



Does Financial Inclusion Diminish Poverty and Inequality? A Panel Data Analysis for Latin American Countries

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Abstract

Despite great developmental efforts in recent decades, Latin America still presents high levels of poverty and inequality when compared to developed nations. As explored widely in the literature, one potential instrument to diminish these issues is financial inclusion, including the access and usage of financial services by all people. Specifically, this paper verifies if financial inclusion and technology adoption decrease the poverty headcount ratio and the Gini index (i.e., inequality) of 13 Latin America countries (Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Honduras, Panama, Paraguay, Peru, and Uruguay). To perform such analysis, an unbalanced panel dataset was built, and the Feasible Generalized Least Squares (FGLS) and the Limited Information Maximum Likelihood (LIML) techniques were employed. The results suggest that, in accordance with previous studies, financial inclusion is a powerful tool to tackle poverty and inequality. Additionally, the combined effects of financial inclusions and technology (i.e., mobile use) are also capable of decreasing the poverty and inequality levels. We discuss the policy implications of our findings and suggest a future research agenda.

Keywords Financial inclusion · Poverty · Inequality · Latin America · Panel data

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1 Introduction

The last decades, particularly the 2000s, were noticeable by a growing interest in reducing issues such as poverty and inequality (Cardoso & Teixeira, 2020). Amidst the multitude of factors influencing these issues, the access and usage of financial services have gained the attention of scholars and policymakers. Hence, 'financial inclusion' became an axiom within the literature (Schönerwald & Vernengo, 2016). Yet, the current position that financial inclusion has on the international debate on social problems is not accidental. Instead, it is the result of multiple studies and international demand (Carballo, 2017; Klapper et al., 2016).

Years ago, the Alliance for Financial Inclusion (AFI), launched in 2009, made policymakers from 60 developing countries commit to invest in financial services to millions of poor people. In 2010, the G20 Summit resulted in leaders pushing forward the financial inclusion agenda and its implementation. In 2011, the World Bank Group started the first global analysis regarding the demand for financial services. Up to this moment, a multitude of empirical studies are studying the growth of financial inclusion worldwide (Anarfo et al., 2020; Kabakova & Plaksenkov, 2018; Raichoudhury, 2020), its effects on issues such as poverty and inequality (Iqbal et al., 2020; Koomson et al., 2020; Mushtaq & Bruneau, 2019; Ndlovu & Toerien, 2020), and many development institutes (e.g., International Monetary Fund—IMF; African Development Bank—AfDB; Asian Development Bank—ADB; Organization for Economic Co-operation and Development—OECD) are funding the research on financial inclusion with the goal of understanding how to bank the unbanked population (Ndlovu & Toerien, 2020).

Thus, financial inclusion is not a meaningless part of development. Rather, it is a key tool to deal with social challenges such as poverty and inequality (Klapper et al., 2016; Ndlovu & Toerien, 2020). De facto, around 1.7 billion people are still unbanked (Ndlovu & Toerien, 2020), meaning they lack access to formal financial services, and 10% of the unbanked population is in Latin America countries (Carballo, 2017). This is worrisome as financial inclusion is arguably capable of decreasing both poverty in inequality through multiple channels (e.g., granting access to savings services and to credit; facilitating personal investments on education and health) (Demirgüç-Kunt et al., 2017; Fouejieu et al., 2020; Klapper et al., 2016), as will be further explained in Sect. 2.

At this point, though, it is important to clarify that financial inclusion differs from the traditional 'financial development' term (Fouejieu et al., 2020). The latter refers to macro-level indicators such as stock market or Gross Domestic Product (GDP) (Klapper et al., 2016), and 'largely benefits the rich' (Tchamyou et al., 2019). In this sense, financial development and banking activities not necessarily facilitate the human-side of development. In Latin America (LATAM), much discussion is made on bank concentration and financial challenges. The oligopolistic aspect of the bank sector may harm the most vulnerable, and this lack of competition may increase interest rates, especially for poor people (i.e., poverty penalty) (Gutiérrez-Nieto et al., 2017; L. Rojas-Suarez, 2016). Therefore, financial development -in some cases- may be associated with predatory credit practices (Correa & Girón, 2019).

Contrarily, the idea of financial inclusion regards offering financial services that are safe, affordable and accessible to all, mainly the poor (Demirgüç-Kunt et al., 2008; Fouejieu et al., 2020). Financial inclusion may alleviate poverty and inequality by facilitating the use of financial services such as loans, deposits and the access to credit (Klapper et al., 2016). This may result in investments in health, education and even new businesses

(Demirguc-Kunt et al., 2017; von Fintel & Orthofer, 2020). Financial planning may become easier, especially with cheaper and efficient financial services (Fouejieu et al., 2020). Yet, this democratization of finance is an ongoing process in LATAM.

