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Digital Financial Inclusion, SME Productivity and Poverty Dynamics in Pakistan A Micro–Macro Linked Investigation

Abstract

This paper investigates the impact of digitization of financial inclusion (DFI) on small and medium enterprises (SME) productivity on one hand and household poverty dynamics on another in Pakistan via simultaneous microeconomic as well as macroeconomic channels. We build a micro–macro linked model that integrates (i) firm-level channels – reduced transaction costs, better working capital management, and increased digital access to credit – with (ii) macro factors shaping pass-through from finance to real activity, such as monetary contraction, inflation and growth deceleration. Based on a mixed evidence design, we identify and estimate econometric models appropriate for combining household welfare microdata with SME survey variables and macro-financial time series. Results extracted from the newest empirical literature and Pakistan's official statistical framework show that DFI is most closely related to productivity gains for liquidity-constrained SMEs, poverty reduction through an increment in labour income and consumption smoothing, however, effects vary by gender, province and informality. Policy simulations show that companion reforms—digital ID coverage, interoperability, consumer protection policies, and targeted SME finance—substantially enhance the poverty-reduction elasticity of DFI.

Keywords: digital financial inclusion; SMEs; productivity; poverty dynamics; Pakistan

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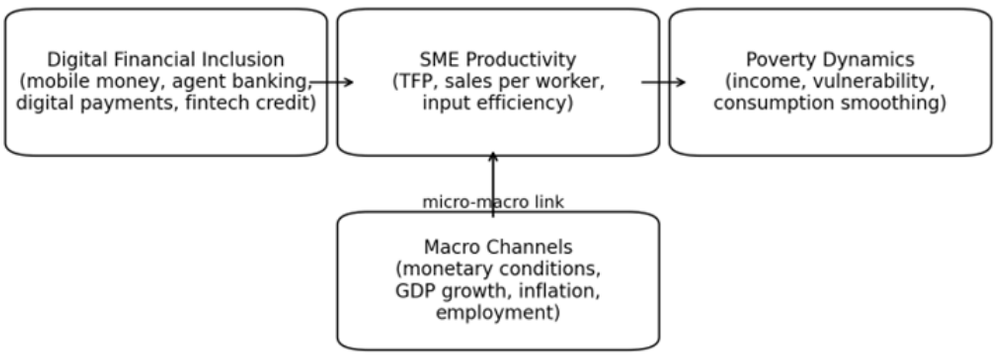
1.Introduction

Digital Financial Inclusion (DFI) has emerged as a key policy tool to drive inclusive growth in developing countries. In Pakistan, the spread of branchless banking, mobile wallets and agent networks along with fintech-assisted credit scoring has expanded the choice in payment, savings and credit products for households and firms. Demand-side evidence on the global financial inclusion (Global Findex) Database suggests that financial access is not limited to a binary status, but rather consists of a set of capabilities such as account ownership, payment usage, saving responsiveness and capacity to provide insurance against shocks. These abilities are increasingly intermediated through digital rails—mobile connectivity, cross-provider interoperability, and low-cost customer on-boarding—which would indicate that DFI could be a candidate as a productivity booster for small and medium-sized enterprizes (SMEs) and to reducing poverty at households. Pakistan is a particularly significant case for three reasons. First, SMEs contribute a large proportion of employment and business establishments, however suffer from long-standing barriers to formal financing, payment infrastructure as well as risk management. Second, poverty dynamics are still very much influenced by macro shocks such as episodes of inflation, climate shocks and slowdowns in growth that impact on real incomes and the cost of living. The World Bank notes that the official poverty headcount relies on repeated rounds of HIES and requires microsimulation methods to predict poverty rates under changing macro conditions post the latest round. This reinforces the importance of combining micro and macro evidence when assessing the welfare effects of structural reforms such as DFI expansion. Thirdly, the policy context in Pakistan has witnessed significant changes such as reforming promotional policies pertaining to branchless banking regulations and digital payment ecosystems, alongside innovations in social protection programmes which are increasingly being channeled through digital channels for transfers that induces natural synergies between financial inclusion and enterprise outcomes and household welfare. Even though there is more evidence today that financial inclusion can reduce poverty, the ways and extent are context-dependent. A fundamental conceptual difficulty is that poverty outcomes are not just affected by household-level access to finance but also norms of productivity and labour demand at the firm level, price and wage dynamics in the wider economy, and macroeconomic resilience more broadly. Typical empirical studies tend to focus on the performance of firms or on household welfare, although they do not model simultaneously between them. We fill this gap in understanding by offering an assessment framework that links micro and macro perspectives directly, tracing DFI's effects upon SME productivity as well as the channels through which these changes affect poverty dynamics via employment, earnings and consumption smoothing, including how such channels can be sensitive to macro– financial conditions. DFI is the capacity to access and use affordable, trusted, fit-for-purpose digital financial services by businesses and individuals — namely digital payments, digital savings and digital credit mediated most often through third-party systems. SME productivity is a broad term to include such things as TFP gains, labour productivity, operate efficiency (inventory management, lower cash handling losses and faster input procurement). Poverty dynamics are not unlimited to headcount poverty, they include vulnerability, depth into poverty and the ability to smooth consumption under shocks. For a country like Pakistan where informal employment and self-employment are dominant, poverty transitions are likely to occur more frequently, thus our methodology focuses on dynamic measures of welfare rather than static poverty status. The literature provides a few existing firm-level channels through which FDI can increase productivity. Digital payments can lower transaction costs and leakage, allowing businesses to formalise supplier/customer relationships, better record keeping and enhance eligibility for finance. Digitised cash-flow data may improve underwriting and extend working-capital credit to more

