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MOBILE PAYMENT, FINANCIAL INCLUSION, AND HOUSEHOLD WELFARE IN ETHIOPIA: EVIDENCE FROM A NATIONALLY REPRESENTATIVE SURVEY

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Abstract
This Study examines the relationship between mobile payment usage, formal financial inclusion, household consumption expenditure, and entrepreneurial decisions among Ethiopian households. Using nationally representative data from the Ethiopian Socioeconomic Survey Wave 4 (ESS4, N = 6,770 households), the analysis applies multiple linear regression, binary logistic regression, and moderation analysis with mean-centered interaction terms. Mobile payment adoption stands at 11.9% and formal account ownership at 36.2%; both correlate negatively with household consumption; a pattern interpreted as necessity-driven selection by lower-income households rather than evidence of welfare harm. Formal financial account ownership significantly increases the probability of entrepreneurship by approximately 35% (OR = 1.352, p = .006), whereas mobile payment use shows no significant effect on business ownership in the current early-stage ecosystem. Iddir membership Ethiopia's indigenous mutual-aid institutions a significant positive predictor of entrepreneurship (OR = 1.357, p = .002) and provides exploratory evidence of partially moderating the negative consumption–mobile payment association (B = +0.148, p = .095). A statistically significant gender gap in mobile payment adoption is confirmed ($\chi^2 = 13.922$, $p < .001$). The findings demonstrate that digital financial inclusion alone does not automatically produce welfare improvements; complementary investments in infrastructure, financial literacy, and gender-responsive programming are essential. These results carry direct implications for Ethiopia's National Financial Inclusion Strategy II and for the broader sub-Saharan African context of early-stage digital finance ecosystems.

Keywords: Mobile Payments; Financial Inclusion; Household Consumption; Entrepreneurship; Iddir; Ethiopia; ESS4.

Introduction

Over the past two decades, digital financial technologies have fundamentally altered how financial services are accessed and delivered worldwide. Mobile money, digital wallets, internet banking, and electronic payment systems collectively grouped under the label Fin Techhave reduced transaction costs, improved efficiency, and extended financial access to previously excluded populations (Arner et al., 2015; Demirgüç-Kunt et al., 2022). In sub-Saharan Africa, where traditional banks have historically failed to reach large segments of the population, mobile money has emerged as a transformative vehicle for financial inclusion, with Kenya's M-PESA serving as the continent's most celebrated example (Jack & Suri, 2016).

Ethiopia presents a particularly instructive case. With a population exceeding 120 million, the country has historically exhibited low financial inclusion rates, urban-concentrated banking infrastructure, weak telecommunications coverage, and widespread financial illiteracy (World Bank, 2022). These structural deficits have perpetuated a cash-dependent economy and constrained households' capacity to smooth consumption, manage risk, and invest in productive activities. Against this backdrop, the Ethiopian government launched the National Financial Inclusion Strategy II (2021–2025) and the

National Digital Payments Strategy, positioning digital financial services as cornerstones of inclusive development (National Bank of Ethiopia [NBE], 2021).

The 2021 launch of Telebirr by Ethio Telecom followed by Safaricom Ethiopia's introduction of M-PESA marked a turning point in Ethiopia's digital finance landscape. These platforms enabled person-to-person transfers, bill payments, airtime top-ups, and merchant transactions through mobile devices. Despite this momentum, Ethiopia continues to trail regional peers on financial inclusion benchmarks, with adoption gaps concentrated among women, rural residents, and low-income households (Alliance for Financial Inclusion [AFI], 2024).

Yet the welfare implications of this digital finance expansion remain poorly understood. Most existing studies in the Ethiopian context focus on adoption determinants or stated intentions rather than actual household welfare outcomes (Bereket & Hwang, 2024). Studies that do examine outcomes are typically confined to small urban samples with limited generalizability. Moreover, the role of informal financial institutions particularly iddir, Ethiopia's indigenous mutual-aid associations in moderating the effects of digital finance on household welfare has received almost no empirical attention.

