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Financial Development and Poverty Reduction in Developing Countries: The Role of Entrepreneurial Activity

Summary: This study empirically examines links between financial development and poverty reduction in developing countries during the period 2000-2019, paying special attention to the role played by entrepreneurial activity. For this purpose, we apply fixed effects and random effects models with panel data by using different measures of incidence and intensity of poverty. Our results confirm that financial development is closely connected to poverty reduction, and provide new evidence on the importance of entrepreneurial activity in developing economies in terms of poverty mitigation and how entrepreneurship can modulate the relationship between financial development and poverty reduction. These findings involve significant policy implications that give entrepreneurship a prominent role in anti-poverty programs in developing countries.

Keywords: Financial development, Poverty reduction, Entrepreneurial activity, Developing countries, Panel data.

JEL: I32, L26, O10.

Nowadays, poverty constitutes a serious problem in both developed and developing countries and is a top priority for the United Nations Sustainable Development Goals (SDGs). Poverty is a multifaceted phenomenon that encompasses various dimensions, including numerous social, economic and political aspects (Deepa Narayan et al. 2000; Federica Misturelli and Claire C. Heffernan 2008; Anthony B. Atkinson 2019). From the perspective of society as a whole, higher poverty rates tend to lead to the consequent reduction in the productive capacity of the economy. In developing countries, with future generations in mind, said reduction could favour the inter-generational transmission of poverty, thus contributing to the perpetuation of the vicious cycles that characterize underdevelopment (M. Carmen Blanco-Arana 2019).

It is widely accepted that financial development spurs economic growth in the developing world (see, for example, Michael Appiah, Doren Idan Frowne, and Derrick Tetteh 2020b; António Afonso and Blanco-Arana 2022), but to what extent does it contribute to reducing poverty in those countries? Focusing on the relationship between financial development and poverty, there is growing interest among development scholars and practitioners in studying the potential links between the two (see, for example, Sylviane Guillaumont and Kangni R. Kpodar 2008; Selim Akhter and Kevin Daly 2009; Salvador Pérez-Moreno 2011; Appiah, Frowne, and Tetteh 2020a; Segun Thompson Bolarinwa et al. 2022; Jakob De Haan, Regina Pleninger, and Jan-

Egbert Sturm 2022, among others). A large body of literature has shown that financial development may contribute to reducing income inequality and particularly poverty. However, the results of other research studies indicate that financial development has no effect on poverty alleviation, so there is no consensus.

There is also a vast literature that addresses the importance of entrepreneurship as a key aspect to combat poverty. Much research has found that entrepreneurship can help facilitate poverty reduction (José Ernesto Amorós and Oscar Cristi 2011; Stephanie Furlough-Morris 2017; Simeon Djankov, Dorina Georgieva, and Rita Ramalho 2018; Amorós et al. 2021; Ostonokulov Azamat, Sattoriy Fayzullokh, and Abdullayeva Nilufar 2023) by creating new jobs and increasing the income of those living in poverty, although there is no consensus either in the empirical literature on its effectiveness (see, for instance, Muhammadsuhaimee Yanya 2012; Sharon A. Alvarez and Jay B. Barney 2014, among others).

The purpose of this paper is to examine the connection between financial development and poverty reduction in developing countries between 2000 and 2019, focusing on the potential role played by entrepreneurial activity.

The remainder of the paper is as follows. Section 1 reviews the literature, summarizes the main findings and ideas, and establishes hypotheses. Section 2 describes the data and methodology used in our analysis. Section 3 presents and discusses the results, and Section 4 offers some conclusions.

1. Review of the Literature and Hypotheses

1.1 Financial Development and Poverty Reduction

The effects of finances on poverty reduction have been widely studied in the existing literature, but consensus does not exist on whether financial development benefits a whole population equally, or whether it benefits the rich and the poor disproportionately. Within this body of research, several studies are devoted to individual countries, while the majority examine groups of countries. In some instances, the focus is on developing nations, while in others both advanced and developing economies are analysed collectively.

Referring to a specific country, Nicholas M. Odhiambo (2010) examines the inter-temporal causal relationship between financial development and poverty reduction in Kenya during the period 1968-2006 using a trivariate causality model based on co-integration and error-correction mechanisms. The author finds a distinct causal flow from financial development to poverty reduction in Kenya. In addition, the study finds unidirectional causality from financial development to savings, and bidirectional causality between savings and poverty reduction. Furthermore, Gazi S. Uddin et al. (2014) study the relationship between financial development, economic growth, and poverty reduction in Bangladesh using quarter frequency data over the period 1975-2011 through an innovative empirical approach based on ARDL co-integration with structural breaks. They show that a long-run relationship between financial development, economic growth, and poverty reduction does exist in Bangladesh. In particular, financial development helps to reduce poverty, but its effect is not linear. From a micro perspective, Dina Chhron (2021) examines the effect of access to microfinance on

household poverty and welfare using cross-sectional data from a 2015 survey of 411 households in 48 districts located in nine of Cambodia's provinces. The findings suggest that access to microfinance is associated with poverty reduction and increased per capita income of households, but access to microfinance services has an insignificant impact on household welfare proxied by per capita economic assets and expenditure on child well-being.

Concerning a group of countries, Patrick Honohan (2004) studies the impact of banking depth on poverty reduction in China, Russia, the United Kingdom, and Korea by means of ordinary least squares (OLS) techniques for the period 1960-2000, proving that finance-intensive growth is empirically associated with lower poverty ratios, even after allowing for mean income and inequality. Thorsten Beck, Asli Demirgüç-Kunt, and Ross Levine (2007) examine finance, inequality, and the poor in a sample of 72 developing and developed countries for the period 1960-2005, using both OLS regressions and dynamic panel instrumental variable regressions. They find that financial development is associated with a drop in the fraction of the population living on less than $1 a day, verifying the importance of the financial system for the poor. Likewise, Ruixin Zhang and Sami Ben Naceur (2019) present evidence for the connection between financial development, income inequality, and poverty through a comprehensive study of 143 countries between 1961 and 2011. Their results reveal that four dimensions of financial development (access, depth, efficiency, and stability) can significantly reduce inequality and poverty. However, they tend to be aggravated by financial liberalizations. Besides, banking development has a greater impact on income distribution than the stock market.

However, other studies combining in some cases developed and developing countries provide distinct insights. Thus, Nasreddine Kaidi, Sami Mensi, and Mehdi Ben Amor (2019) test the relationship between financial development and poverty by using the three-stage least squares method to examine a sample of 132 countries worldwide observed over the 1980-2014 period, demonstrating that financial development does not improve the situation of the poor. In the same vein, using fixed effects estimation results for an unbalanced panel of 84 countries for the period 1975-2014, the findings of De Haan, Pleninger, and Sturm (2022) show that financial development does not have a direct impact on reducing the poverty gap. Although financial development increases poverty indirectly by promoting income inequality, economic growth and financial instability have no effect on poverty.

