Financial Inclusion and Poverty Reduction in Developing Economies

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Abstract

This paper examines the relationship between financial inclusion and poverty reduction across 45 developing countries from 2015 to 2024. Using panel data analysis and instrumental variable estimation, we find that a 10% increase in financial inclusion correlates with a 2.3% reduction in extreme poverty rates. The effects are strongest when combined with digital infrastructure and financial literacy programs.

I. INTRODUCTION

Financial exclusion remains a critical barrier to economic development in the contemporary global economy, affecting the livelihoods and economic prospects of approximately 1.4 billion adults worldwide who lack access to formal financial services. The inability to access basic financial instruments such as savings accounts, credit facilities, insurance products, and payment systems creates substantial obstacles to economic advancement and perpetuates cycles of poverty across developing nations. This research investigates the causal relationship between expanding financial inclusion and reducing poverty rates in developing economies, with particular attention to the mechanisms through which financial access translates into improved economic outcomes.

The significance of this research stems from the growing recognition among development economists and policymakers that financial inclusion represents not merely a social good but a fundamental prerequisite for sustainable economic development. Access to financial services enables households to smooth consumption during periods of income volatility, invest in human capital development through education and health expenditures, accumulate productive assets, and protect themselves against catastrophic shocks that might otherwise push them into persistent poverty. Despite substantial progress in expanding financial access over the past two decades, particularly through mobile money innovations and digital banking platforms, significant gaps remain in understanding the precise magnitude of financial inclusion's impact on poverty reduction and the conditions under which such effects are maximized.

This study addresses several critical research questions that have important implications for development policy. First, we examine whether financial inclusion significantly and causally reduces poverty rates in developing economies, moving beyond correlational evidence to establish causation through careful econometric identification strategies. Second, we investigate the specific mechanisms through which financial inclusion operates to reduce poverty, distinguishing between direct effects such as asset accumulation and indirect effects operating through changes in household decision-making and risk management. Third, we analyze how complementary factors such as digital infrastructure, financial literacy, and regulatory frameworks moderate the relationship between financial inclusion and poverty reduction.

The contribution of this research to the existing literature on financial inclusion and development is multifaceted. Methodologically, we employ an instrumental variables approach that addresses potential endogeneity concerns arising from reverse causality and omitted variable bias, which have plagued previous studies in this domain. We construct a comprehensive Financial Inclusion Index that captures multiple dimensions of financial access rather than relying on single indicators such as account ownership. Our dataset spans the post-2015 period, allowing us to incorporate recent innovations in mobile banking and digital payments that have transformed the financial inclusion landscape in many developing countries. Furthermore, we examine heterogeneous effects across different populations, recognizing that the impact of financial inclusion may vary substantially based on factors such as gender, geographic location, income level, and existing financial infrastructure.

The theoretical framework guiding this analysis builds upon several strands of economic theory. The permanent income hypothesis, first articulated by (Friedman,1957), suggests that households seek to maintain stable consumption patterns over time despite fluctuations in current income. Access to financial services facilitates this consumption smoothing by allowing households to save during periods of high income and borrow during periods of low income. Credit constraint theory, developed extensively by (Stiglitz & Weiss, 1981), emphasizes that information asymmetries and collateral requirements often prevent creditworthy borrowers from accessing loans, particularly in developing economies where formal credit markets function imperfectly. Financial inclusion initiatives that reduce these constraints can unlock productive investments that generate returns exceeding borrowing costs.

Our empirical analysis utilizes panel data from 45 developing countries observed annually from 2015 to 2024, yielding 450 country-year observations. The dependent variable of primary interest is the poverty headcount ratio measured at the international poverty line of $2.15 per day in purchasing power parity terms. Our key independent variable is a Financial Inclusion Index that aggregates four components: account ownership rates, credit access, savings behavior, and insurance coverage. This composite measure provides a more comprehensive assessment of financial inclusion than single indicators, recognizing that different dimensions of financial access may operate through distinct channels to affect poverty outcomes.

To address endogeneity concerns, we employ instrumental variable estimation using three instruments that plausibly affect financial inclusion but do not directly influence poverty rates through other channels. First, we utilize historical banking sector regulations established before the year 2000, recognizing that regulatory frameworks established decades ago continue to shape contemporary financial sector development but are unlikely to directly affect current poverty rates except through their impact on financial inclusion. Second, we use geographic distance from financial centers as an instrument, as physical distance creates transaction costs that inhibit financial sector development but, conditional on current economic conditions, should not directly determine poverty levels. Third, we instrument mobile financial services penetration using terrain ruggedness, which affects the costs of deploying mobile network infrastructure but plausibly does not directly influence poverty outcomes once we control for current infrastructure quality and economic development.

The structure of this paper proceeds as follows. Section 2 reviews the relevant literature on financial inclusion and poverty reduction, situating our contribution within existing research. Section 3 develops the theoretical framework that guides our empirical analysis, specifying the channels through which financial inclusion affects poverty. Section 4 describes our data sources, variable construction, and summary statistics. Section 5 presents our empirical methodology, including the instrumental variable approach and robustness checks. Section 6 reports our main findings regarding the impact of financial inclusion on poverty reduction and explores heterogeneous effects across different contexts. Section 7 investigates the specific mechanisms through which financial inclusion operates. Section 8 discusses policy implications for governments and development organizations. Section 9 acknowledges limitations and suggests directions for future research. Section 10 concludes by synthesizing our findings and their implications for development policy.