Granting that developed economies present high levels of financial inclusion, the overall status of financial inclusion (and its efficiency) in developing nations is still under discussion (Donou-Adonsou & Sylwester, 2016; Park & Mercado, 2017; Swamy, 2014). Many studies already found empirical evidence of financial inclusion benefiting the poor (Demir et al., 2020; Fouejieu et al., 2020; Koomson et al., 2020; Mushtaq & Bruneau, 2019; N'Dri & Kakinaka, 2020; Omar & Inaba, 2020).

Yet, limited attention is given to Latin America (LATAM), which is alarming considering that around 10% of the unbanked population lives in the region (Carballo, 2017). After a thorough analysis of the literature, to our knowledge, no econometric study on the financial inclusion-poverty-inequality nexus in LATAM has been published. Most regions still present high levels of inequality (i.e., Gini index), and data from the World Bank (2020) shows that several countries presented little or no reduction on their inequality levels in recent years. Therefore, the question stands: what are the effects of financial inclusion on the poverty and inequality levels of LATAM countries? Our study investigates these effects considering the poverty (i.e., poverty headcount ratio as the share of the population living on less than \$1.90 a day) and the inequality (i.e., Gini Index) levels of 13 LATAM countries (Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Honduras, Panama, Paraguay, Peru, and Uruguay).

Again, this question becomes even more alarming when regional attributes of LATAM are taken into consideration. The region presents high levels of poverty and inequality, which has been well documented by the literature. Estimates describe LATAM having 167 million people living in poverty, and 66 million living in extreme poverty (Vacaflores, 2018). In recent years, poverty-related measures were put into action by many governments, especially involving education spending, healthcare access, money transfers, and other social programs (Vacaflores, 2018). Yet, poverty in LATAM is high compared to developed economies. Inequality is an even more persistent issue in the region.

Evidently, poverty and inequality have a multitude of potential determinants. However, financial inclusion is arguably a powerful instrument to facilitate poverty reduction and to decrease inequality. Although studies in LATAM are limited (Bruhn & Love, 2014; Diniz et al., 2012), these social challenges deserve empirical studies attempting to discover potential actions to diminish these issues. Thus, our study attempts to analyze the recent development of LATAM countries and the recent changes in their poverty and inequality levels, as well as investigating the role of financial inclusion amidst the complex social reality of LATAM. Moreover, we seek to discuss possible policy implications and suggest a future research agenda.

The structure of our paper is as follows: Sect. 2 presents the recent development of the LATAM region regarding its poverty and inequality levels; Sect. 3 presents the theoretical background on financial inclusion and its effects on poverty and inequality; Sect. 4 describes the method, including the data gathering process and the estimation strategy; Sect. 5 presents the results; Sect. 6 presents a discussion about the results and their policy implications; Sect. 7 concludes the study.

2 An Overview on the Poverty and Inequality Issues in Latin America

This section summarizes the recent social changes presented by the 13 countries included in the sample to better understand the recent developmental process of LATAM.

Figure 1 shows the recent poverty dynamics in LATAM. Between the two intervals (2004–2011; 2011–2017), some countries exhibited continuously lower poverty levels. Some examples are Bolivia, Colombia, Costa Rica, and the Dominican Republic. However, other countries presented a fairly good improvement on the first interval but presented little or no improvement since 2011. Countries such as Argentina, Brazil, and Ecuador are failing in combating poverty, at least in recent years. Also, Honduras still presented a poverty level of 17.2% in 2017 (and 17.1% in 2011), which demonstrates how poverty is still a serious issue in the region. For comparative purposes, the poverty levels for Belgium and Norway were 0.1% and 0.2% in 2017, respectively.

Some argue that one of the reasons behind such high levels of poverty is the other concern of our paper: inequality. Figure 2 shows the inequality dynamics between the same intervals. As shown, a few countries managed to continuously decrease inequality (e.g., El Salvador; Uruguay). Still, other countries maintained poor levels for all periods. Brazil's inequality increased from 52.9 to 53.3 during the 2011–2017 interval and has one of the highest inequality rates in the world (Lustig et al., 2013; Nissanke & Thorbecke, 2010). Costa Rica maintained approximately the same inequality index for the whole period. Thus, inequality is a persistent challenge for LATAM. Moreover, poverty reduction is not necessarily accompanied by inequality reduction (Klapper et al., 2016; Lustig et al., 2013), and inequality of income slows the poverty reduction process (Omar & Inaba, 2020).

Therefore, both poverty and inequality are still serious concerns for the development of LATAM, as previously discussed by Lustig et al. (2013) and Vacafleres (2018). Despite some development, LATAM still presents itself as an underdeveloped region when compared to richer economies. Also, inequality is a persistent issue. Thus, we verify if financial inclusion may help tackling both issues in the following topic.