Focusing solely on developing countries, Hossein Jalilian and Colin Kirkpatrick (2007) examine the contribution of financial development to poverty reduction in 74 developing countries for the period 1960-1995. They test for a causal process linking financial sector growth and poverty reduction. The empirical results indicate that, up to a threshold level of economic development, financial sector growth contributes to poverty reduction through the growth-enhancing effect. However, the impact of financial development on poverty reduction will be affected by any change in income inequality resulting from financial development. Guillaumont and Kpodar (2008) analyse the relationship between financial development and poverty reduction in a sample of 54 African countries during the period 1966-2000 through a GMM estimator. They identify and quantify the positive and negative channels through which financial

development affects poverty, and they conclude that financial development is on average good for the poor, with the direct effect being stronger than the effect through economic growth. However, these authors also point out that financial instability hurts the poor and partially offsets the benefits of financial development. In addition, Akhter and Daly (2009) study the direct effect of financial development on poverty reduction by analysing a set of panel data from 54 developing countries for the period 1993-2004. By using an efficient estimator called fixed effect vector decomposition (FEVD), they find that on average financial development is conducive to poverty reduction, but that the instability accompanying financial development is detrimental to the poor. Thus, financial sector reforms should be directed at easing credit restrictions while taking into consideration the effects of financial instability on the poor. Furthermore, Pérez-Moreno (2011) studies the relationship between financial development and poverty in 35 developing countries during the period 1970-1990. Using a modified form of traditional Granger causality tests, he finds that in the 1970s and 1980s, financial development (measured by liquid assets of the financial system as a share of GDP, or by money and quasi money as a percentage of GDP) led to the reduction of moderate poverty. In this line, Cyn-Young Park and Rogelio Mercado (2015) study the link between financial inclusion, poverty, and income inequality at the country level for 37 selected developing Asian economies for the period 2004-2012, finding that financial inclusion significantly reduces poverty.

More recently, other studies have found that financial development reduces poverty. For example, Yilmaz Bayar (2017) investigates the relationship between financial development and poverty reduction in emerging market economies during the period 1993-2012, indicating that financial development, including banking sector development and stock market development, had a significant positive impact on poverty reduction in emerging market economies. Likewise, Appiah, Frowne, and Tetteh (2020a) study the extent to which financial development assists the process of reducing poverty through a panel co-integration estimation (namely the FMOLS) applied on a panel of five developing economies over the period 1995-2015. Using liquid liability as a percentage of GDP and domestic private sector credit by bank as a percentage of GDP as the key financial development indicators, their outcomes indicate that both indicators of financial development reduce poverty. In addition, Abdul Rashid and Maurizio Intartaglia (2017) examine the impact of financial development on poverty reduction using a sample of developing countries' unbalanced panel data set from 1985 to 2008. The study finds that financial sector development plays a positive role in reducing absolute poverty, but it does not disproportionately benefit those at the lower end of the income distribution. The poorest 20% of the population benefit from financial development as much as anyone else. Bolarinwa et al. (2022) reviewed the financial development-poverty nexus in Africa between 1996 and 2015. The findings show that financial development appears to diminish absolute poverty, yet it has no impact on relative poverty. While private credit demonstrates a poverty-reducing influence, overall financial development and financial inclusion do not affect poverty in Africa.

So, while empirical evidence in analysis of a specific country suggests a direct or indirect connection between financial development and poverty reduction, other studies that analysed a group of countries provide mixed evidence. To sum up,

although there is no consensus and we find highly varied conclusions, most studies point out a close connection between financial development and poverty reduction, particularly in the developing world.

1.2 Entrepreneurship and Poverty Reduction

In the discourse on poverty alleviation, scholars frequently advocate entrepreneurship as a fundamental and sustainable means of mitigating the economic hardships of people living in poverty (see, among others, Jutta M. Tobias, Johanna Mair, and Celestina Barbosa-Leiker 2013; Myrto Chliova, Jan Brinckmann, and Nina Rosenbusch 2015; Christopher Sutter, Garry D. Bruton, and Juanyi Chen 2019). Taking into consideration that developing regions or countries tend to have more entrepreneurs than richer ones (Scott Shane and Sankaran Venkataraman 2000; Amorós and Cristi 2011), to what extent might entrepreneurship play a key role in reducing poverty or might other factors interfere, contributing to lessening poverty as well?

Despite extensive research, the findings remain inconclusive. For instance, Djankov, Georgieva, and Ramalho (2018), using panel data for 189 economies from 2005 to 2013, find that business-friendly regulations are correlated with the poverty headcount at the country level, but only in the case of getting credit and enforcing contracts. This suggests that entrepreneurial activity, as a source of new jobs, is the conduit for poverty reduction. Similarly, Azamat, Fayzullokh, and Nilufar (2023) identify a strong relationship between entrepreneurship and poverty reduction, using changes in the HDI (Human Development Index) to measure poverty reduction and a panel fixed effects model to analyse data for 73 world countries for the period 2016-2020. Moreover, entrepreneurship development incentives increase the efficiency and capacity of entrepreneurial activities to alleviate poverty.

From a different perspective, Furlough-Morris (2017) analyses the impact of entrepreneurship and the presence of multinational corporations on the change in poverty levels in the nine provinces of South Africa between 2002 and 2015. The results indicate that the provinces with more entrepreneurial activity show faster economic growth and lower incidence of poverty. Furthermore, there is no relationship between the location of multinational corporations and poverty. Similarly, Amorós and Cristi (2011) conduct a study using Global Entrepreneurship Monitor (GEM) and Human Development Index (HDI) data within the context of developing countries. They conclude that entrepreneurial activities, both total and necessity-based, have a positive effect on reducing poverty in developing countries. These results are reconfirmed in Amorós et al. (2021) for the period 2010-2019. Also, Robert Lensink and Thi Thu Pham (2012) explore the impact of microcredit programs on household self-employment profits using data from the Vietnam Household Living Standars Survey (VHLSS) for 2004 and 2006. The findings show that microfinance programs can help households engage in self-employment activities, which in turn can help them escape poverty. Lastly, using panel data collected in 31 provinces in China from 2000 to 2017, Song Lin et al. (2020) find that the correlation between entrepreneurship and poverty alleviation is significant, especially in developed and urban areas.