This study addresses these gaps through a multi-method econometric analysis of nationally representative household data from the Ethiopian Socioeconomic Survey Wave 4. Three primary research questions motivate the analysis

(1) How do mobile payment usage and formal financial inclusion affect household consumption expenditure?

(2) How do these digital finance indicators relate to entrepreneurial participation?

(3) Does iddir membership moderate the relationship between mobile payment adoption and household economic outcomes?

The study makes three principal contributions. First, it provides empirical micro-level evidence on financial inclusion and welfare grounded in nationally representative data—a methodological advance over the small-sample urban studies that dominate the existing Ethiopian literature. Second, it integrates informal financial institutions into the analytical framework, explicitly testing whether iddir moderates digital finance effects. Third, by interpreting negative consumption–finance coefficients as selection effects rather than evidence of welfare harm, the study advances conceptual understanding of necessity-driven adoption in early-stage digital finance marketsa contribution with relevance beyond Ethiopia.

Literature Review and Theoretical Framework

Digital Finance, Financial Inclusion, and Household Welfare

The theoretical foundation for examining financial inclusion and household welfare rests on financial intermediation theory, which holds that formal financial services reduce information asymmetries, lower transaction costs, and channel resources to their most productive uses (Beck et al., 2007). When households gain access to savings, credit, insurance, and payment systems, theory predicts improved consumption smoothing, greater investment in human and physical capital, and enhanced resilience to economic shocks.

Empirical evidence broadly supports these theoretical predictions. Jack and Suri (2014) demonstrated, using longitudinal Kenyan data, that M-PESA adoption enabled households to share risk more effectively through extended social networks, significantly reducing the consumption impact of negative income shocks. Karlan et al. (2016) provide a broader review of digital financial services,

documenting welfare improvements in savings behavior, consumption stability, and entrepreneurial activity across multiple developing-country contexts. Demirgüç-Kunt et al. (2022), drawing on Global Findex data from 123 countries, show that account ownership is positively associated with savings, formal borrowing, and digital payment use.

However, the relationship between financial inclusion and welfare is not uniformly positive, particularly in early-stage markets. The Global System for Mobile Communications Association (GSMA, 2023) notes that in contexts where mobile money adoption is nascent and dominated by lower-income or financially vulnerable households, cross-sectional associations between adoption and welfare outcomes may appear negative due to selection effects. This interpretive challenge distinguishing selection bias from causal harmis central to the present study's analytical approach.

Mobile Money and Entrepreneurship

Financial constraints represent one of the most significant barriers to entrepreneurial entry and growth in developing economies (Ayyagari et al., 2010). Formal account ownership relaxes these constraints by enabling capital accumulation, facilitating access to credit, and supporting working capital management. Fan and Zhang (2017) demonstrate, using Chinese household data, that financial inclusion significantly improves entrepreneurial decision-making and business performance. In sub-Saharan Africa, mobile money has enabled small businesses to manage cash flow, pay suppliers, and process digital transactions, expanding market reach beyond immediate geographic communities (GSMA, 2023).

In Ethiopia, micro, small, and medium enterprises (MSMEs) constitute the backbone of the non-agricultural economy yet face severe financing constraints, limited market access, and low technology adoption (World Bank, 2022). The intersection of mobile money expansion and entrepreneurship development therefore represents a critical policy domain, though empirical evidence on this nexus remains sparse in the Ethiopian context.

Informal Finance and Social Capital: The Role of Iddir

Alongside formal banking and digital finance, Ethiopia's financial landscape is deeply shaped by indigenous informal institutions. Iddirrotating mutual-aid associations established primarily for funeral support and emergency assistance are among the most pervasive, with membership exceeding 36% of households in the current sample. Equb, a rotating savings and credit association, serves complementary functions. Aredo (2010) documents how these institutions provide social insurance, emergency liquidity, informal credit, and community risk-pooling for millions of Ethiopian households.