3 Financial Inclusion and its Impact on Poverty and Inequality

Defining financial inclusion is not a straightforward task. In sum, it can be defined as the access and use of formal financial services to all, including the most vulnerable (Fouejieu et al., 2020). Therefore, financial inclusion implies that no (price or non-price) barriers to financial services prevail (Demirgüç-Kunt et al., 2008). A broader definition describes financial inclusion as the establishment, promotion, and regulation of a financial environment that is safe, accessible, and affordable, to the whole society (Carballo, 2017). Thus, Carballo (2017) argues that financial inclusion is a broad, multidimensional, and ever-changing concept.

The growing interest in financial inclusion and its possible effects is *inter alia* due to the expected effects on poverty and inequality. At this moment, the theoretical debate -although still in development- already made it possible for a variety of empirical studies to take place worldwide (see Table 1). Scholars have commented on the positive benefits from financial inclusion in Mexico (Bruhn & Love, 2014), Ghana (Koomson et al., 2020), the Middle East and North Africa (MENA) countries (Neaime & Gaysset, 2018), and India (Burgess & Pande, 2005), among other regions. Indeed, there are many ways in which financial inclusion may tackle both poverty and inequality-related issues.

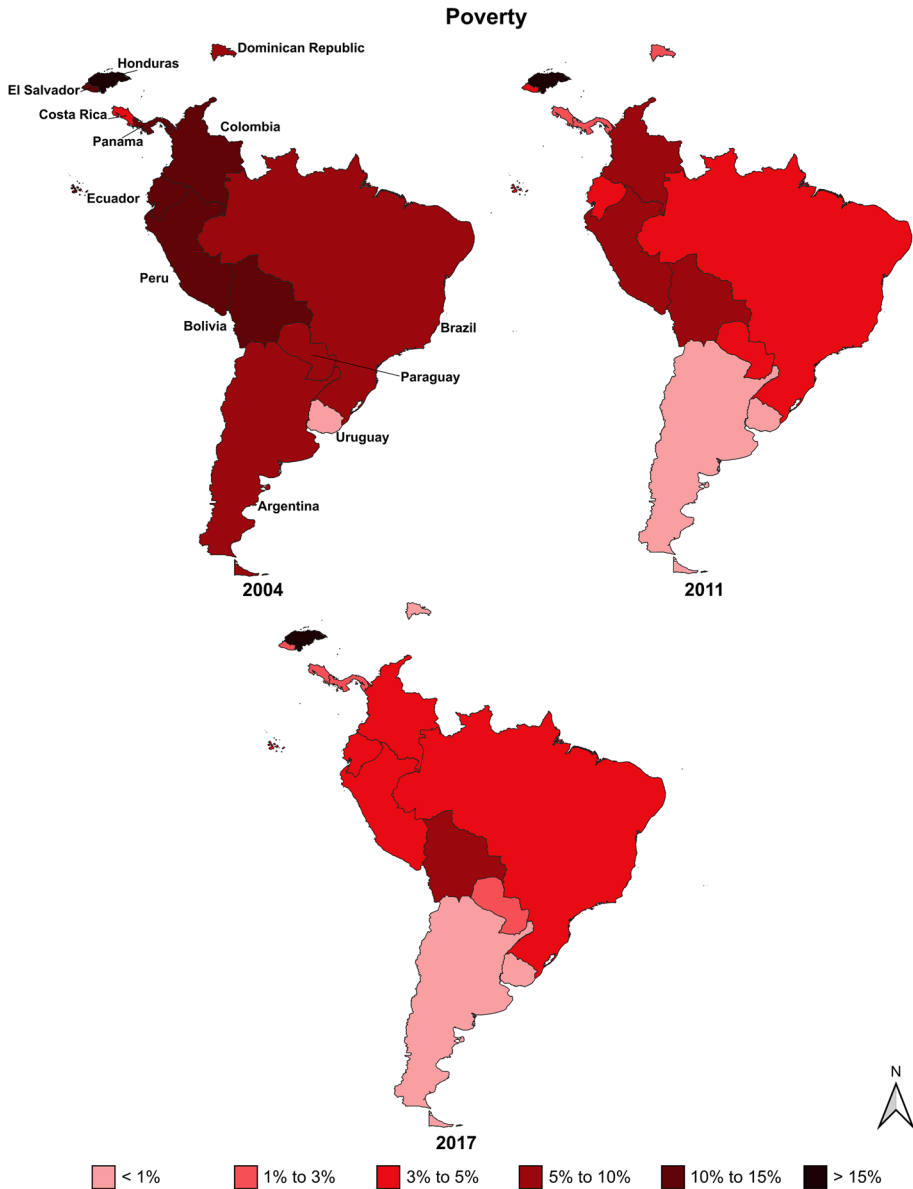


Fig. 1 Poverty headcount ratio (population living on less than USD 1.90 per day—2011 international prices) of all countries included in the sample in 2004, 2011, and 2017. Darker tones indicate poorer regions. Data from the World Bank. To facilitate the visualization, all Latin America and Caribbean countries not included in our analysis were excluded from the figure. Shapefile from Archambault (2017)