Moreover, in their literature review Sutter, Bruton, and Chen (2019) present three different perspectives on the role of entrepreneurship in poverty alleviation:

remediation, reform, and revolution. Remediation refers to the use of entrepreneurship as a tool to address immediate needs and provide economic relief to individuals and communities through job creation and income generation. Reform refers to the contribution of entrepreneurship to poverty alleviation through systemic changes in institutions, policies, and social structures. These changes aim to address the root causes of poverty and promote sustainable development. Revolution refers to entrepreneurship acting as a catalyst for radical social and economic transformation. It challenges existing power dynamics and advocates for fundamental changes in the economic system to achieve equitable distribution of resources and opportunities.

In contrast, alternative research indicates a negative relationship between entrepreneurial activity and poverty reduction. For example, Yanya (2012), using panel data from 76 provinces between 1997-2010 in Thailand, finds that business establishment, as an indicator of entrepreneurship, contributes to a higher incidence of poverty and greater income inequality among the population. To further investigate this relationship, Yanya, Roslan Abdul-Hakim, and Nor Azam Abdul-Razak (2013) extend the data collected from 76 provinces in Thailand from 1995 to 2008. The findings show that entrepreneurship plays little or no role in income distribution and poverty reduction in Thailand. Likewise, Alvarez and Barney (2014) state that self-employment, which is the main form of entrepreneurial activity in impoverished areas, has minimal impact on poverty alleviation. Lastly, Vukenkeng Andrew Wujung and Mukete Emmanuel Mbella (2014) conduct a study of Cameroon during the period 1980-2013, the results of which show a significant negative impact of entrepreneurship on poverty in this country, with bidirectional positive causality existing between entrepreneurship and poverty reduction.

Thus, in spite of the significant amount of research conducted in this field, the results obtained so far have not been conclusive.

1.3 Entrepreneurship and the Financial Development-Poverty Reduction Relationship

Based on the previous literature regarding the relationships between financial development and poverty and between entrepreneurial activity and poverty, it is worth considering the extent to which entrepreneurial activity may interfere in the relationship between financial development and poverty reduction and serve as a catalyst in modulating such a relationship in developing countries. Hence, we should take into account that entrepreneurial endeavours often require access to financial resources, which can be facilitated by a well-developed financial system (Demirgüç-Kunt and Vojislav Maksimovic 1998; Win Naudé 2010). A robust financial infrastructure, including efficient banking services and capital markets, provides entrepreneurs with avenues to access funding for their ventures. This access to capital enables entrepreneurs to invest in their businesses, expand operations, and innovate, ultimately promoting income-generating activities and employment opportunities, and fostering poverty reduction (see, Abhijit V. Banerjee and Esther Duflo 2011; Era Dabla-Norris et al. 2015).

Furthermore, entrepreneurial activity can complement financial development by stimulating demand for financial services and products. As entrepreneurs establish and grow their businesses, they increasingly engage with formal financial institutions

for various financial needs, such as working capital loans, investment financing, and risk management solutions. This heightened demand incentivizes financial institutions to innovate and expand their offerings, leading to the deepening and broadening of the financial sector. In turn, an enhanced financial ecosystem provides entrepreneurs with more diverse and tailored financial instruments and services, improving their ability to manage risks, access credit, and navigate financial markets. In this sense, by facilitating greater financial inclusion and empowerment among entrepreneurs, a symbiotic relationship may emerge between entrepreneurial activity and financial development, being able to nuance their combined impact on poverty reduction efforts in developing countries.

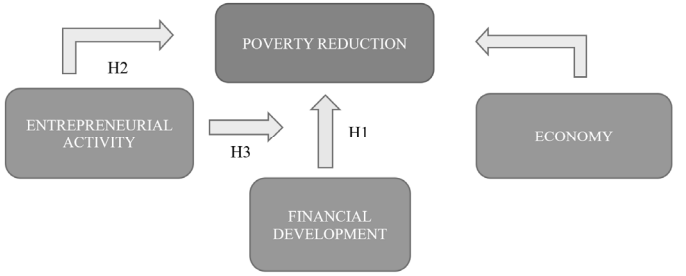
Thus, the aim of this article is to analyse the connection between financial development and poverty reduction in developing countries from 2000 to 2019. We will use different measures of poverty, including incidence and intensity, and consider various poverty thresholds. In our empirical approach, we will focus on the potential role of entrepreneurial activity in the relationship between financial development and poverty alleviation (see Figure 1).

Based on the aforementioned findings and ideas that emerge from the literature review, we formulate the following hypotheses for developing countries:

H1. Greater financial development is expected to be related to poverty reduction (incidence and intensity).

H2. Entrepreneurial activity is expected to be connected to poverty reduction.

H3. Entrepreneurial activity tends to modulate the relationship between financial development and poverty.



Source: Authors' own elaboration.

Figure 1 Links between Financial Development, Entrepreneurial Activity and Poverty Reduction

2. Data, Variables and Methodology

2.1 Data

Developing countries provide a unique and crucial context for studying the relationship between poverty reduction, financial development, and entrepreneurship. These countries face significant challenges in terms of limited access to financial services, high levels of poverty, and an emerging business base.

In this study, we build a database of panel data for the period 2000-2019 with statistical information on poverty, financial development, entrepreneurial activity and GDP per capita in developing countries. Note that the last year included in our analysis is 2019, so as to not distort our analysis with the effects caused by the pandemic. Due to the lack of available data for all countries and years, we work with an unbalanced panel for the period 2000-2019.

We take variables from the World Development Indicators (World Bank 2021)[1]. First, three distinct indicators are used to measure poverty in order to identify extreme poverty and two degrees of moderate poverty (the World Bank defines the extreme poor as those living on less than $1.90 a day). However, because nowadays more people in poverty live in middle-income rather than low-income countries, higher poverty lines have been introduced. These lines are $3.20 and $5.50 a day, which are more typical of poverty thresholds for middle-income countries. We consider the following measures, which reflect the incidence (three indicators) and depth (three indicators) of poverty, as well as its incidence at different levels.

■ Incidence of poverty:

- Poverty headcount ratio at $1.90 a day is the percentage of the population living on less than $1.90 a day at 2011 international prices.
- Poverty headcount ratio at $3.20 a day is the percentage of the population living on less than $3.20 a day at 2011 international prices.
- Poverty headcount ratio at $5.50 a day is the percentage of the population living on less than $5.50 a day at 2011 international prices.

■ Intensity of poverty:

- Poverty gap at $1.90 a day (*Gap $1.90*), in constant 2011 international dollars, which represents the mean shortfall in income or consumption from the $1.90/day poverty line (counting the non-poor as having zero shortfall), expressed as a percentage of the poverty line.
- Poverty gap at $3.20 a day (*Gap $3.20*), in constant 2011 international dollars, which represents the mean shortfall in income or consumption from the $3.20/day poverty line (counting the non-poor as having zero shortfall), expressed as a percentage of the poverty line.
- Poverty gap at $5.50 a day (*Gap $5.50*), in constant 2011 international dollars, which represents the mean shortfall in income or consumption from the $5.50/day poverty line (counting the non-poor as having zero shortfall), expressed as a percentage of the poverty line.