The theoretical lens of social capital (Putnam, 2000) illuminates how iddir membership may influence economic outcomes. Membership generates trust networks, reciprocal obligations, and information flows that can facilitate business formation, reduce economic vulnerability, and complement rather than displace formal financial services. The present study explicitly tests this complementarity hypothesis through a moderation analysis examining whether iddir membership conditions the association between mobile payment use and household welfare.

Empirical Gaps and Study Positioning

The existing literature on mobile money and financial inclusion in Ethiopia exhibits four systematic gaps.

First, most studies focus on adoption determinants or behavioral intentions rather than actual household welfare outcomes (Bereket & Hwang, 2024). Second, predominantly small urban samples or institutional case studies constrain generalizability to Ethiopia's rural majority. Third, mobile payments and formal financial inclusion are typically analyzed in isolation rather than within an integrated framework also encompassing consumption, entrepreneurship, and informal finance. Fourth, informal institutions including iddir are consistently omitted from quantitative welfare analyses.

The present study addresses each of these gaps through a nationally representative, multi-outcome, multi-method econometric design that integrates formal and informal financial participation within a unified analytical framework.

Data and Methodology

Data Source

The study uses secondary data from the Ethiopian Socioeconomic Survey Wave 4 (ESS4), collected in 2022/23 by Ethiopia's Central Statistical Agency (CSA) in collaboration with the World Bank's Living Standards Measurement Study–Integrated Surveys on Agriculture (LSMS-ISA) program (CSA & World Bank, 2023). The ESS4 employs a stratified two-stage probability sampling design selecting enumeration areas from strata defined by region and urban/rural classification, followed by random household selection within enumeration areas. The resulting sample of 6,770 households is nationally representative, covering all administrative regions and both urban and rural settings (Cochran, 1977).

Variables and Measurement

Two dependent variables are examined. Household consumption expenditure is operationalized as total annual household spending across all categories (food, housing, healthcare, education, transport, clothing, and utilities), denominated in Ethiopian Birr (ETB). Following standard practice in household welfare econometrics (Deaton & Zaidi, 2002; Wooldridge, 2020), a natural logarithm transformation is applied to address severe positive skewness (raw skewness = 5.601; post-transformation skewness = 0.312), which also improves model fit (R^2 from 0.139 to 0.243). Entrepreneurship is operationalized as a binary indicator of household business ownership (1 = yes; 0 = no).

The two primary independent variables are mobile payment usea binary indicator of whether household members use mobile phones for financial transactions (1 = yes; 0 = no)and formal financial account ownership, indicating access to formal banking or financial services (1 = yes; 0 = no). Iddir membership (1 = member; 0 = non-member) serves as the moderating variable. Socio-demographic controls include gender of household head, age of household head, household size, urban/rural residence, weeks away from home, and region (categorical fixed effects).

Analytical Methods

Four analytical methods are employed in sequence.

1. Descriptive statistics and cross-tabulation analyses with Pearson chi-square tests characterize the sample and examine bivariate associations with mobile payment adoption.
2. Multiple linear regression with log-transformed consumption as the dependent variable (N = 4,328 after list wise deletion) estimates associations between financial inclusion measures and household welfare, controlling for socio-demographic characteristics.

3. Binary logistic regression (N = 3,805) models the probability of household business ownership as a function of financial inclusion indicators and controls.
4. Moderation analysis using a mean-centered interaction term (MC_Mobile × MC_Iddir) tests whether iddir membership conditions the mobile payment–consumption relationship.
5. Mean-centering of both constituent variables before forming the interaction term follows Hayes (2018) and Aiken and West (1991). This procedure eliminates structural multicollinearity: in the un-centered model, variance inflation factors (VIFs) reached 12.76, 36.40, and 46.57 for mobile payment use, iddir membership, and the interaction term, respectively; after mean-centering, all VIFs fall below 1.24. All analyses were conducted in IBM SPSS Statistics Version 27. The cross-sectional nature of ESS4 precludes definitive causal inference; endogeneity concerns are addressed through interpretive grounding in the early-stage digital finance literature.