II. LITERATURE REVIEW

The relationship between financial development and economic growth has been a subject of scholarly inquiry for decades, with foundational work by (Goldsmith, 1969) documenting positive correlations between financial sector size and economic development across countries. (McKinnon, 1973; Shaw ,1973) argued that financial repression through interest rate controls and directed credit programs hampered economic growth in developing countries, advocating for financial liberalization policies. Subsequent research by (King & Levine,1993) provided empirical evidence that financial development predicts future economic growth, suggesting that finance plays a causal role in the development process rather than merely responding to economic activity.

More recent literature has shifted focus from aggregate financial development to financial inclusion, recognizing that the distribution of financial access matters as much as its overall level. (Levine, 2005) synthesized theoretical and empirical work on finance and growth, emphasizing that well-functioning financial systems improve resource allocation, facilitate risk management, and ease the trading of goods and services. However, Levine acknowledged that the benefits of financial development may not reach the poor if financial systems primarily serve elite segments of the population, motivating research specifically examining financial inclusion and poverty reduction.

The Global Financial Development Report published by the (World Bank,2014) documented that approximately 2.5 billion adults worldwide lacked access to formal financial services, with particularly large gaps in Sub-Saharan Africa and South Asia. (Demirgüç-Kunt & Klapper ,2013) utilized the Global Findex database to provide comprehensive cross-country data on financial inclusion patterns, revealing substantial variation both across and within countries. Their analysis identified several key correlates of financial exclusion, including poverty, low education levels, rural residence, and female gender, highlighting that financial exclusion disproportionately affects already disadvantaged populations.

Empirical research examining the causal impact of financial inclusion on poverty and development outcomes has employed various methodological approaches. (Beck et al., 2007) found that financial development disproportionately benefits the poor by reducing income inequality and accelerating poverty reduction. Their cross-country analysis suggested that countries with better-developed financial systems experience faster reductions in income inequality and poverty, with the income of the poorest quintile growing faster than average GDP growth. However, their analysis relied primarily on cross-sectional variation and could not definitively establish causality.

Recent research has leveraged natural experiments and randomized controlled trials to identify causal effects of financial inclusion. (Burgess & Pande ,2005) exploited a policy experiment in India that required banks to open branches in unbanked rural locations, finding that bank expansion significantly reduced poverty rates and increased non-agricultural output. Their identification strategy relied on the exogenous component of branch expansion driven by regulation rather than profit motives, providing more credible causal estimates than earlier cross-sectional studies.

The advent of mobile money has created new opportunities for financial inclusion in developing countries, particularly in regions with limited traditional banking infrastructure. (Jack & Suri,2014) conducted a landmark study examining the impact of M-Pesa mobile money in Kenya, finding that access to mobile money increased consumption levels and lifted approximately 194,000 households, or 2% of Kenyan households, out of poverty. Their analysis utilized the staggered rollout of M-Pesa agent networks across Kenya to establish causality, comparing outcomes in areas that gained access earlier versus later. The mechanisms they identified included better risk sharing, increased savings, and improved labor market outcomes, particularly for women who shifted from subsistence agriculture to business activities.

However, not all research has found positive effects of financial inclusion. (Karlan & Zinman,2010) conducted a randomized evaluation of expanded consumer credit in South Africa and found limited impacts on most welfare outcomes, cautioning that increased credit access may lead to over-indebtedness rather than productive investment. Similarly, (Banerjee et al.,2015) synthesized findings from six randomized evaluations of microcredit programs across multiple countries, concluding that microcredit access produced modest impacts on business creation but did not consistently increase household income or consumption. These findings suggest that financial access alone is insufficient without complementary factors such as financial literacy, business training, and supportive regulatory environments.

The role of digital technology in expanding financial inclusion has received increasing attention in recent literature. (Suri & Jack ,2016) examined how mobile money affected households' ability to cope with negative economic shocks in Kenya, finding that households with access to mobile money were better able to maintain consumption following adverse events such as health shocks or crop failures. This risk-sharing function of mobile money represents an important channel through which financial inclusion reduces vulnerability to poverty.

(Demirgüç-Kunt et al.,2018) analyzed data from the 2017 Global Findex database, documenting substantial progress in financial inclusion globally, with the share of adults owning an account increasing from 51% in 2011 to 69% in 2017. They attributed much of this progress to mobile money innovations in Sub-Saharan Africa and government policies promoting digital payments in countries such as India. However, they also documented persistent gaps, with women in developing countries 9 percentage points less likely than men to own an account, and rural residents substantially less likely to have financial access than urban residents.

The literature on financial literacy and capability has emphasized that access to financial services must be accompanied by the knowledge and skills to use them effectively. (Lusardi & Mitchell,2014) documented widespread financial illiteracy even in developed countries, with particularly large gaps in developing countries where financial education is often limited. (Carpena et al.,2011) conducted a randomized evaluation of financial literacy training in India, finding that training improved financial knowledge but had limited impacts on actual financial behavior, suggesting that behavioral barriers beyond knowledge constrain effective financial decision-making.

Research examining the mechanisms through which financial inclusion affects poverty has identified multiple channels. (Dupas & Robinson,2013) conducted an experiment providing savings accounts to market vendors in Kenya, finding that women with accounts increased business investment by 38% and increased expenditures by 16%. The mechanism operated primarily through helping women resist pressure from relatives to share resources, highlighting that financial tools can strengthen bargaining power within households and communities. (Ashraf et al., 2006) found that commitment savings products that restricted withdrawals helped Filipino households achieve savings goals, suggesting that behavioral features of financial products matter beyond simple access.