To measure the financial development of countries, we take three fundamental variables, all internationally recognised and most commonly included in studies of this kind (see, for example, Robert G. King and Levine 1993; Levine and Sara Zervos 1998; Beck, Demirgüç-Kunt, and Levine 2000; Levine, Norman Loayza, and Beck 2000; Odhiambo 2010; Mariusz Prochniak and Katarzyna Wasiak 2017; Johan

[1] **World Bank.** 2021. World Development Indicators. https://databank.worldbank.org/source/world-development-indicators (accessed December 20, 2021).

Rewilak 2017; Afonso and Blanco-Arana 2022). Thus, we use the following financial development variables:

- Domestic credit provided by the financial sector as a percentage of GDP (*Domestic credit*), which includes all credit to various sectors on a gross basis, except for credit to the central government, which is net. The financial sector includes monetary authorities and deposit money banks, as well as other financial corporations where data are available (including corporations that do not accept transferable deposits but that incur liabilities such as time and savings deposits). Examples of other financial corporations are finance and leasing companies, moneylenders, insurance corporations, pension funds, and foreign exchange companies.

- Broad money (*Broad money*) as a percentage of GDP is the sum of currency outside banks; demand deposits other than those of the central government; the time, savings, and foreign currency deposits of resident sectors other than the central government; bank and traveller's checks; and other securities such as certificates of deposit and commercial paper.

- Claims on other sectors of the domestic economy as a percentage of GDP (*Claims*), which include gross credit from the financial system to households, nonprofit institutions serving households, nonfinancial corporations, state and local governments, and social security funds.

As a control variable we also include GDP per capita, based on purchasing power parity (PPP) in constant 2017 international dollars, which is gross domestic product converted to international dollars using purchasing power parity rates. An international dollar has the same purchasing power over GDP as the U.S. dollar has in the United States. GDP at purchaser's prices is the sum of gross value added by all resident producers in the country plus any product taxes and minus any subsidies not included in the value of the products. It is calculated, without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. as an indicator of economy (GDP), given the close relationship between GDP growth and poverty reduction (David Dollar and Aart Kraay 2002; Peter Warr 2001; Gaurav Datt and Martin Ravillion 2002; Pradeep Agrawal 2008; Rewilak 2017).

In order to measure entrepreneurship, we use the Entrepreneurship Database from Doing Business. The Doing Business project measures business regulations and their enforcement across the world, and also provides a dataset on entrepreneurship called the Entrepreneurship Database. This database describes entrepreneurship as "the activities of an individual or a group aimed at initiating economic enterprise in the formal sector under a legal form of business". In other words, this database focuses on the registration of firms as a legal entity (and therefore exclusively on the formal sector). Data are extracted from national business registries. Thus, we use the following variable:

- The business entry rate (*Entry rate*), defined as the number of newly registered firms with limited liability per 1,000 working-age people (ages 15-64).

In the Appendix we report the summary statistics (Table 1A) and correlation matrix (Table 1B) for the variables used in the analysis. Thus, Table 1A shows the main descriptive measures of the variables used, while Table 1B displays the correlation tests used to establish how the interacted variables will react to the other variables.

2.2 Methodology

■ Preliminary tests

At the first stage, we could consider the basic approach to regression analysis with panel data, such as pooled regression. The advantage of estimation through OLS lies in the simplification that results from being able to determine the value of a certain endogenous variable through a linear relationship with all the exogenous variables that participate in the system. In contrast, the main drawback of this method lies precisely in the simplification of the model, where the correlation of individual errors with observations is not corrected and, therefore, the resulting estimates will be biased.

Thus, for the situation presented, the Breusch and Pagan test (for a wider discussion of this test, see Trevor Breusch and Adrian Pagan (1980)) leads us to reject the null hypothesis of "no country effects", that is, it is not feasible to carry out an estimation through OLS regression as estimates made with pooled OLS would be biased (Breusch and Pagan 1980). In consequence, another structure has to be used, specifically panel data (results are in Tables 2A, 2B, 2C, 3A, 3B, 3C, 4A, 4B and 4C).

Next, we estimate a random effects model. The advantage of this model is that is does not require excessive statistical resources, since the differences between states are obtained with a random value. With this type of model, we manage to control the individual character of each state, since they are heterogeneous. The main drawback is the requirement that the error deviation factor should not be correlated with the explanatory variables, which is not desirable for many situations.

Once this model has been estimated by panel data, we use the Hausman test to contrast which of the nested models is appropriate by comparing their estimates; that is, we choose between the fixed effects or random effects model. Thus, in each case, we apply the fixed effects or random effects model depending on the results of Hausman test (results are in Tables 2A, 2B, 2C, 3A, 3B, 3C, 4A, 4B and 4C), which is conducted to determine the appropriate method for the model.

Moreover, Charles R. Nelson and Charles R. Plosser (1982) argue that almost all macroeconomic time series one typically uses have a unit root. The presence or absence of unit roots helps to identify some features of the underlying data generating process of a series. In the absence of a unit root (stationary), the series fluctuates around a constant long-run mean and implies that the series has a finite variance which does not depend on time. On the other hand, non-stationary series have no tendency to return to a long-run deterministic path and the variance of the series is time dependent. Non-stationary series suffer permanent effects from random shocks, and thus follow a random walk. The results in this study show that all variables are stationary at levels. In particular, following the studies of Appiah, Stephen T. Onifade, and Bright A. Gyamfi (2022, 2024) and Kaodui Li et al. (2023), in this paper we have applied a unit root test to check the robustness of the analysis (see Table 1C in the Appendix). In particular, we have used the Dickey-Fuller (David A. Dickey and Wayne A. Fuller 1979) unit-root test for an unbalanced panel, showing that all variables are stationary at levels.

