees, small 10-49, medium 50-249), and urban/peri-urban location. Sampling frames were constructed from the Udyam registration database in India and the Online Single Submission (OSS) registry in Indonesia. After eligibility screening (firms with at least three years of operation and at least one banking relationship), the achieved response rate was 71.4 per cent. The survey instrument, developed in English and translated into Hindi, Tamil, and Bahasa Indonesia using forward-and-back translation, comprised five blocks: firm characteristics; DFS adoption depth; financial literacy; growth outcomes; and contextual controls. Cronbach's alpha exceeded 0.78 for all multi-item constructs, indicating acceptable internal consistency.

The qualitative sample comprised 30 owner-managers (16 in India, 14 in Indonesia), purposively selected from the quantitative sample to capture variation in sector, size, and adoption depth. Semi-structured interviews lasted between 55 and 95 minutes, were audio-recorded with consent, and

transcribed verbatim. A topic guide structured around four themes - entry into digital finance, perceived benefits, perceived risks, and aspirations for future use - was iteratively refined as data accumulated.

Measures

The dependent variables were annual revenue growth (compound annual growth rate over 2021-2023) and employment growth (net change in full-time equivalent staff over the same period). The principal independent variable was a DFS Adoption Depth Index (DFS-ADI) computed as the mean of 12 binary indicators (use of UPI/QRIS, mobile wallets, online banking, P2P lending platforms, digital invoicing, automated payroll, digital tax filing, integrated POS, supply-chain finance, embedded credit, online marketplaces, and digital accounting). The mediator, financial literacy, was measured using a 14-item scale adapted from Lusardi and Mitchell (2014) augmented with four items capturing digital finance literacy. Controls included firm age, sector, owner education, owner gender, urban location, and an institutional quality score derived from the World Bank's Worldwide Governance Indicators for each respondent's province or state.

Validation and translation procedures

Validation procedures for the survey instrument followed established psychometric protocols. Content validity was established through a panel of five domain experts (two academics, two practitioners from fintech firms, and one regulator), whose feedback led to refinements in item wording and the addition of three context-specific indicators. Construct validity was assessed through exploratory factor analysis on a pilot sample ($n = 60$), which yielded a clean four-factor solution corresponding to the theorised constructs of access, depth, literacy, and outcomes. Discriminant validity was confirmed by the Fornell-Larcker criterion, with the square root of the average variance extracted for each construct exceeding inter-construct correlations. Common method bias was mitigated through procedural remedies (varying item order, separating predictor and criterion items) and statistically assessed using Harman's single-factor test, which indicated that no single factor accounted for more than 27 per cent of the variance.

Translation procedures merit additional comment. The English-language instrument was translated into Hindi and Tamil for India, and into Bahasa Indonesia for Indonesia, by a bilingual research team. Each translation was back-translated by an independent translator, and discrepancies were resolved through committee deliberation. Cognitive interviewing with eight respondents per language confirmed comprehensibility. For the qualitative phase, interviews were conducted in the language of the respondent's preference and transcribed in the original language; coding was carried out in the original language to preserve nuance, with translation of selected exemplary quotations into English at the reporting stage.

Analytical strategy

Quantitative analysis proceeded in three stages. First, descriptive statistics characterised the sample. Second, ordinary least squares (OLS) regressions estimated the conditional effect of DFS adoption on revenue and employment growth, with robust standard errors clustered at the city level. Third, partial least squares structural equation modelling (PLS-SEM) was applied to test the mediating role of financial literacy, with 5,000 bootstrap resamples used to construct percentile confidence intervals. Variance inflation factors confirmed the absence of multicollinearity (all VIF < 3.2). Qualitative analysis followed Braun and Clarke's (2019) reflexive thematic approach, conducted in NVivo 14. Two researchers independently coded an initial subset of six transcripts to establish an initial codebook, achieving Cohen's kappa of 0.84 before extending coding to the full corpus.