The credit channel has received extensive attention in the microfinance literature. (Morduch,1999) provided an early critical assessment of microfinance, questioning whether microcredit substantially reduced poverty despite its rapid expansion. Subsequent research has produced mixed findings, with (Pitt & Khandker,1998) finding positive impacts of microfinance participation in Bangladesh, while later work by (Roodman & Morduch, 2014) questioned the robustness of these findings to alternative specifications. (Banerjee et al., 2015) conducted a randomized evaluation of microfinance expansion in Hyderabad, India, finding increased business investment among pre-existing entrepreneurs but no impact on average household expenditure or poverty rates after 18 months.

The insurance channel, though less studied than credit and savings, represents another important mechanism linking financial inclusion to poverty reduction. (Cole et al., 2013) examined demand for rainfall insurance among farmers in India, finding that insurance takeup was sensitive to price, trust in the insurance provider, and understanding of the product. Even when insurance was heavily subsidized, many poor households declined coverage, suggesting that behavioral barriers and product design issues constrain the poverty-reducing potential of insurance.

Research examining heterogeneous effects of financial inclusion has documented that impacts vary substantially across populations. Women often benefit more from financial inclusion than men, as documented by (Garikipati,2008) who found that microcredit access in India had larger impacts on women's empowerment and child welfare than on overall household income. This gender dimension reflects both the fact that women face larger barriers to financial access and that women's control over resources tends to generate larger investments in children's health and education.

Geographic heterogeneity in financial inclusion effects has also been documented. (Bruhn & Love ,2014) examined the impact of bank branch expansion in Mexico, finding positive effects on informal business income and employment in areas that were initially underserved by banks, but smaller effects in areas with pre-existing financial access. This pattern suggests diminishing returns to financial deepening, with the largest marginal impacts occurring when expanding access to previously excluded populations.

Despite substantial progress in understanding financial inclusion and poverty, several gaps in the literature motivate this research. First, much existing research focuses on specific financial products such as microcredit or mobile money, while a comprehensive assessment of financial inclusion across multiple dimensions remains limited. Second, most studies examine short-term impacts over periods of one to three years, while longer-term effects remain understudied. Third, while several

studies have examined individual mechanisms such as consumption smoothing or entrepreneurship, integrated analyses examining multiple channels simultaneously are rare. Fourth, the role of complementary factors such as digital infrastructure, financial literacy programs, and regulatory frameworks in determining the effectiveness of financial inclusion has received insufficient attention.

This study addresses these gaps by examining financial inclusion broadly defined across account ownership, credit access, savings behavior, and insurance coverage. Our panel data spanning nine years allows examination of medium-term effects. We explicitly investigate multiple mechanisms and analyze how complementary factors moderate the relationship between financial inclusion and poverty reduction. Our instrumental variable approach addresses endogeneity concerns more comprehensively than most previous panel data studies. These contributions advance understanding of how financial inclusion can be leveraged most effectively for poverty reduction in developing economies.

III. THEORETICAL FRAMEWORK

Our theoretical framework integrates insights from multiple strands of economic theory to explain how financial inclusion affects poverty through several distinct but interrelated channels. This section develops formal models of each channel and derives testable predictions that guide our empirical analysis.

3.1. Consumption Smoothing Channel

Following the permanent income hypothesis articulated by (Friedman,1957; Hall, 1978), households prefer smooth consumption over time rather than consumption that fluctuates with transitory income variations. In the absence of financial services, households must maintain consumption levels equal to current income each period, leading to inefficient volatility. Access to savings and credit instruments allows households to decouple consumption from current income by saving during high-income periods and borrowing or dissaving during low-income periods.

We formalize this insight through a two-period consumption model. A household receives income y_1 in period 1 and y_2 in period 2, with $E(y_1) = E(y_2) = \bar{y}$ but substantial variance in each period. The household has a utility function $U(c)$ exhibiting diminishing marginal utility with $U'(c) > 0$ and $U''(c) < 0$. Without financial access, the household must consume its income each period: $c_1 = y_1$ and $c_2 = y_2$. Total utility equals $U(y_1) + \beta U(y_2)$ where β represents the discount factor.

With financial access, the household can save or borrow at interest rate r, facing the intertemporal budget constraint: $c_1 + c_2/(1+r) = y_1 + y_2/(1+r)$. The household maximizes lifetime utility $U(c_1) + \beta U(c_2)$ subject to this budget constraint. The first-order condition yields $U'(c_1) = \beta(1+r)U'(c_2)$. For simplicity, assume $\beta(1+r) = 1$, implying $U'(c_1) = U'(c_2)$, which combined with the budget constraint gives $c_1 = c_2 = (y_1 + y_2/(1+r))/(1 + 1/(1+r))$.

The welfare gain from financial access equals the difference in expected utility between the consumption smoothing case and the no-access case. By Jensen's inequality, given U is concave, $E[U(y)] < U(E[y])$ when income is variable. Therefore, the ability to smooth consumption to equal expected income in both periods yields higher utility than consuming volatile income directly. The magnitude of the welfare gain increases with the degree of income volatility and the curvature of the utility function (degree of risk aversion).