■ Econometric approach

Thus, with the objective of analysing the effects of the financial development and entrepreneurial activity on poverty reduction and also check how entrepreneurial activity inflects the connection between financial development and poverty reduction in developing countries during the period 2000-2019, we estimate a model with panel data. Due to the simplification offered by an OLS, the correlation of individual errors with the observations is not corrected, and in consequence estimates made with this methodology will be biased (Breusch and Pagan 1980). Thus, the use of the panel data seems to be essential, as this permits controlling the existence of individual effects not controlled by the explanatory variables observed in the model; it also permits controlling through variables that change over time. Some of the advantages and disadvantages of the use of panel data are listed in the study carried out by Badi Baltagi (2001). The advantages that are mentioned include the following: control over individual heterogeneity, greater variability, less collinearity between variables, more degrees of freedom, greater efficiency, better adaptation to the study of adjustment dynamics, better adequacy for identifying and measuring effects that are not detectable in pure cross-sectional or time-series data, and better analysis capacity in more complicated behaviors. The disadvantages of panel data include the problem of data collection, distortions due to measurement errors, and the short time dimension that is generally found in the data sets. According to Jerry A. Hausman and William E. Taylor (1986), one of the most noteworthy characteristics of the use of panel data is the ability to control specific individual effects that may be correlated with other variables.

Therefore, the use of panel data seems fundamental since it allows considering the existence of individual effects not controlled by the explanatory variables observed in the model and, in addition, it allows controlling for variables that change over time. Furthermore, the use of panel data offers more informative data and, as stated, more variability, less collinearity, and a greater degree of freedom (N. Anders Klevmarken 1989; Cheng Hsiao 2003). In consequence, because the considered series is sufficiently long, we opt for an estimation based on panel data.

Therefore, we first propose these alternative linear models:

◆ Incidence of poverty:

$$Pov1.90_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 GDP_{it} + \zeta_i + \omega_{it}, \quad (1)$$

$$Pov3.20_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 GDP_{it} + \zeta_i + \omega_{it}, \quad (2)$$

$$Pov5.50_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 GDP_{it} + \zeta_i + \omega_{it}. \quad (3)$$

◆ Intensity of poverty:

$$Gap1.90_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 GDP_{it} + \zeta_i + \omega_{it}, \quad (1')$$

$$Gap3.20_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 GDP_{it} + \zeta_i + \omega_{it}, \quad (2')$$

$$Gap5.50_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 GDP_{it} + \zeta_i + \omega_{it}. \quad (3')$$

Second, we estimate the same three models shown above, including the entrepreneurial activity.

- Incidence of poverty:

$$Pov1.90_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 GDP_{it} + \zeta_i + \omega_{it}, \quad (4)$$

$$Pov3.20_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 GDP_{it} + \zeta_i + \omega_{it}, \quad (5)$$

$$Pov5.50_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 GDP_{it} + \zeta_i + \omega_{it}. \quad (6)$$

- Intensity of poverty:

$$Gap1.90_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 GDP_{it} + \zeta_i + \omega_{it}, \quad (4')$$

$$Gap3.20_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 GDP_{it} + \zeta_i + \omega_{it}, \quad (5')$$

$$Gap5.50_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 GDP_{it} + \zeta_i + \omega_{it}. \quad (6')$$

Third, as the main novelty of this paper, we estimate the same three models shown above by interacting the financial development variable with the entry rate in order to check how the entrepreneurial activity modulates the relationship between financial development and poverty reduction.

- Incidence of poverty:

$$Pov1.90_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 FDV * Entry_{it} + \beta_4 GDP_{it} + \zeta_i + \omega_{it}, \quad (7)$$

$$Pov3.20_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 FDV * Entry_{it} + \beta_4 GDP_{it} + \zeta_i + \omega_{it}, \quad (8)$$

$$Pov5.50_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 FDV * Entry_{it} + \beta_4 GDP_{it} + \zeta_i + \omega_{it}. \quad (9)$$

- Intensity of poverty:

$$Gap1.90_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 FDV * Entry_{it} + \beta_4 GDP_{it} + \zeta_i + \omega_{it}, \quad (7')$$

$$Gap3.20_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 FDV * Entry_{it} + \beta_4 GDP_{it} + \zeta_i + \omega_{it}, \quad (8')$$

$$Gap5.50_{it} = \beta_0 + \beta_1 FDV_{it} + \beta_2 Entry_{it} + \beta_3 FDV * Entry_{it} + \beta_4 GDP_{it} + \zeta_i + \omega_{it}, \quad (9')$$

where $Gap1.90_{it}$ refers to the poverty gap at \$1.90 a day, $Gap3.20_{it}$ denotes the poverty gap at \$3.20 a day, $Gap5.50_{it}$ refers to the poverty gap at \$5.50 a day, FDV_{it} denotes the respective variable of the financial development variable, $Entry_{it}$ refers to the entrepreneurial activity, GDP_{it} is the above-mentioned control variable, $FDV * Entry_{it}$ refers to the interaction between FDV and entrepreneurial activity variable, ζ_i is the intercept for each country, and ω_{it} are the individual level residuals.

3. Results

According to the methodology discussed in the previous section, the results of the data panel regression analysis for the group of countries considered are reported in Tables 2 (A, B and C), 3 (A, B and C) and 4 (A, B and C).

Table 2A Poverty Reduction Estimation (FDV: Domestic Credit)

Variables	(1) *Pov $1.90*	(2) *Pov $3.20*	(3) *Pov $5.50*	(1') *Gap $1.90*	(2') *Gap $3.20*	(3') *Gap $5.50*
Domestic credit	**-0.043*****	**-0.071*****	**-0.096*****	**-0.024*****	**-0.037*****	**-0.059*****
	[0.016]	[0.023]	[0.027]	[0.008]	[0.012]	[0.017]
GDP	**-10.922*****	**-22.579*****	**-35.315*****	**-4.069*****	**-9.293*****	**-17.903*****
	[1.229]	[1.755]	[2.028]	[0.605]	[0.945]	[1.312]
Constant	**24.302*****	**48.392*****	**79.628*****	**9.519*****	**20.451*****	**39.316*****
	[2.364]	[3.114]	[3.147]	[1.098]	[1.747]	[2.273]
Observations	319	319	319	319	319	319
Number of countries	44	44	44	44	44	44
Breush-Pagan test	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	0.172	0.444	0.922	0.347	0.281	0.592

Notes: Standard deviations in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: World Development Indicators (World Bank 2021).

Table 2B Poverty Reduction Estimation (FDV: Broad Money)

Variables	(1) *Pov $1.90*	(2) *Pov $3.20*	(3) *Pov $5.50*	(1') *Gap $1.90*	(2') *Gap $3.20*	(3') *Gap $5.50*
Broad money	**-0.161*****	**-0.276*****	**-0.234*****	**-0.058*****	**-0.127*****	**-0.196*****
	[0.021]	[0.030]	[0.026]	[0.011]	[0.016]	[0.021]
GDP	**-6.970*****	**-18.466*****	**-35.764*****	**-2.292*****	**-6.471*****	**-15.117*****
	[1.104]	[1.596]	[1.362]	[0.571]	[0.833]	[1.099]
Constant	**26.267*****	**55.244*****	**92.771*****	**9.292*****	**22.236*****	**43.849*****
	[1.067]	[1.542]	[1.862]	[0.552]	[0.805]	[1.062]
Observations	839	839	839	839	839	839
Number of countries	116	116	116	116	116	116
Breush-Pagan test	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	0.000	0.000	0.015	0.000	0.000	0.000

Notes: Standard deviations in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: World Development Indicators (World Bank 2021).