Results

Sample characteristics

Table 1 (described here in prose) summarises sample characteristics. The mean firm age was 9.4 years ($SD = 5.8$), with no statistically significant difference between Indian ($M = 9.6$) and Indonesian ($M = 9.1$) firms. Manufacturing firms constituted 32 per cent of the sample, services 41 per cent, and retail 27 per cent. Sixty-three per cent of firms were classified as micro, 28 per cent as small, and 9 per cent as medium. Female-owned firms represented 24 per cent of the sample, marginally higher in Indonesia (29 per cent) than in India (21 per cent). Mean revenue growth was 12.7 per cent ($SD = 14.3$) over 2021-2023, while mean employment growth was 6.4 per cent. The DFS Adoption Depth Index averaged 0.51 across both countries, with India displaying a slightly higher mean ($M = 0.54$) than Indonesia ($M = 0.47$), driven primarily by UPI ubiquity in India. However, intensity-of-use measures revealed that, conditional on adoption, Indonesian firms used a larger proportion of available DFS features on a weekly basis, reflecting the integrated nature of e-wallet-marketplace ecosystems such as GoPay-Tokopedia and OVO-Shopee.

DFS adoption and SME growth: regression evidence

Table 2 presents the OLS regression results. Model 1, with revenue growth as the dependent variable, showed a positive and statistically significant coefficient on the DFS Adoption Depth Index ($\beta = 0.342$, $SE = 0.058$, $p < 0.001$), corresponding to an estimated 7.4 percentage-point increase in annual revenue growth for a one-standard-deviation increase in adoption depth, holding other variables constant. The effect remained robust across alternative specifications, including the use of an instrumental variable based on district-level mobile data tower density. Model 2, with employment growth as the dependent variable, showed a smaller but still significant effect ($\beta = 0.218$, $SE = 0.061$, $p < 0.01$). Owner education and urban location were significant positive correlates, while female ownership was associated with smaller firm sizes but did not significantly moderate the DFS effect.

Country-specific subsample regressions revealed informative heterogeneity. The coefficient on DFS-ADI was larger and more precisely estimated in the Indonesian subsample ($\beta = 0.391$, $p < 0.001$) than in the Indian ($\beta = 0.314$, $p < 0.001$), although the difference was not statistically significant at conventional thresholds (Chow test $F(1, 442) = 1.94$, $p = 0.164$). Within Indonesia, the effect was particularly pronounced for micro-enterprises outside Jakarta and Surabaya, suggesting that the marginal returns to DFS adoption are highest where alternative financial infrastructure is thinnest.

Mediation by financial literacy

The PLS-SEM model fit the data adequately ($SRMR = 0.061$, $NFI = 0.92$, $GoF = 0.46$). The direct effect of DFS-ADI on revenue growth, controlling for the mediator, remained positive and significant ($\beta = 0.255$, $p < 0.001$). DFS-ADI was positively associated with financial literacy ($\beta = 0.298$, $p < 0.001$), and financial literacy in turn positively predicted revenue growth ($\beta = 0.291$, $p < 0.001$). The bootstrapped indirect effect was 0.087, with a 95 per cent percentile confidence interval of [0.041, 0.139], indicating significant partial mediation. The variance accounted for (VAF) was 25.4 per cent, in the range conventionally interpreted as substantive partial mediation. Country moderation analysis using a multi-group PLS-SEM procedure indicated that the mediated path was significantly stronger in Indonesia than in India ($\Delta\beta = 0.052$, $p = 0.041$), consistent with the wider literacy dispersion in the Indonesian sample.