Financial inclusion may help to eliminate extreme poverty by allowing poorer populations to access financial services such as deposits, loans, and savings, as well as facilitating investments and financial control (Klapper et al., 2016). In a way, it helps people taking

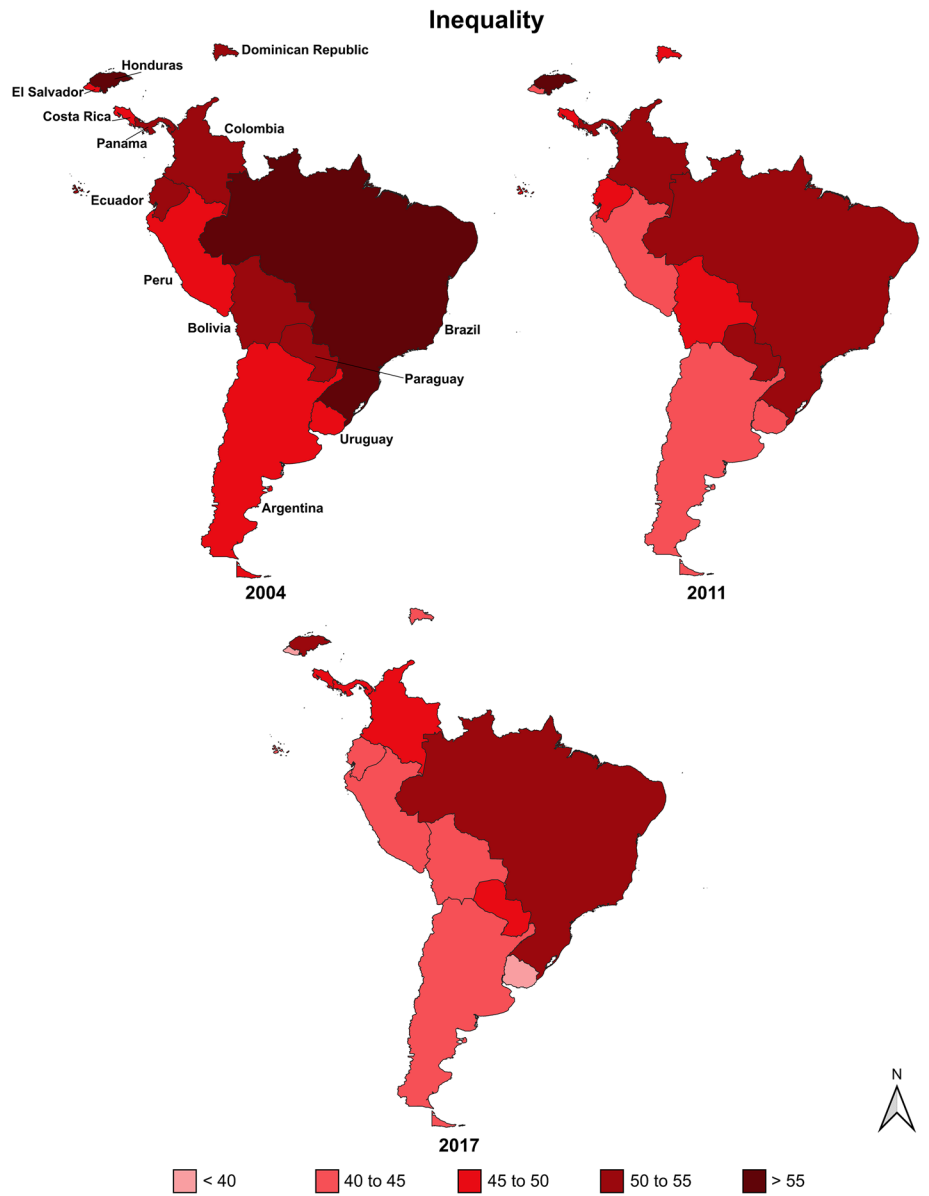


Fig. 2 Inequality (Gini index) of all countries included in the sample in 2004, 2011, and 2017. Darker tones indicate regions with greater inequality. Data from the World Bank. To facilitate the visualization, all Latin America and Caribbean countries not included in our analysis were excluded from the figure. Shapefile from Archambault (2017)

control of their financial lives (Klapper et al., 2016). New investments may result in new small businesses, investments in education, health services, insurance and many other services (Demirguc-Kunt et al., 2017; Fouejieu et al., 2020; Klapper et al., 2016; Koomson et al., 2020; von Fintel & Orthofer, 2020). Financial inclusion is also capable of facilitating

Table 1 Summary of previous studies regarding financial inclusion, poverty and/or inequality