Table 2C Poverty Reduction Estimation (FDV: Claims)

Variables	(1) *Pov $1.90*	(2) *Pov $3.20*	(3) *Pov $5.50*	(1') *Gap $1.90*	(2') *Gap $3.20*	(3') *Gap $5.50*
Claims	**-0.073*****	**-0.111*****	**-0.129*****	**-0.039*****	**-0.060*****	**-0.089*****
	[0.019]	[0.028]	[0.033]	[0.010]	[0.015]	[0.021]
GDP	**-7.324*****	**-17.724*****	**-30.406*****	**-2.425*****	**-6.538*****	**-14.164*****
	[1.418]	[2.080]	[2.426]	[0.709]	[1.107]	[1.551]
Constant	**20.701*****	**43.573*****	**74.990*****	**8.115*****	**17.843*****	**35.745*****
	[2.336]	[3.229]	[3.453]	[1.113]	[1.776]	[2.383]
Observations	281	281	281	281	281	281
Number of countries	38	38	38	38	38	38
Breush-Pagan test	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	0.290	0.633	0.980	0.304	0.392	0.665

Notes: Standard deviations in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: World Development Indicators (World Bank 2021).

First, in Tables 2A, 2B and 2C, in all models we observe that there is a statistically significant negative relationship between financial development and poverty (incidence and intensity). These results support H1 and are consistent with most previous theoretical and empirical literature, such as Jalilian and Kirkpatrick 2007, Guillaumont and Kpodar (2008), Akhter and Daly (2009), Pérez-Moreno (2011), Park and Mercado (2015), Bayar (2017) and Appiah, Frowne, and Tetteh (2020a). Thus, our empirical evidence appears to confirm the importance of financial development as a key aspect to mitigate both the incidence and intensity of poverty in developing countries. In consequence, improved access to financial services, such as savings, credit and insurance, can enable individuals and households to smooth consumption, invest in education and healthcare, and establish or expand microenterprises, thereby improving their resilience to economic shocks and lifting them out of poverty. Additionally, the level of development measured by GDP per capita is also negatively correlated with the different indicators of poverty, as expected.

When we introduce entrepreneurial activity in our model by considering the business entry rate (Tables 3A, 3B, 3C), our analysis reveals that entrepreneurial activity is closely connected with poverty reduction in the sense that entrepreneurship seems to contribute to alleviating both the incidence and intensity of poverty. Thus, our results clearly support H2 in line with previous literature that underscores how entrepreneurship, as a source of employment, income and new economic opportunities, facilitates poverty reduction in low-income contexts (see, for instance, Amorós and Cristi 2011; Lensink and Pham 2012; Furlough-Morris 2017; Lin et al. 2020; Amorós et al. 2021).

Note that when entrepreneurship is introduced in the models, the significance of the respective financial development indicators tends to decrease in favour of the business entry rate, especially when examining poverty indicators with low thresholds of both incidence and intensity measures (Pov $1.90, Pov $3.20, Gap $1.90, Gap $3.20). This highlights the relevance of dealing with entrepreneurial activity in the framework of the relationship between financial development and poverty reduction. In this vein, let us recall that moderate poverty often characterises people who have the potential to move up through investments in education, training, and small-scale entrepreneurship. Therefore, greater financial development, through better access to banking services and credit facilities, could facilitate these investments and empower people to escape poverty. However, people in the most extreme levels of poverty often encounter significantly greater challenges in leveraging these opportunities.

In Tables 4A, 4B and 4C, apart from financial development and entrepreneurial activity indicators, we present the estimates by introducing the interaction between them. Our results confirm the empirical relationships between financial development and entrepreneurial activity with poverty reduction. Even though the latter association is present along all poverty indicators, the relationship between financial development and poverty seems to be modulated by such entrepreneurial activity, in line with the expectations outlined in hypothesis H3. Thus, the greater the level of entrepreneurship is, the lower the association between financial development and poverty reduction. In any case, the link between financial development and poverty is stronger when addressing the reduction of moderate poverty rather than extreme poverty, both in terms of incidence and intensity.

Table 3A Poverty Reduction Estimation (FDV: Domestic Credit)

Variables	(4) *Pov $1.90*	(5) *Pov $3.20*	(6) *Pov $5.50*	(4') *Gap $1.90*	(5') *Gap $3.20*	(6') *Gap $5.50*
Domestic credit	0.002	-0.037	**-0.133*** **	0.003	-0.003	**-0.041** **
	[0.015]	[0.027]	[0.032]	[0.005]	[0.011]	[0.018]
Entry rate	**-0.276** **	**-0.532*** **	**-0.590*** **	**-0.103*** **	**-0.223*** **	**-0.382*** **
	[0.107]	[0.188]	[0.225]	[0.035]	[0.080]	[0.130]
GDP	**-6.252*** **	**-14.074*** **	**-25.197*** **	**-2.090*** **	**-5.427*** **	**-11.392*** **
	[1.412]	[2.492]	[2.972]	[0.443]	[1.060]	[1.715]
Constant	**11.917*** **	**31.896*** **	**68.188*** **	**4.672*** **	**10.969*** **	**27.543*** **
	[1.272]	[2.244]	[2.677]	[1.001]	[0.954]	[1.545]
Observations	179	179	179	179	179	179
Number of countries	32	32	32	32	32	32
Breush-Pagan test	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	0.006	0.000	0.000	0.093	0.003	0.000

Notes: Standard deviations in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: World Development Indicators (World Bank 2021).

Table 3B Poverty Reduction Estimation (FDV: Broad Money)

Variables	(4) *Pov $1.90*	(5) *Pov $3.20*	(6) *Pov $5.50*	(4') *Gap $1.90*	(5') *Gap $3.20*	(6') *Gap $5.50*
Broad money	-0.007	-0.046	**-0.083***	-0.002	-0.01	-0.039
	[0.025]	[0.041]	[0.046]	[0.010]	[0.019]	[0.028]
Entry rate	**-0.248***	**-0.389***	**-0.344**	**-0.086**	**-0.173***	**-0.265***
	[0.136]	[0.221]	[0.250]	[0.057]	[0.101]	[0.150]
GDP	**-4.065*** **	**-9.861*** **	**-20.685*** **	**-1.267*** **	**-3.591*** **	**-8.381*** **
	[1.030]	[1.667]	[1.886]	[0.428]	[0.764]	[1.132]
Constant	**12.607*** **	**31.292*** **	**62.603*** **	**4.090*** **	**11.197*** **	**26.460*** **
	[1.235]	[1.998]	[2.261]	[0.512]	[0.915]	[1.356]
Observations	395	395	395	395	395	395
Number of countries	75	75	75	75	75	75
Breush-Pagan test	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Standard deviations in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: World Development Indicators (World Bank 2021).