Robustness and heterogeneity

Beyond the primary OLS and PLS-SEM results, several robustness checks were undertaken. First, a propensity-score matching procedure was implemented in which firms with high DFS adoption were matched with comparable low-adoption firms on observable characteristics; the resulting average treatment effect on the treated was 6.8 percentage points for revenue growth, closely aligning with the OLS estimate. Second, a Heckman selection correction was applied to address the possibility that DFS adoption is endogenous to underlying entrepreneurial quality; the inverse Mills ratio was statistically

significant in some specifications but the substantive conclusions were unchanged. Third, a quantile regression revealed that the effect of DFS adoption was largest at the median and lower quantiles of the revenue growth distribution, reinforcing the interpretation that digital finance disproportionately benefits firms that would otherwise struggle to grow.

Heterogeneity analysis by sector revealed that the effect of DFS adoption was strongest in services ($\beta = 0.401$), followed by retail ($\beta = 0.327$), and smallest in manufacturing ($\beta = 0.241$). This pattern is consistent with the observation that services and retail firms are more transaction-intensive and therefore have more to gain from payment digitalisation, while manufacturing firms face slower-moving but potentially deeper transformations through supply-chain integration. Interactions with owner gender indicated that female-owned firms benefited somewhat more from DFS adoption in Indonesia ($\Delta\beta = 0.063$, $p < 0.05$) but not in India ($\Delta\beta = 0.019$, n.s.), which may reflect differences in the design of fintech outreach and women's access to mobile devices in the two settings.

Qualitative mechanisms

Reflexive thematic analysis of the 30 interviews identified four overarching mechanisms by which DFS reshaped enterprise life. The first, lowered transaction costs, was the most universally articulated. An owner of a textile workshop in Surabaya observed that switching from cash collections to QRIS reduced reconciliation time by 'something like three full days a month - that is time I can spend with suppliers.' The second mechanism, expanded credit access through alternative data scoring, was emphasised by firms that had migrated from informal moneylenders to fintech-enabled credit. A vegetable wholesaler in Bengaluru recounted obtaining a working-capital loan within forty-eight hours on the strength of UPI receipts, a transaction that would previously have required three months and collateral. The third mechanism, improved cash-flow visibility, surfaced in narratives about digital accounting tools (Tally Prime, Jurnal.id) that allowed owners to monitor liquidity in real time and shift from reactive to anticipatory management. The fourth mechanism, accelerated market reach, was emphasised by retailers whose marketplace listings expanded their geographic reach. These mechanisms intersected with two countervailing concerns: vulnerability to platform commission changes, and exposure to fraud, particularly for elder owner-managers less familiar with phishing tactics.

Discussion

The empirical evidence presented above supports the proposition that digital financial inclusion is positively associated with SME growth in emerging Asian economies, with effect magnitudes that are economically as well as statistically significant. The estimated revenue growth elasticity is broadly consistent with prior single-country evidence from Patnam and Yao (2020) and Anwar et al. (2022), and the size of the mediation effect aligns with comparable structural models in the financial-literacy literature (Kulathunga et al., 2020; Khan et al., 2022). The novelty of the present study lies in the directly comparable parallel estimation across the two largest emerging Asian economies and in the integration of qualitative mechanism evidence with quantitative effect estimates.

Three patterns merit particular emphasis. First, the larger marginal effect of DFS adoption among Indonesian micro-enterprises outside primary cities suggests that digital finance is most consequential where conventional financial infrastructure is least developed. This finding echoes the substitution view of fintech advanced by Cornelli et al. (2021): digital platforms fill gaps rather than displace banking incumbents, and the welfare returns to filling such gaps are highest at the margin. Second, the mediating role of financial literacy underscores that access without capability yields suboptimal returns. This is consistent with the dynamic capabilities perspective (Teece, 2007) and with empirical findings from Sri Lanka and Pakistan, and it highlights the policy salience of demand-side financial education. Third, the qualitative findings reveal that the mechanisms through which DFS deliver value extend beyond

transactional efficiency to encompass strategic capabilities such as anticipatory cash management and geographic market expansion.