Empirical Results

Descriptive Statistics

Table 1 presents descriptive statistics for continuous variables. Mean total annual household consumption is ETB 61,417 (SD = 56,025), ranging from ETB 440 to ETB 1,143,184a distribution reflecting profound welfare inequality consistent with World Bank (2022) documentation. The severe raw skewness (5.601) justifies the log transformation applied in all regression analyses (post-transformation skewness = 0.312). Mean household size is 4.24 members (SD = 2.29), and mean household member age is 22.67 years (SD = 17.78), reflecting Ethiopia's young demographic profile.

Table 1: **Descriptive Statistics of Continuous Variables**

Variable	N	Mean	SD	Skewness	Range
Ln(Annual Consumption) [ETB]	6,770	10.61	0.728	0.312	6.09–13.95
Total Annual Consumption (ETB)	6,770	61,417	56,025	5.601	440–1,143,184
Household Size	6,770	4.24	2.29	0.89	1–19
Age of Household Member (years)	29,503	22.67	17.78	1.14	0–99
Note. Log transformation applied to Total Annual Consumption to address severe positive skewness (raw skewness = 5.601; post-transformation skewness = 0.312, within the ±1.0 threshold). Source: Author's computation from ESS4.					

Table 2 presents frequency distributions for key categorical variables. Rural households comprise 54.7% of the sample. Mobile payment adoption stands at 11.9%markedly low and consistent with Ethiopia's early-stage mobile money market. Formal financial account ownership and iddir membership both register at 36.2%, a convergence reflecting the parallel importance of formal and informal financial systems. Business ownership is reported by 11.2% of households.

Table 2: **Frequency Distribution of Key Categorical Variables (N = 6,770)**

Variable / Category	Frequency	Valid %	Cumulative %
Rural/Urban Residence			
Rural	17,523	54.7%	54.7%
Urban	14,506	45.3%	100.0%
Mobile Payment Use			
Yes	878	11.9%	11.9%
No	6,516	88.1%	100.0%
Formal Financial Account Ownership			
Yes	5,376	36.2%	36.2%
No	9,486	63.8%	100.0%
Iddir Membership			
Yes	5,382	36.2%	36.2%
No	9,481	63.8%	100.0%
Business Ownership			
Yes	759	11.2%	11.2%
No	6,001	88.8%	100.0%
Note. Rural/Urban frequencies reflect individual-level observations (N = 32,029). All other variables measured at household level. Source: Author's computation from ESS4.			

4.2 Cross-Tabulation Analysis

Table 3 reports chi-square test results for bivariate associations with mobile payment adoption. Despite 78% of mobile payment users residing in urban areas, the urban/rural difference is not statistically significant ($\chi^2(1) = 0.159$, $p = .690$, Phi = 0.005), suggesting that income and education rather than location alone drive adoption.

A significant gender gap is confirmed: male-headed households are significantly more likely to adopt mobile payments ($\chi^2(1) = 13.922$, $p < .001$, Phi = 0.044), consistent with documented gender-based barriers to digital financial participation (Adera & Abdisa, 2023).

Formal account ownership is positively associated with mobile payment use ($\chi^2(1) = 89.314$, $p < .001$, Phi = 0.110), confirming the complementarity between digital payments and formal banking access (Fan & Zhang, 2017). Iddir membership is also positively correlated with mobile payment adoption ($\chi^2(1) = 52.671$, $p < .001$, Phi = 0.084), indicating that informal and digital finance coexist rather than substitute.

Table 3: **Chi-Square Tests: Mobile Payment Adoption by Selected Household Characteristics**

Cross-Tabulation	X^2	Df	P-Value	Phi (Φ)	Decision
Mobile Payment × Urban/Rural	0.159	1	.690	0.005	Not Significant
Mobile Payment × Gender Of HH Head	13.922	1	<.001***	0.044	Significant
Mobile Payment × Formal Account	89.314	1	<.001***	0.110	Significant
Mobile Payment × Iddir Membership	52.671	1	<.001***	0.084	Significant
Note. *** P< .001. HH = Household. Source: Author's Computation From ESS4.					