Table 3C Poverty Reduction Estimation (FDV: Claims)

Variables	(4) *Pov $1.90*	(5) *Pov $3.20*	(6) *Pov $5.50*	(4') *Gap $1.90*	(5') *Gap $3.20*	(6') *Gap $5.50*
Claims	-0.01	**-0.047***	**-0.092*** **	-0.002	-0.011	**-0.039** **
	[0.015]	[0.028]	[0.034]	[0.005]	[0.011]	[0.018]
Entry rate	**-0.230** **	**-0.517*** **	**-0.633*** **	**-0.093*** **	**-0.191** **	**-0.338*** **
	[0.103]	[0.186]	[0.227]	[0.032]	[0.078]	[0.127]
GDP	**-5.320*** **	**-12.950*** **	**-27.974*** **	**-1.549*** **	**-4.826*** **	**-11.677*** **
	[1.278]	[2.430]	[2.958]	[0.411]	[0.963]	[1.530]
Constant	**13.604*** **	**30.754*** **	**68.548*** **	**4.458*** **	**12.320*** **	**29.705*** **
	[2.326]	[2.231]	[2.715]	[1.082]	[1.753]	[2.381]
Observations	160	160	160	160	160	160
Number of countries	29	29	29	29	29	29
Breush-Pagan test	0.000	0.000	0.000	0.001	0.000	0.000
Hausman test	0.519	0.008	0.023	0.327	0.482	0.075

Notes: Standard deviations in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: World Development Indicators (World Bank 2021).

Table 4A Poverty Reduction Estimation (FDV: Domestic Credit)

Variables	(7) *Pov $1.90*	(8) *Pov $3.20*	(9) *Pov $5.50*	(7') *Gap $1.90*	(8') *Gap $3.20*	(9') *Gap $5.50*
Domestic credit	-0.016	**-0.075*** **	**-0.162*** **	-0.002	-0.017	**-0.065*** **
	[0.015]	[0.025]	[0.030]	[0.005]	[0.011]	[0.018]
Entry rate	**-0.997*** **	**-2.089*** **	**-2.088*** **	**-0.323*** **	**-0.793*** **	**-1.432*** **
	[0.266]	[0.462]	[0.560]	[0.087]	[0.199]	[0.319]
Domestic credit*Entry rate	**0.009*** **	**0.020*** **	**0.019*** **	**0.003*** **	**0.007*** **	**0.013*** **
	[0.003]	[0.005]	[0.006]	[0.001]	[0.002]	[0.004]
GDP	**-6.651*** **	**-14.869*** **	**-26.195*** **	**-2.146*** **	**-5.730*** **	**-12.010*** **
	[1.276]	[2.107]	[2.481]	[0.435]	[0.956]	[1.477]
Constant	**15.381*** **	**37.845*** **	**73.839*** **	**5.067*** **	**13.648*** **	**31.797*** **
	[2.160]	[3.057]	[3.429]	[1.005]	[1.625]	[2.211]
Observations	179	179	179	179	179	179
Number of countries	32	32	32	32	32	32
Breush-Pagan test	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	0.997	0.640	0.390	0.217	0.317	0.488

Notes: Standard deviations in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Sources: World Development Indicators (World Bank 2021).

Table 4B Poverty Reduction Estimation (FDV: Broad Money)

Variables	(7) *Pov $1.90*	(8) *Pov $3.20*	(9) *Pov $5.50*	(7') *Gap $1.90*	(8') *Gap $3.20*	(9') *Gap $5.50*
Broad money	-0.038	**-0.113** **	**-0.163*** **	-0.010	**-0.035***	**-0.087*** **
	[0.028]	[0.045]	[0.050]	[0.012]	[0.021]	[0.030]
Entry rate	**-0.947*** **	**-1.848*** **	**-2.117*** **	**-0.277** **	**-0.731*** **	**-1.313*** **
	[0.306]	[0.492]	[0.555]	[0.128]	[0.227]	[0.333]
Broad money*Entry rate	**0.012** **	**0.026*** **	**0.031*** **	**0.003***	**0.010*** **	**0.018*** **
	[0.005]	[0.008]	[0.009]	[0.002]	[0.004]	[0.005]
GDP	**-4.220*** **	**-10.184*** **	**-21.077*** **	**-1.309*** **	**-3.714*** **	**-8.613*** **
	[1.023]	[1.645]	[1.856]	[0.427]	[0.757]	[1.114]
Constant	**14.455*** **	**35.151*** **	**67.293*** **	**4.594*** **	**12.671*** **	**29.232*** **
	[1.423]	[2.288]	[2.582]	[0.594]	[1.054]	[1.550]
Observations	395	395	395	395	395	395
Number of countries	75	75	75	75	75	75
Breush-Pagan test	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Standard deviations in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: World Development Indicators (World Bank 2021).

Table 4C Poverty Reduction Estimation (FDV: Claims)

Variables	(7) *Pov $1.90*	(8) *Pov $3.20*	(9) *Pov $5.50*	(7') *Gap $1.90*	(8') *Gap $3.20*	(9') *Gap $5.50*
Claims	-0.023	**-0.076** **	**-0.114*** **	-0.005	**-0.021***	**-0.059*** **
	[0.016]	[0.029]	[0.036]	[0.005]	[0.012]	[0.020]
Entry rate	**-0.829*** **	**-1.886*** **	**-1.663** **	**-0.244*** **	**-0.675*** **	**-1.251*** **
	[0.294]	[0.524]	[0.649]	[0.092]	[0.220]	[0.358]
Claims*Entry rate	**0.007** **	**0.017*** **	**0.013***	**0.002***	**0.006** **	**0.011** **
	[0.003]	[0.006]	[0.008]	[0.001]	[0.003]	[0.004]

GDP	**-4.940*** **	**-13.092*** **	**-28.081*** **	**-1.475*** **	**-4.561*** **	**-11.283*** **
	[1.327]	[2.369]	[2.937]	[0.416]	[0.997]	[1.620]
Constant	**11.783*** **	**33.050*** **	**70.275*** **	**3.495*** **	**10.997*** **	**28.423*** **
	[1.303]	[2.325]	[2.883]	[0.409]	[0.979]	[1.590]
Observations	160	160	160	160	160	160
Number of countries	29	29	29	29	29	29
Breush-Pagan test	0.000	0.000	0.000	0.000	0.000	0.000
Hausman test	0.000	0.000	0.000	0.000	0.000	0.000

Notes: Standard deviations in brackets. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Source: World Development Indicators (World Bank 2021).