Reference	Location	Period	Dependent variables	Financial inclusion and main control variables	Main findings
(Neaime & Gaysset, 2018)	MENA countries	2002–2015	Gini index; Poverty growth rate	ATM per 100,000 adults; banks per 100,000 adults; education; female workforce; population; inflation; trade openness; age-dependency ratio; GDP; GDP per capita growth	Results suggest that financial inclusion decreases income inequality. Yet, it has no effect on poverty
(N'Dri & Kakimaka, 2020)	Burkina Faso	2016	Lack of nutrition; lack of healthcare; lack of education	Use of financial services (dummy); use of mobile money (dummy); age of respondent; gender of the household size; time-to-market; mobile phone ownership; education; land size; rural area	Financial inclusion reduces poverty (i.e., lack of nutrition, education, and healthcare). Moreover, it has a greater impact when individuals have access to digital financial services (i.e., mobile money)
(Iqbal et al., 2020)	Bangladesh	2010–2015	Population in moderate and extreme poverty (%)	Branches per 10 km ² ; accounts per adult; deposits per adult; credit per adult; river erosion; cropping intensity; paved road; high remittance	By using a unique dataset of 544 administrative sub-districts of Bangladesh, the authors found that financial inclusion decreases both extreme and moderate poverty levels in rural areas

Table 1 (continued)

Reference	Location	Period	Dependent variables	Financial inclusion and main control variables	Main findings
(Mushtaq & Bruneau, 2019)	62 countries	2001–2012	Poverty headcount ratio; Gini index; Poverty gap; GDP per capita	Deposits per head; Borrower ratio; Loans (% GDP); GDP per capita; trade openness; government consumption; inflation; mobile; fixed telephone; internet; price of 3-min local call	Results suggest financial inclusion had negative and significant effects on poverty and inequality. Moreover, Information and Communication Technologies (ICT) stimulate financial inclusion, therefore favoring economic growth and reducing poverty and inequality
(Demir et al., 2020)	140 countries	2011, 2014 and 2017	Gini index	Use of mobile phone to pay bills (% population); Accounts (% population); Savings (% population); Borrowers (% population); GDP growth; education; trade openness; government expenditure; inflation; population	Financial inclusion reduces inequality at all quantiles of the inequality distribution, and 'FinTech' also reduces income inequality
(Park & Mercado, 2017)	176 countries	2004–2012	Poverty headcount ratio; Gini index	ATMs per 100,000 adults; branches per 100,000 adults; borrowers per 1000 adults; credit (% GDP); depositors per 1000 adults; share of highest to lowest income; inflation; education; banks growth; GDP growth; Rule of Law	Results demonstrate that financial inclusion is capable of decreasing poverty and inequality levels. However, financial inclusion presented no effect on inequality when only a subsample of 37 developing Asian nations was considered

Table 1 (continued)

Reference	Location	Period	Dependent variables	Financial inclusion and main control variables	Main findings
(Fouejieu et al., 2020)	Between 19 and 107 countries	2004–2015	Gini index	ATMs per 100,000 adults; number of bank branches per 100,000 adults; number of borrowers; number of depositors; number of mobile money accounts; number of mobile money transactions; inflation; telephone; trade openness; population; remittance; education; Rule of Law	Financial inclusion reduces inequality. The author tests for nonlinearities (i.e., the level of financial inclusion that increases inequality), and results suggest that financial inclusion does not boost inequality
(Omar & Inaba, 2020)	116 countries	2004–2016	Poverty headcount ratio; Gini index	Deposit accounts per 1000 adults; depositors per 1000 adults; branches per 100,000 adults; ATMs per 100,000 adults; loan accounts per 1000 adults; borrowers per 1000 adults; mobile users; GDP per capita; education; Rule of Law; inflation; government expenditure; trade openness	In addition to analyzing the determinants of financial inclusion, the authors found that financial inclusion reduces poverty and inequality levels in developing countries
(Cabeza-García et al., 2019)	91 countries	2014	GDP per capita	Accounts (% women over 15 years); borrowers (% women over 15 years); credit card (% female); workforce; expenditure in R&D; country-dummies	Greater female financial inclusion presents a significant and positive effect on economic growth

Table 1 (continued)

Reference	Location	Period	Dependent variables	Financial inclusion and main control variables	Main findings
(Koomson et al., 2020)	Ghana	2016–2017	Poverty headcount; vulnerability to poverty	Ownership of financial products; use of financial products; access to credit; receipt of remittance; household size; female (dummy); rural (dummy); education (dummy); employment status; distance to nearest bank	Results suggest financial inclusion reduces the poverty levels in Ghana, in addition to decreasing the vulnerability to poverty. Also, results suggest that this effect holds for urban and rural households, although the effect is more pronounced in rural households
(Bruhn & Love, 2014)	Mexico	2000–2004	Wage earner dummy; Employment dummy; Income; Above minimum wage dummy; Business owner dummy	Presence of Banco Azteca after 2002 (dummy)	This study analyzes the effects of Banco Azteca in Mexico, as more than 800 branches opened almost simultaneously. The results show that bank opening led to a boost in informal businesses and increased the income levels, especially in low-to-middle-income populations and regions in which the previous bank presence was mediocre