4.3 Multiple Linear Regressions: Determinants of Household Consumption

Table 4 presents result from the baseline and moderation regression models. The baseline model (N = 4,328) is highly significant (F (8, 4319) = 173.64, p < .001, R^2 = 0.243, Adjusted R^2 = 0.241), with all VIFs below 1.24.

Mobile payment use is negatively associated with log-consumption (B = −0.155, β = −0.050, p < .001), implying that mobile payment users consume approximately 14.4% less than non-users, holding other factors constant ([e^0.155 − 1] × 100). Formal financial account ownership similarly shows a negative coefficient (B = −0.212, β = −0.102, p < .001). These negative associations are interpreted as selection effects: in Ethiopia's early-stage mobile money market, adopters are disproportionately lower-income households whose adoption is driven by financial necessity rather than prosperity (GSMA, 2023). This interpretation is supported by the mean annual consumption of ETB 53,642 among mobile payment users versus ETB 62,453 among non-users.

Urban residence emerges as the strongest positive predictor of consumption (B = +0.487, β = +0.220, p < .001), implying an urban consumption premium of approximately 63% ([e^0.487 − 1] × 100). Household size has a positive effect (B = +0.108, β = +0.247, p < .001), consistent with economies of scale. Female-headed households consume significantly less than male-headed ones (B = −0.079, p = .013), confirming gender-based economic disparities. All findings hold across urban (B = −0.141, p = .012) and rural (B = −0.168, p < .001) subsamples, as well as among the lowest two income quartiles (B = −0.132, p = .031), confirming robustness.

Table 4: **Multiple Linear Regression Results: Determinants of Log Household Consumption**

Variable	Baseline Model				Moderation Model			
	B	SE	β	p	B (MC)	SE	p	VIF
Constant	10.192	0.135	—	<.001***	10.194	0.135	<.001***	—
Mobile Payment Use (MC)	−0.155	0.043	−0.050	<.001***	−0.163	0.043	<.001***	1.093
Formal Account Ownership	−0.212	0.031	−0.102	<.001***	−0.212	0.031	<.001***	1.176
Iddir Membership (MC)	−0.057	0.030	−0.028	.060*	−0.059	0.030	.051*	1.228
Urban Residence	+0.487	0.034	+0.220	<.001***	+0.486	0.034	<.001***	1.231

Female HH Head	−0.079	0.032	−0.036	.013**	−0.079	0.032	.014**	1.070
Household Size	+0.108	0.007	+0.247	<.001***	+0.108	0.007	<.001***	1.215
Age of HH Head	+0.004	0.001	+0.052	<.001***	+0.004	0.001	<.001***	1.200
Weeks Away from Home	+0.009	0.003	+0.041	.004**	+0.009	0.003	.004**	1.003
MC_Mobile × MC_Iddir	—	—	—	—	+0.148	0.089	.095*	1.041
Baseline: R^2 = 0.243, Adj. R^2 = 0.241, F(8, 4319) = 173.64, p < .001 **Moderation: R^2 = 0.244, Adj. R^2 = 0.242, F(9, 4318) = 155.07, p < .001; ΔR^2 = 0.001**								
Note. Dependent variable: Natural log of total annual household consumption [Ln(ETB)], N = 4,328. MC = mean-centered variable. The interaction term MC_Mobile × MC_Iddir was excluded from the Baseline Model. Mean-centering eliminated structural multicollinearity (un-centered VIFs: mobile payment = 12.76, iddir = 36.40, interaction = 46.57; post-centering VIFs ≤ 1.24). *** p< .001; ** p < .01; * p < .10. HH = household. Source: Author's computation from ESS4.								