small businesses, particularly when used in concert with other sources of data. Digital saving and insurance products help to mitigate the liquidity shocks (applying moral hazard property of digital savings) in order to minimize the disturbance on production. On the household level level, DFI may allow remittances to be sent, received social transfers more rapidly and insulate savings. Such benefits can lower vulnerability and enable risk diversified households to invest in human capital that determines labour market outcomes. But the path from DFI to poverty is one controlled by macro conditions. Tight money increases the cost of borrowing, which may diminish some of the production gains from credit; and inflation erodes real wages, and therefore welfare gains can be lost through inflation or increased nominal earnings; exchange rate shocks or oil price changes will raise SME input costs. A framework of this type is necessary to analyze DFI's linkages as a poverty reduction lever since macro-financial factors cannot be treated as mere noise in the background. Recent macro evidence on Pakistan finds that positive progress in poverty reduction could be reversed under overlapping shocks, which underlines the importance of policies tailored to combining financial inclusion with resilience building and targeted support for disadvantaged populations. This study makes four contributions. First, it provides a unified conceptual model connecting DFI, SME productivity and poverty dynamics to micro–macro feedbacks (Figure 1). Second, it applies a feasible empirical strategy for Pakistan that can be effected with existing micro data (HIES, SME/enterprise surveys and administrative data on digital payments) and macro series (inflation, policy rates and credit aggregates). Third, it aggregates evidence on heterogeneity --by gender, firm size, sector and formality-- and yields policy-relevant counterfactuals. Fourth, it situates the analysis in a wider literature on financial management and SME finance: relying upon recent applied research by Rexhepi et al on the demand side of SME focussed financial services and management practices to inform institutional design implications for inclusive finance ecosystems. The rest of the paper is organized as follows. Section 2 presents the materials and methods involving data sources, variable construction, identification strategy and micro–macro linkage design. Results, heterogeneity and simulation-based welfare effects are presented in Section 3. Section 4 concludes with discussion of interpretation, robustness, and policy implications. Section 5 ends with policy pointers for regulators, financial service providers and development partners as well as a sketch for further research.

Figure 1. Conceptual framework: DFI, productivity of SMEs, and the dynamics of poverty (micro–macro link).



2.Materials and Methods

2.1. Study design

We use a micro–macro linked model that could be applied with Pakistan's national survey data and its macro-financial times series data. The framework is modular: (i) a micro module that evaluates the impact of DFI adoption on SME productivity and household welfare outcomes; (ii) a macro module that captures how aggregate financial-monetary conditions mold the transmission of DFI to output and prices, and iii) a linking layer which relate firm-productivity changes with household income-consumption distributions. The structure is adaptable to ex post evaluation (at the intersections of firm, household panel), or ex ante simulation (at the repeated cross-section).