This framework generates several testable predictions. First, households with financial access should exhibit lower consumption volatility than households without access, conditional on income volatility. Second, the consumption smoothing benefits of financial inclusion should be larger for households facing greater income variability, such as agricultural households subject to weather shocks or informal sector workers with irregular income. Third, savings and credit instruments should be complements rather than substitutes in household portfolios, as both facilitate consumption smoothing through different mechanisms.

3.2. Investment in Human Capital Channel

The second channel through which financial inclusion affects poverty operates through enabling investments in human capital that yield returns over extended time horizons. Following (Becker,1964), human capital investments such as education and health care involve upfront costs with benefits accruing over many years. Credit constraints prevent households from making optimal human capital investments when they cannot borrow against future income, particularly affecting poor households with limited current resources.

Consider a household deciding on education investment for a child. The investment costs I incurred in the current period, while returns R accrue annually over T future periods. The net present value of the education investment equals NPV:

$$-I + \sum_{t=1}^{T} \frac{R}{(1+r)^t}$$

The household should invest if NPV > 0. However, without access to credit, the household faces a liquidity constraint: investment cannot exceed current disposable income after subsistence consumption. If I > current disposable income, the household cannot make the investment even if NPV > 0, resulting in inefficient underinvestment in human capital.

Financial inclusion relaxes this constraint by allowing households to borrow against future returns to human capital investment. With credit access, the household can invest optimally based on NPV rather than being constrained by current liquidity. This generates several predictions. First, households with financial access should invest more in education and health than similar households without access. Second, the impact should be largest for investments with long payback periods, as these require larger upfront expenditures and generate returns over extended horizons. Third, the effect should be strongest for households that were previously credit constrained, typically those with low income and few assets.

Human capital investments not only increase future income for the household making the investment but also generate positive externalities. More educated individuals are more productive workers, contributing to aggregate economic growth. They are healthier, reducing public health costs. They have smaller families with better-nourished and educated children, generating intergenerational poverty reduction. These multiplier effects mean that the social returns to financial inclusion through the human capital channel may exceed private returns.

3.3. Entrepreneurship Channel

The third channel linking financial inclusion to poverty reduction operates through enabling productive entrepreneurship. Following the occupational choice model developed by Evans and (Jovanovic,1989), individuals choose between wage employment and self-employment based on their entrepreneurial ability and access to startup capital. Many individuals with profitable business ideas lack the capital to start businesses, particularly in developing countries where capital markets function imperfectly.

We model this using a simple framework. An individual possesses entrepreneurial ability θ drawn from distribution $F(\theta)$. If the individual becomes an entrepreneur, they earn income $\pi(\theta,K)$ where K represents capital invested in the business, with π increasing in both θ and K. If they remain a wage worker, they earn wage w. The individual prefers entrepreneurship if $\pi(\theta,K) > w$. However, starting a business requires minimum capital K_min. Without financial access, the individual can only invest their own wealth A in the business. If $A < K\_min$, the individual cannot start a business regardless of their entrepreneurial ability.

Financial inclusion expands entrepreneurship through two mechanisms. First, credit allows individuals to borrow capital to supplement their own wealth, enabling business formation when $A + L \geq K\_min$ where L represents borrowed capital. Second, access to business savings accounts facilitates capital accumulation over time, allowing individuals to reach K_{min} more quickly than through informal savings methods vulnerable to theft or spending pressure from relatives.

This framework generates testable hypotheses. Financial access should increase the rate of business formation, particularly among individuals with intermediate wealth levels who have some capital but insufficient amounts to start businesses without credit. The effect should be smaller among very poor households who cannot afford even minimal business investments and very wealthy households who are not credit constrained. Industries with lower capital requirements should see larger increases in new business formation following expansion of financial access. Female entrepreneurship should respond particularly strongly to financial inclusion given that women face larger barriers to credit access in many developing economies.

The entrepreneurship channel creates dynamic effects on poverty. New businesses generate income for entrepreneurs, directly reducing their poverty. They create employment opportunities for others, indirectly reducing poverty. Successful businesses accumulate capital, building household wealth that provides insurance against future shocks. The aggregate effect of expanded entrepreneurship is economic dynamism and job creation that accelerates poverty reduction at the community and national levels.

3.4. Risk Management Channel

The fourth channel operates through improved risk management via access to insurance and precautionary savings. Following the literature on risk and poverty, including (Rosenzweig & Wolpin ,1993 ; Dercon ,2002), poor households in developing countries face substantial income risks from sources including weather shocks, health problems, price fluctuations, and economic crises. Without insurance mechanisms, these shocks force costly coping strategies such as asset depletion, reduced consumption, or removing children from school, creating poverty traps where temporary shocks have permanent consequences.

We formalize risk management using a model with uncertain income. A household receives income y_{good} with probability p and y_{bad} with probability (1-p), where $y_{good} > y_{bad}$. Without insurance, expected utility equals $p \cdot U(y_{good}) + (1-p) \cdot U(y_{bad})$. The household can purchase insurance at cost C that pays benefit B when the bad state occurs, such that consumption in the bad state increases to $y_{bad} + B - C$ while consumption in the good state falls to $y_{good} - C$.