Moderation Analysis

The moderation model (Table 4, Moderation Model columns) adds the mean-centered interaction term MC_Mobile × MC_Iddir to the baseline specification. Overall model fit is maintained ($F(9, 4318) = 155.07$, $p < .001$, $R^2 = 0.244$), and the incremental R^2 change ($\Delta R^2 = 0.001$) is modest but theoretically informative. The interaction coefficient is positive and marginally significant ($B = +0.148$, $\beta = +0.023$, $p = .095$, VIF = 1.04). This indicates that iddir membership partially offsets the negative association between mobile payment use and household consumption: for households that both use mobile payments and belong to an iddir, the estimated negative consumption effect of mobile payment adoption is buffered by approximately 16% ([e^0.148 − 1] × 100), relative to mobile-payment-using households that are not iddir members.

This finding provides preliminary empirical support for the complementarity hypothesis: informal financial institutions may absorb some of the financial volatility and liquidity risks associated with early-stage mobile money adoption. The marginal significance ($p = .095$) and confidence interval crossing zero ([−0.026, 0.322]) warrant cautious interpretation; replication with more recent post-Telebirr data would strengthen the inference. The finding is nonetheless substantively consistent with Ethiopia's National Financial Inclusion Strategy II, which explicitly promotes integration between digital finance and informal financial networks (NBE, 2021).

Binary Logistic Regression: Determinants of Entrepreneurship

Table 5 presents binary logistic regression results for business ownership. The model (N = 3,805) is highly significant (Omnibus $\chi^2(7) = 96.032$, $p < .001$), adequately calibrated (Hosmer–Lemeshow $\chi^2(8) = 7.698$, $p = .464$), and achieves 84.7% classification accuracy (Nagelkerke $R^2 = 0.043$). Contrary to the consumption models, mobile payment use does not significantly predict business ownership ($B = −0.090$, $p = .531$). This null finding is interpreted contextually: during the ESS4 survey period, Ethiopia's mobile money platforms were primarily used for person-to-person transfers and airtime top-ups rather than business transactions. As the ecosystem matures with Telebirr and M-PESA expanding into merchant payments, the entrepreneurship effect may increase. Formal financial account ownership

is a significant positive predictor of entrepreneurship (OR = 1.352, 95% CI [1.090, 1.676], p = .006): banked households are approximately 35% more likely to own a business, supporting the financial constraints hypothesis (Fan & Zhang, 2017; Ayyagari et al., 2010). Iddir membership is also a significant positive predictor (OR = 1.357, 95% CI [1.122, 1.641], p = .002), indicating that social capital embedded in informal financial networks facilitates entrepreneurial entry—consistent with Putnam (2000) and Aredo (2010). Urban households are approximately 2.3 times more likely to own a business than rural ones. Larger household size is associated with reduced probability of entrepreneurship (OR = 0.883, p < .001), consistent with resource dilution effects.

Table 5: **Binary Logistic Regression: Determinants of Business Ownership**

Variable	B	SE	Wald χ^2	p	OR [Exp(B)]	95% CI
Mobile Payment Use	−0.090	0.143	0.392	.531	0.914	[0.690, 1.211]
Formal Financial Account	+0.301	0.110	7.534	.006**	1.352	[1.090, 1.676]
Iddir Membership	+0.305	0.097	9.934	.002**	1.357	[1.122, 1.641]
Urban Residence (rural = 1)	−0.821	0.131	39.614	<.001***	0.440	[0.341, 0.568]
Household Size	−0.125	0.022	32.534	<.001***	0.883	[0.846, 0.921]
Age of Household Head	+0.010	0.004	5.938	.015**	1.010	[1.002, 1.018]
Female HH Head	+0.197	0.111	3.132	.077*	1.217	[0.979, 1.514]
Constant	2.382	0.462	26.599	<.001***	10.830	—
Model fit: Omnibus $\chi^2(7) = 96.032$, $p < .001$ | Hosmer–Lemeshow $\chi^2(8) = 7.698$, $p = .464$ | Nagelkerke $R^2 = 0.043$ | Classification accuracy = 84.7%						
Note. Dependent variable: Business Ownership (1 = Yes; 0 = No), N = 3,805. Non-significant Hosmer–Lemeshow result (p = .464) indicates adequate model calibration. *** p< .001; ** p < .01; * p < .10. HH = household. OR = odds ratio. Source: Author's computation from ESS4.						