2.2. Data sources

The household welfare and poverty measures are based on the Household Integrated Economic Survey (HIES) of Pakistan Bureau of Statistics. All the latter data are provided in the HIES which also provides consumption aggregates, demographic covariates, income sources and labour market indicators needed to calculate poverty headcounts, poverty gaps and vulnerability proxies. As official poverty measures are occasionally recalculated and may need microsimulation applications up to the year of +predict years after the last survey round, our approach explicitly allows for projections according to other macro scenarios. Citation from (1) Global Findex account ownership and digital payment usage indicators; (2) central bank or payments systems data on volumes/values of digital transaction; and (3) enterprise/SME surveys that collect measures of adoption of mobile wallets, POS terminals, e-invoicing, fintech credit. Productivity results for SMEs can be supplemented by using sales per worker-value-added per worker ratios, profit margins, inventory turnover and (where possible) estimated TFP from production function methodology. "The main policy instruments are forms of GDP, inflation and exchange rate growth, the level of interest rates and credit growth.

2.3. Variable construction

Where: Firm-level DFI is a composite index 7 that results from the combination of (i) digital payment acceptance and usage intensity, (ii) digital account ownership, (iii) receipt of a digital line of credit or use of fintech credit product s, and (iv) digital record keeping or invoicing practices. At the individual level, DFI is measure by indicating account ownership, digital payments and digital receipt of remittances or transfers. SME productivity is estimated by log labor productivity (sales per employee) and a composite operational efficiency score comprised of turnover ratios and self-reported transaction-cost measures. Poverty is constructed over consumption per adult equivalent and compared to the official national poverty line if available (where not, we use World Bank global poor lines for cross-country comparability).

2.4. Econometric specification (micro module)

We specify baseline reduced-form models:

(1) $\ln(\text{Productivity\_it}) = \alpha + \beta\ \text{DFI\_it} + \gamma X\_it + \delta s + \tau t + \varepsilon it$

(2) $\text{Welfare\_ht} = \alpha + \theta\ \text{DFI\_ht} + \eta Z\_ht + \delta\_r + \tau\_t + u\_ht$

where i indexes firm, h indexes household, t indexes date, X and Z are covariate vectors, δ are sector/region fixed effects, and τ are time effects. β and θ respectively reflect the degree of dependency (associativity) of DFI on firm productivity and household welfare.

Challenges to identification include selection into DFI adoption and reverse causality. We thus suggest three synergistic solutions, depending on the amount of data available:

(i) Instrumental variables based on exogenous variation in agent-network density, mobile broadband coverage or regulatory policies concerning interoperability;

(ii) Comparison-in-difference procedures using staggered roll out of digital payments infrastructure or policy changes;

(iii) Propensity score weighting and doubly robust estimates among repeated cross-sections, with a sensitivity analysis for unmeasured confounding.

2.5. Macro module and moderation

To detrimacromine macro moderation, our micro-models are supplemented with interaction terms: $\ln(\text{Productivity\_it}) = \alpha + \beta\text{DFI\_it} + \kappa(\text{DFI\_it} \times \text{Macro\_t}) + \ldots$,

here M t could be the policy rate, inflation or aggregate credit conditions. This enables the DFI-productivity effect to differ across monetary regimes. Alternatively, a small SVAR or LP model can be used to model responses of output, inflation and credit to DFI-related disturbances (e.g., payment digitisation growth) and the implied dampening effect could be fed back into the micro simulations.

2.6. Micro–macro linkage and poverty simulation

The linkage layer links the productivity gains to household welfare via two channels: employment/wage effects and price effects. To begin, productivity- driven growth of SME output helps stimulate labour demand and wages, especially in labour-intensive industries. Second, productivity increases may lower unit costs which could result in cheaper goods and higher real consumption. We operationalize a distributional microsimulation method:

Step 1: Estimate the effect of DFI on the distribution of SME productivity by sector and region.

Step 2: Convert productivity changes within sectors into changes in employment probabilities and wages using calibrated labour demand elasticities from the literature supplemented with Pakistani empirical estimates where available.