The household purchases insurance if $p \cdot U(y_{good} - C) + (1-p) \cdot U(y_{bad} + B - C) > p \cdot U(y_{good}) + (1-p) \cdot U(y_{bad})$. For actuarially fair insurance where $C = (1-p) \cdot B$, risk-averse households (those with concave utility functions) always prefer insurance. Even with loading costs making insurance actuarially unfavorable, sufficiently risk-averse households purchase coverage to avoid catastrophic losses.

Beyond formal insurance, access to savings serves an insurance function by allowing households to accumulate precautionary savings that buffer shocks. Without savings accounts, households may accumulate assets such as livestock or jewelry, but these are less liquid, may need to be sold at unfavorable prices during crises, and are vulnerable to theft or loss. Financial savings provide a more efficient self-insurance mechanism.

The risk management channel generates several predictions. Households with insurance or savings access should maintain higher consumption and asset levels following negative shocks than households without financial access. They should be less likely to employ costly coping mechanisms such as removing children from school or reducing food consumption. Agricultural households, facing particularly high weather-related risks, should benefit especially from risk management instruments. The poverty-reducing effects of risk management tools should be most apparent during crisis periods when shocks materialize.

3.5. Integrated Framework

While we have described four channels separately, they interact in practice. Consumption smoothing capability enables human capital investments by ensuring that temporary income shortfalls do not force removal of children from school.

Entrepreneurship success depends on ability to manage business risks through insurance and savings. Human capital investments increase entrepreneurial success by improving business management capabilities. These complementarities mean that the total effect of comprehensive financial inclusion across multiple dimensions may exceed the sum of individual channel effects.

We express this integrated framework as a household production function: $W_{(t+1)} = f(W_t, H_t, \theta_t, F_t, X_t, \varepsilon_t)$, where W represents household welfare (inversely related to poverty), H represents human capital, θ represents entrepreneurial ability, F represents financial inclusion across multiple dimensions, X represents other household and environmental characteristics, and ε represents shocks. Financial inclusion F enters both directly and through interactions with other arguments, capturing that financial access both directly increases welfare and amplifies the productivity of human capital and entrepreneurial ability.

This integrated framework emphasizes that financial inclusion represents an enabling factor that allows households to actualize their productive potential rather than being constrained by credit, savings, and insurance market failures. The poverty-reducing effect of financial inclusion should therefore be understood as removing constraints that previously prevented households from making optimal decisions regarding consumption, investment, entrepreneurship, and risk management.

IV. DATA AND METHODOLOGY

This section describes the data sources, variable construction, and summary statistics that form the foundation for our empirical analysis. We have assembled a rich panel dataset combining country-level aggregates with microeconomic household survey data to examine the relationship between financial inclusion and poverty reduction across multiple levels of analysis.

4.1. Data Sources

Our analysis draws on multiple complementary data sources that together provide comprehensive coverage of financial inclusion, poverty, and economic conditions across developing countries. The primary data source for financial inclusion measures is the Global Financial Inclusion (Global Findex) Database compiled by the World Bank. This database contains nationally representative surveys of adults in over 140 countries conducted in 2011, 2014, 2017, and 2021, providing information on how individuals save, borrow, make payments, and manage risk. The survey interviews approximately 1,000 adults per country using randomly selected stratified sampling, yielding representative data on financial access and usage. For our purposes, the Global Findex provides detailed information on account ownership, credit access, savings behavior, insurance coverage, and digital financial service usage that forms the basis of our Financial Inclusion Index.

Poverty data comes from the World Bank's PovcalNet database, which compiles poverty estimates based on national household surveys conducted by statistical agencies in each country. These surveys measure household consumption or income and calculate the percentage of the population living below international poverty lines. We utilize the poverty headcount ratio measured at $2.15 per day in 2017 purchasing power parity terms, which represents the international extreme poverty line. This measure captures the proportion of the population unable to afford basic necessities. While measurement challenges exist in poverty data, particularly regarding informal incomes and consumption, the PovcalNet database represents the most comprehensive and methodologically consistent source of cross-country poverty statistics available.

Economic and demographic data comes from the World Bank's World Development Indicators database. This includes GDP per capita in constant 2015 dollars, educational enrollment and attainment statistics, health indicators, infrastructure measures such as electricity access and internet penetration, trade openness calculated as exports plus imports as a percentage of GDP, inflation rates from consumer price indices, and population characteristics including age structure and urbanization rates. These variables serve as controls in our regressions and allow us to distinguish the specific effects of financial inclusion from broader economic development trends.

Governance indicators come from the Worldwide Governance Indicators project maintained by the World Bank, which provides measures of six dimensions of governance: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law, and control of corruption. These indicators, available biennially from 1996 to 2020, capture institutional quality that may affect both financial sector development and poverty outcomes. We focus particularly on regulatory quality and rule of law as these most directly relate to financial sector functioning.

For our instrumental variable estimation, we utilize several additional data sources. Historical banking regulations come from (Abiad et al.,2010), who compiled detailed information on financial sector reforms across countries from the 1970s through 2005. Terrain ruggedness data comes from (Nunn & Puga ,2012), who calculated average terrain ruggedness for countries based on elevation data from geographic information systems. Mobile network coverage data comes from the GSMA Mobile Connectivity Index, which tracks mobile network availability and quality across countries.

4.2. Sample Construction

Our analysis sample consists of 45 developing countries with complete data on financial inclusion and poverty over the period 2015 to 2024. We define developing countries as those classified as low-income or middle-income by the World Bank as of 2015, excluding high-income countries where financial inclusion and extreme poverty are no longer major policy concerns. Within developing countries, we further restrict the sample to countries with consistent poverty monitoring over time, as many countries lack regular poverty surveys necessary for panel data analysis.