Table 6: **Hypothesis Test Summary**

H#	Hypothesis	Key Statistic	p-value	Decision	Interpretation
H1	Mobile payment use → household consumption (positive)	B = −0.163 (MC model)	<.001	Not supported	Negative coefficient reflects necessity-driven selection; not causal welfare harm
H2	Formal financial inclusion	B = −0.212	<.001	Not	Same selection

	→ household consumption (positive)			supported	interpretation; lower-income households adopt out of necessity
H3	Mobile payment use → entrepreneurship (positive)	B = −0.090; Wald = 0.392	.531	Not supported	No significant effect; platforms not yet business-oriented during survey period
H4	Formal financial inclusion → entrepreneurship (positive)	OR = 1.352; Wald = 7.534	.006	Supported	Account ownership raises business ownership odds by ~35%
H5	Iddir membership moderates mobile payment–consumption relationship	B = +0.148 (MC interaction)	.095	Marginally supported	Positive buffering effect; marginal significance requires replication
H6	Significant gender gap in mobile payment adoption	$\chi^2(1)$ = 13.922; Phi = 0.044	<.001	Supported	Male-headed households significantly more likely to adopt mobile payments
Note. MC = mean-centered. All linear regression results refer to Ln(Total Annual Consumption). H5 confidence interval crosses zero; result is exploratory. Source: Author's compilation from ESS4 analysis.					

Discussion

The Necessity-Driven Adoption Paradox

The negative consumption associations for both mobile payment use and formal account ownership represent the study's most counterintuitive finding. These results are best understood through the lens of necessity-driven adoption—a phenomenon well-documented in the early-stage digital finance literature (GSMA, 2023). In Ethiopia's current market context, the households most likely to adopt mobile payments are those facing the greatest financial precarity, using these services to receive emergency transfers, access remittances, or maintain minimal savings buffers rather than to generate incremental wealth. This pattern contrasts sharply with Kenya's M-PESA trajectory, where following a decade of ecosystem maturation mobile money usage became positively associated with consumption and savings (Jack & Suri, 2016).

The implication is not that mobile payments harm welfare, but that cross-sectional associations between adoption and welfare are heavily confounded by self-selection in early-stage markets. Longitudinal panel designs and instrumental variable approaches exploiting exogenous variation in telecom tower density or mobile money agent rollout timing would be required to estimate causal treatment effects. The present study's findings are more appropriately interpreted as characterizing the socioeconomic profile of current adopters than as measuring the causal welfare impact of adoption.

Formal Finance as an Entrepreneurial Enabler

The significant positive effect of formal account ownership on entrepreneurship (OR = 1.352, p = .006) provides the study's clearest evidence of digital finance enabling household welfare improvement. This finding aligns with the financial constraint's literature (Fan & Zhang, 2017;

Ayyagari et al., 2010), which holds that removing capital access barriers lowers the cost of entrepreneurial entry, enabling households to accumulate startup capital, manage working capital cycles, and access formal credit products. The policy implication is direct: expanding formal financial account ownership particularly among rural, female-headed, and low-income households should be a strategic priority for Ethiopia's MSME development agenda.

Iddir as a Complementary Institution

The iddir findings contribute a novel empirical dimension to the informal finance literature. Iddir membership's positive effect on entrepreneurship (OR = 1.357, p = .002) suggests that the social capital embedded in indigenous mutual-aid institutions—encompassing trust networks, reciprocal obligations, emergency liquidity mechanisms, and community governance structures facilitates business formation independently of formal finance access. This finding resonates with Putnam's (2000) social capital theory and is consistent with Aredo's (2010) qualitative documentation of iddir's economic functions.

The marginal moderation finding (B = +0.148, p = .095) suggests that iddir membership partially buffers the negative consumption–mobile payment association, potentially by providing informal social insurance that reduces households' vulnerability during the transition to digital financial services. While statistically marginal, this finding has substantive policy resonance: it suggests that digital finance strategies may be more effective when designed to complement and reinforce existing informal financial networks rather than displace them.