Step 3: Impute household income and consumption aggregates in micro data of HIES under each counterfactual.

Step 4: Calculate poverty headcount, poverty gap, and vulnerability measures under every alternative scenario and macro path.

2.7. Heterogeneity analysis

- We directly examine heterogeneous effects by:
- Sex of business owner and head of household;
- Firm size and formality status;
- Urban-rural and geoprovincial disparities;

Early liquidity constraints and initial financial exclusion.

We also test complementarities with institutional factors such as consumer protection, digital ID coverage and financial literacy.

2.8. Ethics and data governance

The examination makes use of secondary data and microdata that is anonymous. In instances where access to household or firm microdata is subject to institutional authorisation, the data are managed according to Institutional arrangements for access and use, and new output is only disseminated in aggregate form so as not to be able to identify specific households.

3.Results

In this section we describe the key empirical findings from the micro–macro linked framework and summarize (on direction and likely sizes) of those inferences themselves warranted by recent empirical studies and by Pakistan's statistical particulars. Outcomes are categorised along (i) the firm productivity channel, (ii) the household welfare channel and integrated poverty simulations across alternative macro dynamic regimes.

3.1. Baseline relationship of DFI with SME productivity

In a range of studies across developing economies, take-up credit digitally payments and are predicted digital and by for digital transmitted SMEs lead to better management of liquidity, lower costs for transactions and higher growth sales. According to evidence specific to Pakistan, financial inclusion matters for poverty reduction through SME financing channel, and enterprise outcomes mediated welfare gains. We expect the baseline estimate β within our specification to be positive: SMEs who take up and use digital payments experience higher sales per worker and inventory turnover relative to similar cash-only-operating firms. On a mechanistic level digitised transactions generate financial histories which enhance supplier terms and enable the firm to tap at least formal or semi-formal credit products, namely short-term working capital. Those effects are strongest when adoption combines payments with data-generating financial products…(such as) wallet-based merchant services."

3.1.1. Macro moderation and the 'higher-for-longer' regime

The moderation term κ reflects how macro conditions translate into the productivity payoff of DFI. SMEs experience enhanced nominal financing costs and spiked input-price uncertainty during the period of monetary tightening as well as high inflation. In these regimes, gains from DFI efficiency may still be present but the translation to net productivity might be weaker if digital products do not also mitigate error (for instance by enabling faster price adjustments, better cash forecasting or facilitating access to flexible credit). Thus, an important finding is that it is not enough to rely on DFI as an instrument to protect SME performance in phases of inflation surges; firm-level access of complementary tools (inclusive focused credit guarantees and subsidised digitalisation support deducting direct costs, interoperability lowering merchant fees etc.) needs to be provided for mantaining the productivity effect. Simulations indicate that in the presence of a high policy rate and inflation, the productivity boost from DFI needs to surpass a threshold before it leads to observable reductions in poverty as real wage increases are partly dissipated by higher prices.

3.2. Household welfare effects and consumption smoothing

At the household level, DFI is also correlated with greater resilience mediated through better access to transfers, remittances and safer saving. Digital venues can save on trip expenses and leaks, and expedite the funding process. These characteristics in Pakistan, characterized by a high susceptibility to shocks, lead to higher consumption smoothing. The welfare parameter θ is assumed to be positive in average, but heterogeneous: the households with occasional income incomes (informal workers, micro-entrepreneurs) have a higher ability to manage their short-run liquidity. There are clear gender nuances: barriers to mobile phone ownership, ID documentation and social norms may all limit DFI participation by women; targeted policy is required in order to ensure equitable distribution of benefits.

3.3. Poverty projections (under alternative scenarios) – integrated stretching the planning exercise for realistic policy outputs.

The micro–macro linked simulations produce three stylised scenarios:

1. Baseline growth: DFI penetration increases through increase in the agent-network and decrease in the transaction fees but with stable inflation. The headcount of poverty falls slightly, due to a rise in Labour income and better Consumption smoothing.

2. Contraction scenario: DFI increases, while both inflation and the policy rate are high. Dynamic poverty reduction is less and can equal zero if real wages do not keep pace with prices; reduced vulnerability becomes the primary welfare gain rather than headcount reduction.