The 45 countries in our sample include 12 from Sub-Saharan Africa: Benin, Burkina Faso, Ethiopia, Ghana, Kenya, Malawi, Mali, Nigeria, Rwanda, Tanzania, Uganda, and Zambia. These represent the region with the lowest financial inclusion rates and highest poverty levels globally. We include 14 Asian countries: Bangladesh, Cambodia, India, Indonesia, Laos, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Timor-Leste, Uzbekistan, and Vietnam. These countries span a range of development levels from low-income countries such as Nepal and Cambodia to upper-middle-income countries such

as Thailand and China. Latin America is represented by 11 countries: Bolivia, Brazil, Colombia, Dominican Republic, Ecuador, El Salvador, Guatemala, Honduras, Mexico, Nicaragua, and Peru. From the Middle East and North Africa region, we include 8 countries: Egypt, Jordan, Morocco, Tunisia, West Bank and Gaza, Yemen, Djibouti, and Mauritania.

The temporal scope of our analysis spans 2015 to 2024, providing nine annual observations per country and yielding 405 country-year observations for most analyses. This time period is particularly salient as it encompasses rapid expansion of digital financial services, particularly mobile money in Africa and digital payments in Asia, allowing us to capture the effects of these innovations. The period also includes the COVID-19 pandemic years of 2020 to 2021, which accelerated digital financial service adoption and affected both poverty and financial access through multiple channels. We conduct robustness checks excluding pandemic years to ensure our results are not driven by this unusual period.

4.3. Variable Construction

The dependent variable in our main analysis is the poverty headcount ratio at $2.15 per day in 2017 purchasing power parity terms, expressed as the percentage of the population living below this threshold. This measure ranges from 1.2% in Thailand to 71.3% in Madagascar in our sample, with a mean of 24.8% and standard deviation of 18.7%. The poverty measure is based on household surveys that collect detailed consumption or income data, apply appropriate deflators to convert nominal values to real terms, and compare household per capita consumption or income to the international poverty line converted to local currency using PPP exchange rates.

Our key independent variable is a Financial Inclusion Index that aggregates four dimensions of financial access and usage. The first component is account ownership, measured as the percentage of adults aged 15 and above who report having an account at a financial institution or through a mobile money provider. This captures the most basic dimension of financial inclusion. The second component is credit access, measured as the percentage of adults who report borrowing from a financial institution in the past year. The third component is savings behavior, measured as the percentage of adults who report saving at a financial institution in the past year. The fourth component is insurance coverage, measured as the percentage of adults who report having personal or agricultural insurance. We standardize each component to have mean zero and standard deviation one, then average the four standardized components to create the composite Financial Inclusion Index. This index has mean zero by construction and ranges from negative 2.4 for countries with very low financial inclusion to positive 2.1 for countries with relatively high financial inclusion.

Control variables include GDP per capita in thousands of constant 2015 dollars, which controls for overall economic development. We include average years of schooling for adults aged 25 and above to capture human capital. Infrastructure quality is measured using the percentage of the population with access to electricity and the percentage with internet access, combined into an infrastructure index. Trade openness is calculated as exports plus imports as a percentage of GDP. Inflation rate is included as sustained high inflation erodes real incomes and affects poverty. Governance quality is captured using the rule of law index from the Worldwide Governance Indicators, which measures perceptions of the quality of contract enforcement, property rights, the police, and the courts.

For our instrumental variable estimation, we construct three instruments. The historical regulation instrument is based on the financial liberalization index developed by (Abiad et al., 2010), which scores countries on seven dimensions of financial sector reform including credit controls, interest rate liberalization, entry barriers, state ownership, capital account restrictions, prudential regulations, and securities market development. We use each country's score as of the year 2000 as an instrument, reasoning that regulatory frameworks established before our sample period affect current financial inclusion but do not directly determine current poverty levels except through their impact on financial development.

The second instrument is geographic distance to financial centers, calculated as the population-weighted average distance from each location within a country to the nearest city with population exceeding 500,000. This measure captures that physical distance creates transaction costs for financial service provision, affecting the costs of expanding financial access, but should not directly affect poverty conditional on current economic conditions. The third instrument leverages mobile network infrastructure to instrument for mobile financial services. Specifically, we use terrain ruggedness as an instrument for mobile money penetration, as rugged terrain increases the costs of deploying mobile network towers but plausibly does not directly affect poverty outcomes once we control for current infrastructure and economic development.

V. EMPIRICAL RESULTS

This section presents the main empirical findings regarding the relationship between financial inclusion and poverty reduction. We begin with baseline fixed effects estimates, proceed to instrumental variable estimates that address endogeneity concerns, examine heterogeneous effects across different contexts, and conduct multiple robustness checks to assess the sensitivity of our findings.

5.1. Baseline Fixed Effects Estimates

Table 1 presents our baseline estimates from panel regressions with country and year fixed effects. Column 1 shows a simple bivariate regression of poverty on the Financial Inclusion Index without additional controls. The coefficient of negative 2.31 indicates that a one standard deviation increase in financial inclusion is associated with a 2.31 percentage point reduction in the poverty rate, significant at the 1% level. Given that the mean poverty rate in our sample is 24.8%, this represents a 9.3% reduction in poverty relative to the mean.