This set of econometric studies was arbitrarily chosen by the authors, and they are presented in no particular order

the development of the financial sector (as a whole) by making all transactions more agile, safer, cheaper, along with better efficiency (Fouejieu et al., 2020). The discrimination against developing markets and poorer regions makes millions of people to lack access to finance, and therefore these regions lose in savings, funds, and overall accumulation of wealth (Omar & Inaba, 2020). Koomson et al. (2020) even argue that by increasing access to financial services (i.e., supply-side factor), demand-side factors (e.g., consumption) will be boosted, which is positive for the economy. Yet, contrary to the traditional financial market development (e.g., stock market issues), financial inclusion is pro-poor (UNCDF, 2014).

Therefore, financial inclusion is capable of helping with the families' capacity to absorb financial shocks, achieve good health, promote gender equality and gain access to infrastructure such as water treatment (Demirguc-Kunt et al., 2017; Klapper et al., 2016). Also, it may help with inequality-issues. For example, a poor person may have access to financial services that facilitate planning and investing in education, which may ultimately result in jobs with better wages (Fouejieu et al., 2020; Mushtaq & Bruneau, 2019; Neaime & Gaysset, 2018).

Additionally, in recent years, financial inclusion gained potential due to new Information and Communications Technologies (ICTs), such as 'FinTech' solutions and 'mobile money'. With new technologies and the promotion of FinTech solutions, poor people previously excluded from the financial system may have access to financial services (Senyo & Osabutey, 2020). As pointed out by N'Dri & Kakinaka (2020), the use of mobile technologies enhances the positive effects of financial inclusion. Thus, digital financial services are expected to boost the potential benefits from financial inclusion, particularly to remote areas (Carballo, 2017; Lashitew et al., 2019; Mushtaq & Bruneau, 2019; N'Dri & Kakinaka, 2020; Ouma et al., 2017).

The empirical literature summarized in Table 1 corroborates with these claims, as it summarizes many previous econometric studies regarding the financial inclusion-poverty-inequality nexus around the world. As shown in Table 1, many regions have studied the impacts of financial inclusion. However, many studies are focused on large groups (50+ countries), and a dedicated debate on the results and policy implications for Latin America (and other regions) is missing.

Hence, the theoretical and empirical research on financial inclusion offers promising results to the financial inclusion-poverty-inequality issue. The findings exposed in Table 1 and the current literature debate allows us to develop the following research hypothesis:

H1: Financial Inclusion is Negatively Associated with Poverty and Inequality; Additionally, the empirical findings showing that the use of mobile services and ICTs, along with financial access, is beneficial and decreases poverty and inequality levels, allows the development of a second research hypothesis:

H2 The combined effect of financial inclusion and mobile use is negatively associated with poverty and inequality.

4 Data and Method

4.1 Data Description

Our study employs a panel dataset including 13 LATAM countries. Namely Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Honduras, Panama, Paraguay, Peru, and Uruguay. Although other countries were considered, they were excluded due to the lack of data. Therefore, different models may include different countries, and an unbalanced panel was built to ensure as much data was used depending on availability. The oldest period was 2004, and the most recent period was 2017.

Our study employs two dependent variables to better comprehend the effects of financial inclusion on two relevant issues: poverty and inequality. We use the poverty headcount ratio (*POV*) which accounts for the population living on less than USD 1.90 per day (2011 PPP). Also, inequality is measured by the Gini index (*GINI*), developed by the Italian statistician Corrado Gini, and it measures inequality in income distribution. A higher Gini index represents greater inequality.

Also, choosing financial inclusion variables is not an easy task. Multiple studies find it difficult to precisely analyze financial inclusion (Demir et al., 2020; Mushtaq & Bruneau, 2019; Omar & Inaba, 2020; Park & Mercado, 2017), as it presents a broad definition. Additionally, the main databases employed by such studies (e.g., World Bank; International Monetary Fund—IMF) often present incomplete datasets. Several financial inclusion-related variables are unavailable for multiple countries, and -at least in some cases- data is only available for a few discontinuous years. Hence, gathering data is a difficult task.

We follow previous studies such as Park & Mercado (2017), Kim et al. (2018), Mushtaq & Bruneau (2019), Omar & Inaba (2020), and others in assuming that multiple financial inclusion-related variables must be employed as they represent distinct aspects of financial inclusion. Specifically, we follow Omar & Inaba (2020) in specifying three dimensions for financial inclusion: availability, penetration, and usage.