4. Conclusions

This study empirically examines the relationship between financial development and poverty reduction in developing countries from 2000 to 2019, with a particular focus on the role of entrepreneurial activity. To do this, we have estimated fixed effects and random effects models with panel data, using different measures of incidence and intensity of poverty (at $1.90, $3.20 and $5.50 per day).

Our findings highlight a significant negative association between financial development and poverty reduction in developing countries, confirming the findings of previous theoretical and empirical literature (Jalilian and Kirkpatrick 2007; Guillaumont and Kpodar 2008; Akhter and Daly 2009; Pérez-Moreno 2011; Park and Mercado 2015; Bayar 2017; Appiah, Frowne, and Tetteh 2020a). The results consistently demonstrate that increased financial development is associated with lower levels of both poverty incidence and intensity. This underscores the crucial role of financial development in mitigating poverty within developing economies.

Furthermore, the introduction of entrepreneurship in analytical models reveals a complementary relationship between entrepreneurship and poverty reduction. Entrepreneurship also emerges as an important factor that contributes to alleviating both the incidence and intensity of poverty (especially in the case of moderate poverty), in line with part of the existing literature that highlights the role of entrepreneurship in reducing poverty in low-income contexts, as a mechanism for generating employment, income and economic opportunities (Amorós and Cristi 2011; Lensink and Pham 2012; Furlough-Morris 2017; Lin et al. 2020; Amorós et al. 2021).

Additionally, our study attempts to contribute to the literature by exploring the extent to which entrepreneurial activity may modulate the relationship between financial development and poverty. Our analysis reveals that the greater the level of entrepreneurship is, the weaker the association between financial development and poverty reduction, confirming the hypothesis that entrepreneurial activity plays a significant role in shaping the effectiveness of financial development interventions in poverty reduction efforts, especially in terms of the reduction of moderate poverty rather than extreme poverty.

These findings have important policy implications for anti-poverty programs in developing countries. Policymakers should prioritise initiatives that focus on promoting entrepreneurship alongside traditional financial development programs to maximize the effectiveness of poverty reduction strategies. This involves creating an enabling environment for entrepreneurship through supportive policies, access to finance, skills

development and infrastructure improvement. By integrating entrepreneurship into poverty alleviation frameworks, policymakers can improve the impact of financial development interventions and address the nuanced challenges of moderate poverty more effectively. However, the fight against extreme poverty requires complementary measures, such as redistributive policies, as the most impoverished individuals often encounter significantly greater challenges in benefiting from financial development and entrepreneurial opportunities.

In conclusion, this study contributes to our understanding of the complex relationship between financial development, entrepreneurship and poverty reduction in developing countries. It underlines the importance of considering entrepreneurial activity alongside financial development in poverty alleviation strategies. These insights offer valuable guidance for policymakers seeking to design comprehensive and effective poverty reduction programs that prioritise both financial inclusion and entrepreneurship as key drivers of poverty reduction. Nevertheless, despite its contributions, this study has several limitations, in addition to data constraints on poverty, financial development and entrepreneurship in developing countries. First, the mechanisms underlying the relationships between financial development, entrepreneurship, and poverty reduction at the country level are still not fully understood, suggesting the need for further research to elucidate these complexities. Second, in developing countries, a substantial portion of entrepreneurial activity occurs informally, which may not be fully captured by statistical data. This discrepancy between formal and informal entrepreneurship could potentially bias the findings and limit the generalisability of the results.

Therefore, further research incorporating more nuanced methodologies and data sources is needed to comprehensively understand these dynamics. This way, building upon these findings, future micro research may delve deeper into understanding the specific mechanisms through which entrepreneurial activity influences the relationship between financial development and poverty reduction. Additionally, exploring how various contextual factors, such as institutional frameworks and access to resources, shape the links between poverty, financial development and entrepreneurship would enrich our understanding and inform more targeted policy interventions.

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Appendix

Table 1A Summarize Statistics

Variables	Observations	Mean	Std. dev.	Min.	Max.
Pov $1.90	944	10.86	17.26	0.00	94.30
Pov $3.20	944	22.08	25.17	0.00	98.50
Pov $5.50	944	38.72	30.05	0.10	99.70
Gap $1.90	944	3.97	7.46	0.00	64.10
Gap $3.20	944	9.08	12.91	0.00	77.40
Gap $5.50	944	18.15	18.80	0.00	86.60
Domestic credit	626	58.48	38.29	5.03	192.66
Broad money	2,688	50.31	34.38	2.86	260.06
Claims	523	52.51	33.62	11.77	176.21
Entry rate	1,132	2.35	3.14	0.01	23.59
GDP	2,915	1.00	1.10	0.05	8.26

Source: World Bank (2021).

Table 1B Correlation Matrix

Variables	Pov $1.90	Pov $3.20	Pov $5.50	Gap $1.90	Gap $3.20	Gap $5.50	Domestic credit	Broad money	Claims	Entry rate	GDP
Pov $1.90	1										
Pov $3.20	0.8963	1									
Pov $5.50	0.6982	0.9156	1								
Gap $1.90	0.9502	0.7477	0.5369	1							
Gap $3.20	0.989	0.948	0.7826	0.9165	1						
Gap $5.50	0.8777	0.9924	0.9506	0.739	0.9338	1					
Domestic credit	-0.1569	-0.2331	-0.278	-0.1274	-0.1885	-0.2507	1				
Broad money	-0.2346	-0.2991	-0.2977	-0.187	-0.2601	-0.3038	0.8677	1			
Claims	-0.1629	-0.2434	-0.3002	-0.1335	-0.1965	-0.2652	0.9586	0.8368	1		
Entry rate	0.1021	0.0866	0.0921	0.0815	0.092	0.0944	0.1638	0.0352	0.2195	1	
GDP	-0.4482	-0.5848	-0.6828	-0.3511	-0.4994	-0.6229	0.185	0.1522	0.226	0.1668	1

Source: World Bank (2021).

Table 1C Unit Root Test for Panel Data

Variables	Dickey-Fuller test
Pov $1.90	568.84***
Pov $3.20	566.05***
Pov $5.50	407.65***
Gap $1.90	544.89***
Gap $3.20	704.14***
Gap $5.50	735.44***
Domestic credit	206.25***
Broad money	4122.21***
Claims	128.67***
Entry rate	286.97***
GDP	1675.37***

Notes: *** signifies $p < 0.01$.

Source: Authors' calculations.