Column 2 adds GDP per capita as a control, recognizing that economic growth drives both financial deepening and poverty reduction. The financial inclusion coefficient declines modestly to negative 1.87 but remains highly significant. This suggests that financial inclusion affects poverty beyond simply proxying for overall economic development. The GDP per

capita coefficient of negative 0.42 indicates that each $1,000 increase in GDP per capita correlates with a 0.42 percentage point reduction in poverty, though this effect is measured holding financial inclusion constant.

Column 3 adds additional controls including education, infrastructure, trade openness, inflation, and governance quality. The financial inclusion coefficient declines to negative 1.54 but remains statistically significant at the 1% level. This specification controls for multiple channels through which countries develop economically, yet financial inclusion retains independent explanatory power for poverty outcomes. The education coefficient is negative and significant, confirming that human capital development reduces poverty. Infrastructure quality also shows a negative coefficient, though not statistically significant. Trade openness shows a small negative coefficient, consistent with the view that international trade supports poverty reduction through economic growth. Inflation enters with a positive coefficient as expected, since inflation erodes real incomes and particularly harms the poor who hold few inflation-hedged assets. Governance quality measured by rule of law shows a negative coefficient, suggesting that better institutions facilitate poverty reduction.

Column 4 includes state-specific linear time trends in addition to year fixed effects, allowing each country to follow its own trend in poverty reduction beyond common global patterns. This specification addresses potential confounding from country-specific trajectories that might be correlated with both financial inclusion expansion and poverty reduction. The financial inclusion coefficient remains negative 1.32 and significant at the 5% level. The stability of the coefficient across specifications with progressively more stringent controls provides confidence that the relationship between financial inclusion and poverty reflects a genuine effect rather than spurious correlation.

To assess whether financial inclusion effects differ across the distribution of financial access, we divide countries into quartiles based on baseline financial inclusion levels and estimate separate coefficients for each quartile. The results, presented in Column 5, reveal that effects are largest in countries with low initial financial inclusion (Quartile 1 coefficient of negative 2.84) and decline in countries with higher baseline financial access (Quartile 4 coefficient of negative 0.76, not statistically significant). This pattern of diminishing returns is intuitive: expanding financial access from 10% to 30% of the population likely has larger poverty impacts than expanding from 70% to 90%, as the initial expansion reaches previously excluded poor households while later expansion increasingly covers non-poor households already close to financial access.

5.2. Instrumental Variable Estimates

While the fixed effects estimates control for time-invariant country characteristics and common time trends, endogeneity concerns remain. Reverse causality could operate if poverty reduction increases demand for financial services, causing financial institutions to expand in response to growing markets. Omitted variable bias could arise if unobserved factors such as political reforms or economic shocks affect both financial inclusion and poverty simultaneously. To address these concerns, we implement instrumental variable estimation using the three instruments described in Section 4.3: historical banking regulations, geographic distance to financial centers, and terrain ruggedness instrumented mobile network coverage.

Table 2 presents first-stage results regressing the Financial Inclusion Index on the three instruments plus all control variables. Column 1 shows that each instrument enters with the expected sign and is individually significant. Historical financial liberalization from 2000 positively predicts current financial inclusion, with a coefficient of 0.34 meaning that each one-point higher liberalization score in 2000 translates to 0.34 standard deviations higher financial inclusion currently. Geographic distance to financial centers negatively predicts financial inclusion with a coefficient of negative 0.021, indicating that each additional 100 kilometers of average distance to urban centers reduces financial inclusion by 0.21 standard deviations. Terrain ruggedness negatively predicts financial inclusion with a coefficient of negative 0.18, operating primarily through its effect on mobile network deployment.

The F-statistic for the joint significance of instruments in the first stage equals 27.3, well exceeding conventional thresholds for weak instruments. (Stock & Yogo ,2005) suggest that F-statistics above 10 indicate instruments of sufficient strength to avoid substantial bias, and our value of 27.3 provides confidence that our instruments strongly predict financial inclusion. Column 2 shows the reduced form regression of poverty directly on the instruments, confirming that instruments correlate with poverty outcomes, as required for a valid instrument. Column 3 presents overidentification tests examining whether the instruments satisfy exclusion restrictions. With three instruments and one endogenous variable, we have two overidentifying restrictions. The Hansen J-statistic of 3.26 with p-value of 0.19 fails to reject the null hypothesis that instruments are valid, supporting the exclusion restriction that instruments affect poverty only through their effect on financial inclusion.

Table 3 presents second-stage results with poverty as the dependent variable and financial inclusion instrumented. Column 1 shows the IV estimate with all controls, yielding a coefficient of negative 3.14, significant at the 1% level. This estimate is notably larger in absolute magnitude than the OLS estimate of negative 1.54 from Table 1 Column 3. The larger IV estimate suggests that OLS understates the true causal effect, likely due to measurement error in financial inclusion that creates attenuation bias. The Global Findex survey data captures formal financial access but may miss informal financial arrangements, causing measured financial inclusion to imperfectly proxy true financial access. Instrumental variables correct for this measurement error, yielding larger coefficients.

Economically, the IV coefficient of negative 3.14 implies that a 10 percentage point increase in financial inclusion causes a 3.14 percentage point reduction in extreme poverty. Given that mean poverty in our sample is 24.8%, this translates to a 12.7% reduction in poverty. For a typical country with population of 50 million and poverty rate of 25%, a 10 percentage point increase in financial inclusion would lift approximately 1.6 million people out of extreme poverty (50 million times 0.25 times 0.127). These effects are economically substantial and suggest that financial inclusion represents a powerful poverty reduction tool.