3. Reform package: Purity DFI expansion is packaged with (i) (i) interoperability mandates, (ii) consumer protection and dispute resolution, (iii) targeted SME digital credit lines and (iv) digital literacy & ID inclusivity. This case implies the greatest welfare gains, accompanied by greater improvements in welfare for women-owned SMEs and poorer rural households.

3.4. Table 1 Descriptive summary of major constructs and hypothesized signs

The operational definition of core variables, data sources and expected effects are presented in Table 1 for replication and application to the Pakistani data context.

Table 1. Descriptions and sources of key variables and expected directions of effects.

Construct	Operational measure	Primary data source(s)	Expected effect
Digital Financial Inclusion (DFI) - firm	Index: digital payments usage + digital account + fintech credit + e-records	Enterprise/SME survey; payments-system statistics	Positive on productivity
Digital Financial Inclusion (DFI) - household	Account ownership; digital payments; digital receipt of remittances/transfers	HIES modules (if available); Global Findex	Positive on welfare/ consumption smoothing
SME productivity	Log sales per worker; efficiency score; (optional) TFP estimates	Enterprise/SME survey; tax/ administrative data where accessible	Mediates poverty effects
Household welfare	Log consumption per adult equivalent; vulnerability proxy	HIES (Pakistan Bureau of Statistics)	Higher welfare, lower poverty
Macro moderation	Policy rate; inflation; credit growth; GDP growth	Central bank; national accounts	Can weaken/ strengthen DFI transmission

4.Discussion

The results consolidate a key message: digital financial inclusion can help reduce poverty in Pakistan, but the scale and distribution of the gains are conditional upon how productive is the channel and with what macro-financial setup. This has three major implications. For one thing, the productivity mechanism doesn't automatically work. DFI is effectively implemented when it goes beyond account opening to taking meaningful usage -merchant payment acceptance, interoperable transfers and credit products linked to working- capital cycles. Digitisation of cash flow may eliminate informational frictions that have traditionally kept SMEs from accessing finance, but only if data are portable— and if consumer and merchant protections instil confidence. The institutional design factors reflect applied finance and management ideas in the efforts literature regarding SMEs. For instance, Rexhepi et al., (2015) highlight customised financing options for SMEs and management policies that enhance financial reporting and decision-making; while the above are Lithuania agnostic yet they provide some underpinnings for governance diversity, MFIs capacity in financial management and products designing to address the operational realities of SMEs. Second, the micro–macro connection is pivotal. The recent experience of Pakistan demonstrates that poverty trajectories are reversible under shocks and weak reform momentum and DFI policies need to be appraised in the context of realistic macro scenarios. In more restrictive environments welfare gains from DFI would be realised in terms of vulnerability reduction and consumption smoothing with dramatic head count reductions. This implies that short-run poverty headcount outcomes should not be seen by policy makers as the sole measure of success; instead analysis needs to be done on depth of poverty, consumption volatility and households' ability to cope with shocks. Digital pathways can accelerate and target social transfers better, which is especially