The availability dimension represents the depth of demographic penetration of financial services. In sum, it represents how easy it is to access financial services, and the chosen proxy variable is ‘automated teller machines per 100,000 adults’ (*ATMS*). The penetration dimension represents how many users have entered the financial system. The employed proxy variables are the ‘number of depositors with commercial banks per 1000 adults’ (*DEPIK*) and the ‘number of deposit accounts with commercial banks per 1000 adults’ (*ACCIK*). Moreover, the usage dimension shows how much the financial services are being used, and this dimension may be represented by many services (e.g., borrowings; remittances; transfers; etc.). Here, we include the ‘number of borrowers from commercial banks per 1000 adults’ (*BORIK*), the ‘outstanding loans from commercial banks as % of GDP’ (*LOANS*) and the ‘outstanding deposits with commercial banks as % of GDP’ (*DEPGDP*) variables.

We employ these variables in two distinct approaches. As financial inclusion is a multidimensional concept, we employ a Principal Component Analysis (PCA) to reduce the dimensionality of the data. PCA is, therefore, a useful tool to reduce the number of variables representing the same idea with little loss of information (Datta & Singh, 2019). As previous scholars have invested in using PCA to measure financial inclusion (Datta & Singh, 2019; Vo et al., 2020), we also use a principal component approach to our study. Nevertheless, some scholars studied the effects of financial inclusion by adding variables separately into the model (Demir et al., 2020; Mushtaq & Bruneau, 2019; Neaime &

Table 2 Variables and sources

Variable	Description	Source
POV	Poverty headcount ratio at \$1.90 a day	WB
GINI	Gini index	WB
ATMS	Automated teller machines per 100,000 adults	FAS—IMF
DEPIK	Number of depositors with commercial banks per 1,000 adults	FAS—IMF
ACCIK	Number of deposit accounts with commercial banks per 1,000 adults	FAS—IMF
BORIK	Number of borrowers from commercial banks per 1,000 adults	FAS—IMF
LOANS	Outstanding loans from commercial banks (% of GDP)	FAS—IMF
DEPGDP	Outstanding deposits with commercial banks (% of GDP)	FAS—IMF
FL_1	Principal component 1	—
FL_2	Principal component 2	—
GDPPC	GDP per capita	WB
FEM	Female participation of the total workforce	WB
RURAL	Ratio of rural population to the total population	WB
UNEMP	Unemployment level	WB
ROL	Rule of Law index	WGI
INF	Inflation (GDP deflator; annual %)	WB
MOB	Mobile cellular subscriptions per 100 people	WB

WB, World Bank; FAS—IMF, Financial Access Survey (FAS) published by the International Monetary Fund (IMF); WGI, Worldwide Governance Indicators

Gaysset, 2018). Hence, we employed a Kruskal–Wallis test to verify if the financial inclusion variables (i.e., groups) differ significantly from each other, following Eldomiaty et al. (2020). A χ^2 (Chi-square) statistic verifies if the null hypothesis of all medians being equal to all groups can be rejected. In our case, the χ^2 test is significant (χ^2 : 224.857; p -value: 0.0001). Therefore, we also use the variables separately in our models, as they represent unique regressions.

Besides our explanatory variables, we consider multiple control variables. These control variables are commonly employed by poverty and inequality studies (see Table 1). We include the GDP per capita (*GDPPC*) and the rural population ratio (*RURAL*) to account for the region's overall development levels. LATAM presents contrasting development levels across its countries. Also, predominantly rural regions will present poorer households (Nissanke & Thorbecke, 2010). We also include the regions' unemployment levels (*UNEMP*), as employment is necessary to achieve social development (Cabeza-García et al., 2019). Additionally, we incorporate the ratio of female participation in the workforce (*FEM*), as the female workforce is arguably a predictor of social issues, particularly inequality (Asongu & Odhiambo, 2020). Moreover, we include institutions by adding the Rule of Law (*ROL*), which captures perceptions of the extent to which agents have confidence in and abide by the rules of society (e.g., contract enforcement; property rights). Lastly, we add inflation (*INF*) as the GDP deflator (annual %), as scholars argue that inflation may be a significant determinant of poverty and inequality (Demir et al., 2020; Neaime & Gaysset, 2018).

All variables are presented in Table 2 below.

It is important to inform the reader that a multitude of alternative variables could be included. However, many variables are often unavailable for developing regions such as the LATAM countries included in our study.¹

4.2 Model formulation and estimation strategy

As both regional and time-effects are considered (i.e., panel data is employed), the models were built as follows:

$$\begin{aligned} \ln_POV_{jt} = & \beta_0 + \beta_1 \mathbf{X}_{jt} + \beta_2(\mathbf{X}xMOB) + \beta_3 \ln_GDPPC_{jt} + \beta_4 \ln_FEM_{jt} + \beta_5 \ln_RURAL_{jt} \\ & + \beta_6 \ln_MOB_{jt} + \beta_7 \ln_UNEMP_{jt} + \beta_8 \text{ROL}_{jt} + \beta_9 \text{INF}_{jt} + \alpha_j + \varepsilon_{jt} \end{aligned} \quad (1)$$