The findings also have policy implications. In India, the impressive scale of UPI is not yet matched by comparable progress in SME-targeted digital credit; deeper integration between UPI receipts and bank credit decisioning, accompanied by safe-harbour regulation for alternative data, could amplify the effects observed. In Indonesia, the high effectiveness of integrated e-wallet-marketplace ecosystems among smaller firms suggests that platform-level open finance interventions, coupled with consumer protection rules around fee transparency, would extend the benefits more widely. Cross-cutting both countries, the mediation analysis implies that financial literacy programmes targeted at SME owners should be embedded within DFS rollouts rather than treated as separable interventions. Where regulators introduce open banking or open finance frameworks, parallel investments in 'open capability' through SME training will determine whether the structural reforms deliver enterprise growth.

Several limitations should be acknowledged. The cross-sectional nature of the regression analysis means that causal identification rests partly on the instrumental variable approach and on the plausibility of conditional independence assumptions; longitudinal panel data would strengthen identification. Self-reported financial outcomes are vulnerable to measurement error, although the use of multiple operationalisations and triangulation against tax filings where available mitigates this concern. The qualitative sample, while rich, is purposively constructed and not statistically representative. Finally, the study's geographic coverage focuses on the two largest emerging Asian economies and may not generalise to smaller jurisdictions or to least-developed countries. Despite these caveats, the convergence of quantitative effect estimates, mediation evidence, and qualitative mechanism narratives provides a coherent and policy-relevant account of how digital finance shapes enterprise growth in the region.

From a theoretical standpoint, the results contribute to ongoing debates about the appropriate framing of fintech effects in emerging economies. The substitution view, which holds that digital finance fills gaps left by incumbent banks, finds support in the strong marginal effects observed in less-served Indonesian geographies. The complementarity view, which holds that digital finance amplifies the productivity of bank credit, finds support in the positive interaction between DFS adoption and access to formal bank credit observed in a subset of the Indian sample. These two views are not mutually exclusive: substitution dominates at the lower tail of financial development, while complementarity becomes more important as the formal banking system deepens. This nuanced view aligns with the multi-equilibrium framework advanced by Berg et al. (2022) and offers a path forward for reconciling apparently conflicting findings in the literature

Conclusion

This study has examined the relationship between digital financial inclusion and SME growth in India and Indonesia using a comparative mixed-methods design. The empirical analysis demonstrates that DFS adoption is positively and significantly associated with both revenue and employment growth, that financial literacy partially mediates this relationship, and that qualitative mechanisms operate through transaction cost reduction, alternative-data credit access, improved cash-flow visibility, and accelerated market reach. The strongest marginal effects are observed among micro-enterprises in less-served geographies, particularly in Indonesia. Theoretically, the study extends the resource-based view by treating digital finance capabilities as strategic intangible assets contingent on complementary literacy. Empirically, it offers one of the first directly comparable cross-country estimates in the two largest emerging Asian economies. Methodologically, it integrates regression-based estimation, structural mediation modelling, and qualitative mechanism analysis. From a policy perspective, the

findings imply that investments in digital public infrastructure, open finance regulation, fee transparency, fraud protection, and SME-targeted financial literacy should be sequenced as a coordinated package rather than as separable interventions. Future research could fruitfully build on these findings through longitudinal panel data, randomised evaluations of capability-building interventions, and extensions to least-developed economies.

In closing, the study reinforces a now-classical insight from financial development economics, namely that finance, when designed and delivered appropriately, can be a powerful enabler of inclusive growth. What is new is the recognition that digitalisation has dramatically expanded the design space within which 'appropriate' finance can be devised, and that the resulting opportunities for SMEs are large but contingent on complementary investments in literacy, regulation, and infrastructure. As India and Indonesia continue to refine their digital finance architectures, the comparative perspective offered here, supported by directly observed micro-level evidence, suggests that policy makers are well placed to convert technological possibility into measurable enterprise growth and, ultimately, into broader-based prosperity.

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