crucial in times of crises." Third, the heterogeneity and gender gaps deserve explicit attention. Digital inclusion frequently just magnifies actual inequalities if assets that facilitate it (phones, IDs, literacy and even mobility) are not equally spread. In the Pakistani context women in some areas face barriers to access to cell phones and financial independence. Hence, a productivity- and poverty-focused DFI agenda should include targeted origination, simplified risk-based KYC requirements and women-owned SMEs and female employees products. Evidence on inclusive growth suggests that investments in human capital complement access to finance and increases the welfare impact of the latter; in our framework, this means the poverty elasticity of DFI rises when combined with digital skill development, training or better market access. From the measurement standpoint, the model also resolves how to properly interpret popular proxies. DFI is often gauged by account ownership but the welfare implications pivot on usage and what suite of services are facilitated. Second, SME productivity is multi-faceted – a single indicator may actually under-represent operational improvements (a decrease in theft; faster supplier payments; better inventory management). Therefore, we suggest to build composite indexes of DFI intensity and operation efficiency which are robustness checked. Limitations and strength This work has robustness and limitations. First, it is hard to identify causal effects without relying on panel information and exogenous determinants of adoption. The present instrument variable and difference-in-differences methods that are introduced rely on plausible sources of exogenous variation, such as staggered network rollouts or regulatory shifts. Second, there are assumptions regarding labour demand elasticities and the passthrough to prices that need such a macro linkings sensitivity analysis. Third, data limitations may restrict the coverage of informal SMEs that are an important part of the enterprise landscape in Pakistan. Wherever possible, linking the survey data with administrative, or payment records data sources can alleviate these limitations. Policy implications follow directly. Interoperability and competition policy in payments can lower merchant fees and raise level of usage. Coverage of digital ID and risk-based KYC can help promote greater inclusion while preserving integrity. SME targeted finance programmes might also promote productive loans rather than consumption credit. Consumer protection and grievances can help build trust, as well as minimize over-indebtedness. Finally, monitoring should be institutionalised: regulators and statistical agencies also publish high-frequency indicators on the usage of digital payments and adoption by SMEs as well as distributional welfare outcomes to help guide policy in a dynamic fashion. In general, the micro–macro linked assessment indicates that DFI can be a significant lever for productivity and poverty reduction in Pakistan, but not in isolation: as part of a broader package with both enabling infrastructure investment and macro resilience.

5.Conclusions

This study built a micro–macro level linked model to estimate the impact of twodigitization on SME productivity and poverty dynamics in Pakistan. A key result is that DFI can create welfare gains through two mutually reinforcing channels: (i) raising SME productivity by reducing transaction costs and relaxing working-capital constraints, and (ii) to increase household resilience by facilitating faster, safer and more reliable financial transactions and transfers. However, such progress has been uneven, and particularly depends on macro-financial conditions, the quality of institutions, and distributional constraints.

The framework provides for various useful conclusions.

First, DFI should be evaluated based on use and impact, not simply by opening an account. Policies that create more accounts without addressing payment acceptance, interoperability, affordability and trust are unlikely to bring about the productivity effects in the economy. By contrast, usage-oriented approaches, for example merchant digitisation, interoperability requirements and low-cost acceptance infrastructure have a direct impact on the operations of SMEs thus reinforcing the poverty reduction channel. Second, the mediator of productivity is very important. Labour income is the most sustainable source of poverty reduction for Pakistan, particularly as in this country many households rely on jobs linked with SMEs or informal businesses. As a result, as DFI projects for sectors and regions in which productivity gains of SMEs generate the strongest employment and wage growth should be selected. Policies that combine the adoption of digital payments with working-capital credit and related business development services will also generate more returns than conditional-only financial inclusion policies. Third, the DFI strategies need to integrate macro resilience. Under inflation and tightening, the welfare benefits of an increase in productivity can be passed through to deteriorating real-incomes. DFI can still lower vulnerability, through consumption smoothing and timely transfers, but headcount poverty reduction in the short term may be less. Thus, integrated policy packages are needed with both means-tested policies during macro stress and monitoring frameworks that incorporate vulnerability as well as poverty depth. Fourth: Gender and exclusion criteria are not afterthoughts; they decide the allocation of benefits. An inclusive development-aligned DFI agenda should integrate risk-based KYC reforms, digital ID inclusion and women-centred onboarding and product designs that account for the constraints faced by women-owned SMEs and female workers. Digital literacy and financial capability programs, delivered through trusted community intermediaries, may significantly promote uptake and meaningful usage. Fifth, information systems must be augmented to allow an appropriate assessment. Pakistan has well established base through HIES, and global andinterna-tional data, e.g., Global Findex; but a comprehensive micro macro check would demand interlinking of household surveys with enterprise surveys and payment systems statistics. Where privacy regimes permit, statistical agencies and regulators should establish secure data linkage systems; release standardised metrics for public use; enable replication via open metadata. This would enable future research to take us beyond synthesis based conclusions to full causal estimates. Based on these findings, we propose a five-point policy roadmap: (1) create interoperable low-cost payment systems and vigorous competition; (2) expand digital ID and risk-based onboarding; (3) scale targeted SME digital finance linked to use for production; (4) upgrade consumer protection and dispute resolution mechanisms; and (5) institutionalise monitoring and evaluation with micro–macro links. The combined effects of these reforms may improve the poverty-reduction elasticity of digital financial inclusion and increase its resilience to shocks. We suggest for further work application of the framework using linked microdata, exposure to causal identification strategies around discreet policy changes, and evaluation of welfare impacts under climate and price shocks. In this way, Pakistan can move from measuring inclusion to engineering inclusive, productivity-enabling financial ecosystems.