Column 2 examines whether IV estimates differ across regions by including interactions between financial inclusion and region dummies. The results indicate that Sub-Saharan Africa shows the largest coefficients with a value of negative 4.28,

followed by South Asia with negative 3.62, Southeast Asia with negative 2.97, Latin America with negative 2.15, and Middle East/North Africa with negative 1.88. These regional differences likely reflect heterogeneity in baseline financial exclusion, with regions having lower initial financial access experiencing larger marginal impacts from financial inclusion expansion. They may also reflect regional differences in the quality of financial institutions, effectiveness of financial sector regulation, and complementary factors such as digital infrastructure.

5.3. Mechanisms and Channels

To investigate the specific mechanisms through which financial inclusion reduces poverty, we examine effects on intermediate outcomes that correspond to the theoretical channels developed in Section 3. Table 4 presents IV estimates with various outcome variables measuring consumption smoothing, human capital investment, entrepreneurship, and risk management.

Panel A examines consumption smoothing by analyzing consumption volatility as the outcome. We calculate the standard deviation of log consumption for households within each country-year cell from household survey data. The results in Column 1 show that financial inclusion significantly reduces consumption volatility, with a coefficient of negative 0.087 indicating that a one standard deviation increase in financial inclusion reduces consumption volatility by 0.087 standard deviations. This confirms that financially included households better smooth consumption over time, consistent with the theoretical prediction that access to savings and credit allows decoupling of consumption from transitory income fluctuations.

Column 2 examines whether the consumption smoothing effect is stronger for households facing greater income volatility. We interact financial inclusion with agricultural dependence, measured as the share of households deriving primary income from agriculture. Agricultural households face particularly high income volatility due to weather shocks and price fluctuations. The interaction term is negative and significant, confirming that financial inclusion provides larger consumption smoothing benefits for households with more volatile income. The magnitudes indicate that for non-agricultural households, financial inclusion reduces consumption volatility by 5%, while for agricultural households the reduction reaches 14%.

Panel B investigates the human capital channel by examining education outcomes. Column 1 shows that financial inclusion significantly increases secondary school enrollment rates, with a coefficient of 1.42 indicating that a 10 percentage point increase in financial inclusion raises secondary enrollment by 1.42 percentage points. Column 2 examines education expenditure as a share of total household spending, finding that financial inclusion increases educational spending by 0.38 percentage points, representing a 15% increase from the baseline mean of 2.5%. These findings support the theoretical prediction that financial inclusion allows credit-constrained households to invest more in children's education by borrowing against future returns.

Column 3 examines whether effects differ by household income level by including interactions between financial inclusion and income quintiles. The results reveal that the largest education effects occur for households in the second and third income quintiles, while effects are smaller for the poorest quintile and the richest quintile. This pattern suggests that the very poorest households remain constrained even with financial access, perhaps because education costs exceed even expanded borrowing capacity or because extreme poverty forces focus on immediate survival rather than long-term investment. The richest households were not credit constrained initially, so financial inclusion provides little additional benefit for their education decisions.

Panel C examines the entrepreneurship channel. Column 1 shows that financial inclusion increases business ownership rates by 1.72 percentage points. Column 2 examines whether this reflects entry of new businesses or expansion of existing businesses by decomposing business ownership into extensive and intensive margins. The results indicate that financial inclusion primarily operates through the extensive margin, enabling formation of new businesses rather than expansion of existing enterprises. This pattern is consistent with the theoretical model in which financial inclusion allows individuals with profitable business ideas but insufficient capital to start businesses that were previously infeasible.

Column 3 investigates which types of businesses emerge following financial inclusion expansion. We categorize businesses into capital-intensive sectors such as manufacturing and construction versus less capital-intensive sectors such as retail trade and services. The results show that financial inclusion increases business ownership in both categories but with larger effects for less capital-intensive sectors. This suggests that expanded financial access primarily enables small-scale entrepreneurship rather than large-scale industrial ventures, reflecting that even with improved financial access, credit constraints remain binding for very capital-intensive investments. The types of businesses created include small shops, food vendors, tailoring operations, agricultural processing, transport services, and personal services, consistent with the forms of microenterprises common in developing economies.

Panel D examines the risk management channel by analyzing how financial inclusion affects household responses to adverse shocks. Using household survey data, we identify households that experienced major health shocks defined as illness or injury requiring hospitalization in the past year. Column 1 shows that among households experiencing health shocks, those with financial access are 12 percentage points less likely to report selling assets to finance health expenses. Column 2 shows that financially included households experiencing shocks are 8 percentage points less likely to remove children from school. Column 3 examines consumption responses, finding that financially included households maintain consumption levels that are 18% higher than financially excluded households following health shocks.

These findings confirm that financial inclusion provides an insurance function, allowing households to cope with adverse events without resorting to costly strategies that perpetuate poverty. The mechanisms include direct insurance products that pay benefits following shocks as well as savings that households can draw down and credit that allows borrowing to smooth consumption during temporary income shortfalls. The ability to manage risks without asset depletion or reduced human capital investment explains why financial inclusion generates not just short-term poverty reduction but sustainable long-term poverty exits.

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