Urban–Rural and Gender Disparities

The urban consumption premium (B = +0.487, p < .001) and the significant gender gap in mobile payment adoption ($\chi^2(1) = 13.922$, p < .001) underscore the distributional inequalities characterizing Ethiopia's financial inclusion landscape. Urban households consume approximately 63% more than rural counterparts after controlling for other household characteristics—a disparity reflecting systematic differences in infrastructure, market access, financial service availability, and economic opportunity. The gender gap reflects documented structural barriers including differential mobile phone ownership, income disparities, lower digital literacy, and social norms constraining women's financial decision-making (Adera & Abdisa, 2023; AFI, 2024).

Conclusions and Policy Implications

This study contributes the first nationally representative, multi-method econometric analysis integrating mobile payment adoption, formal financial inclusion, informal financial participation, household consumption, and entrepreneurship in Ethiopia. Six principal conclusions emerge.

First, digital finance access remains deeply unequal, concentrated among urban, male-headed, and more educated households. Second, negative consumption–finance associations reflect necessity-driven selection by lower-income adopters rather than welfare harm. Third, formal financial account ownership significantly enables entrepreneurship, consistent with financial constraints theory. Fourth, mobile payment use does not yet significantly predict entrepreneurship, reflecting the early-stage commercial functionality of Ethiopia's mobile money platforms. Fifth, iddir membership independently promotes entrepreneurship and provides exploratory evidence of moderating the digital finance–consumption relationship, confirming formal–informal financial complementarily. Sixth, a statistically significant gender gap in mobile payment adoption confirms systemic exclusion of women from digital financial participation.

These conclusions generate four categories of policy recommendations. First, the National Bank of Ethiopia, the Ministry of Innovation and Technology, and Ethio Telecom should accelerate rural digital infrastructure investment agent banking expansion, last-mile telecommunications rollout, and off-grid mobile charging solutions to close the urban–rural consumption gap. Second, targeted gender-responsive programs combining subsidized Smartphone access, community-based digital literacy, and mobile payment enrollment should be implemented through women's organizations and health extension networks. Third, dedicated MSME financing windows should be established to convert formal account ownership into entrepreneurial activity, through collateral-free credit products and digital merchant payment infrastructure. Fourth, policymakers should facilitate iddir integration with digital finance through mobile contribution management platforms, bank–iddir partnership models, and a national census of informal financial assets.

Most fundamentally, the study demonstrates that digital financial inclusion is necessary but not sufficient for household welfare improvement. Access to financial services must be accompanied by complementary investments in physical infrastructure, financial literacy, market development, and social protection. Monitoring frameworks should track welfare outcomes-consumption levels, entrepreneurship rates, gender-disaggregated indicators-rather than account ownership rates alone. These findings carry implications for the broader sub-Saharan African context of early-stage digital finance ecosystems, where necessity-driven selection effects will confound welfare impact analyses unless sequencing of financial inclusion with complementary investments is strategically implemented.

Limitations and Future Research Directions

This study has several limitations that future research should address. The cross-sectional ESS4 design precludes establishment of causal direction; panel data or quasi-experimental designs exploiting exogenous variation in telecom infrastructure rollout would enable stronger causal identification. Mobile payment adoption is measured as a binary indicator, capturing no information on transaction frequency, intensity, or value—a limitation reflecting the early-stage market conditions at the time of data collection. The moderation analysis is limited to iddir and does not capture equb or other informal financial arrangements. Finally, behavioral determinants of adoption trust, risk tolerance, social network effects cannot be captured through the ESS4 survey instrument.

Future research priorities include: longitudinal analysis exploiting ESS panel structure to estimate within-household effects of adoption; instrumental variable approaches using community-level agent density or network rollout timing as instruments; disaggregated analysis by platform (Telebirr vs. M-PESA) to assess competitive effects; and qualitative research examining the mechanisms through which iddir membership supports entrepreneurial decision-making.

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