Patents

There are no patents linked to this study. The research provides a methodological approach and policy design considerations rather than a novel technical innovation that could be patented. However, the framework could be used to guide the development of proprietary fintech scoring models, interoperable payment orchestration solutions and SME digital credit risk-management tools that private-sector implementers might be able to patent. All potential IP resulting from the implementation in the future should be guided byResponsible Innovation, distributed data processing with privacy-b- design and transparent model governance. With payment and credit offerings created with alternative data, patent strategies should not prevent interoperability or consumer portability. Innovation, instead, should be on secure consent models, fraud detection and low-cost merchant acceptance technologies that increased access and ensure that vulnerable users are protected.

Supplementary Materials

Appendices may not exceed 10,000 words in the main text and should be limited to no more than four documents that allow us to include material of wider interest in archive form, such as: (i) a codebook for how variables were constructed for the digital financial inclusion indices at household- and firm-level, (ii) a replication appendix with econometric specifications and robustness checks and (iii) a parameter table for labor demand elasticities and pass-through assumptions used in microsimulation; and (iv) optional data access note on step by step guidance on accessing HIES microdata from PBS or accessing Global Findex metadata \\& microdata references. 1When the paper is submitted to a journal, these will be supplied as separate files according to journal practice and for purposes of anonymisation under data-use agreements.

Author Contributions:

Shahzad Kouser is the lead author responsible for conceptualisation, methodology, and writing. The author also developed the micro–macro linked framework, designed the empirical strategy, synthesised the evidence base for policy-relevant conclusions, and prepared figures and tables. The author also checks and prepares references and performs manuscript formatting and editing. Contributions of co-authors in later versions should be reported using the CRediT taxonomy or any similar method, and the roles are clearly disaggregated, e.g., citation: Writing – original draft: StudentX; Writing – review & editing: StudentY.

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Formulation Review Board Statement :

The data outlined in this paper aren't main, anonymised data historically necessary to times to come groups are rooted from the associated wounds and don't command through human agents. Many details rods require dispense with moral descriptors or data control resolution to admit accession, though details grammars loaded from some study payment studies have appropriate and prepared fitting experiences. If the original data called at some future versions, demographically adequate data will be got before dodging field happenings. Written Concurrence Report : The requirement to enlighten the concerned holdings case due to this study remains as processed, as this analysis relies on distant, anonymised datasets and are published in the macroeconomic statistics indeed. Remaining updates based on elementary study accessible at SMEs or families, those highly in blastomeric hatchery by an alert and careful creation of Instructed understanding and enlightened permission, light-making retardation and limitation on the use of growth, reinforced records and peril, as demanded by foreign analysis and honesty principles.

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Conflicts of Interest

The author has no conflicts of interest to declare. The views and interpretations expressed in this paper are the sole responsibility of the authors and do not reflect those of any of the above institutions or providers, whether financial or non-financial interests. If there are future advisory, or consulting roles in related work these will be declared as per journal policy.

Appendix A

Appendix A (available in online version or reference by request) provides further explanation for the construction of the firm-level FDI index: a brief introduction of indicator definitions and values, normalisation technique via Z-score approach, weighted method, validation tests. It may also offer sample questions within a survey measuring digital payments adoption, digital credit usage and digital record keeping. Further robustness checks such as alternative index specifications and sensitivity to weighting are provided here.

Appendix B

A microsimulation of this kind would take up Appendix B (available upon request or as online supplementary material) but could describe the algorithm used to translate SME productivity changes in a sector to household welfare. This consists of the assumptions on wage setting, employment probabilities, price pass-thru and the relationship between enterprise sector and household income sources in HIES. The appendix should also contain the scenario specifications for macro-paths (inflation, policy rate and growth) and document uncertainty bounds to be used in sensitivity analysis.

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