And,

$$\begin{aligned} \ln_GINI_{jt} = & \beta_0 + \beta_1 \mathbf{X}_{jt} + \beta_2(\mathbf{X}xMOB) + \beta_3 \ln_GDPPC_{jt} + \beta_4 \ln_FEM_{jt} + \beta_5 \ln_RURAL_{jt} \\ & + \beta_6 \ln_MOB_{jt} + \beta_7 \ln_UNEMP_{jt} + \beta_8 \text{ROL}_{jt} + \beta_9 \text{INF}_{jt} + \alpha_j + \varepsilon_{jt} \end{aligned} \quad (2)$$

In Eqs. 1 and 2, j represents the countries in the sample, t represents the period, β_0 is the intercept, β_1 to β_9 are the estimated coefficients for each variable, \mathbf{X} is the matrix of financial inclusion-related variables, α_j represents the regional time-invariant characteristics, and ε_{jt} is the residual. All variables were used in their natural-log form, with the exception of the Rule of Law index (truncated between -2.5 and 2.5) and the inflation variable (which may assume negative values).

First, the Hausman test determined which specification (i.e., random or fixed-effects) was better suited for each model. Additionally, the modified Wald test for groupwise heteroskedasticity (Greene, 2002) and the Wooldridge test for autocorrelation (Wooldridge, 2010) were employed to ensure consistent estimations. As both heteroskedasticity and autocorrelation issues were found, it is inadvisable to use traditional random and fixed-effects estimations. Therefore, the models were estimated with the Feasible Generalized Least Squares (FGLS) technique (Parks, 1967), as this method is capable of dealing with autocorrelation within panels and heteroskedasticity across panels. Although FGLS is usually a random-effects estimation method, we also employ a fixed-effects FGLS (from this point forward referred to as FE-GLS) by adding country-specific dummy variables while removing the intercept.

Furthermore, there is the issue of endogeneity. Honohan (2008) argues that endogeneity should not be a serious problem in models for poverty and inequality, as it would be in growth models. Nonetheless, banks may be particularly interested in expanding their services in developed regions, as they represent stronger demands for finance-related services (Iqbal et al., 2020). This would generate endogeneity between the dependent and the finance-related variables. We test for endogeneity by employing the C-statistics (also known as Difference-in-Sargan statistics) (Baum et al., 2003). To treat for endogeneity, previous studies usually use the traditional Two-State Least Squares (2SLS) estimation

¹ Several financial inclusion variables from the FAS-IMF (e.g., 'Number of registered mobile money accounts', 'Number of credit cards', 'Number of all microfinance institution branches per 1,000 km²', 'Number of all microfinance institution branches per 100,000 adults', etc.) are mostly unavailable for Latin America countries or only started being published in recent years, which is troublesome for a panel dataset.

(Demir et al., 2020; Hermes, 2014). However, scholars argue that the Limited Information Maximum Likelihood (LIML) estimation method is better suited to ensure consistency and asymptotic normality (Akashi et al., 2013), even in situations in which 2SLS presents askew results or in smaller samples (Wansbeek and Prak, 2017). In other words, LIML estimation reduces the bias of the estimates (Anderson, 2005). Thus, we employ LIML and lagged values of the financial inclusion variables as instruments, while testing for endogeneity.

5 Results

5.1 Main Findings

Table 3 shows the main results. As previously described, all models were estimated using the FGLS method. However, when endogeneity is significant, we show the LIML results as they reduce the estimation bias and enhance consistency.

Regarding poverty, all financial inclusion-related variables are negative and significant, demonstrating great potential to decrease the poverty levels of LATAM countries included in the analysis (Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Honduras, Panama, Paraguay, Peru, and Uruguay). This is important as all dimensions included in the analysis (i.e., availability, penetration, and usage) are powerful tools to increase welfare in the region. Moreover, their combined effect, measured through a PCA, is also negative and significant. In sum, the result from Table 3 show support for H1 (*H1: Financial inclusion is negatively associated with poverty and inequality*).

Furthermore, we see that the overall economic growth (GDP per capita) of the region is of great importance to both poverty and inequality. Conversely, higher unemployment levels and increases in the share of the rural population are alarming, as they are powerful predictors of poverty and inequality. Interestingly, mobile use, although not significant for the poverty model, is significant in the inequality model. Yet, as we aim to evaluate the combined effects of financial inclusion and mobile use, we present the result from Table 4.

With Table 4, we evaluate if the combination of financial inclusion-related variables with the ICT variable (e.g., *DEPIK* x *MOB*) is significant. De facto, many studies focus on the impact of digital financial services on poverty and inequality (see Table 1). However, variables representing this aspect of financial inclusion are mostly unavailable for LATAM countries. Using mobile-related data as a proxy for ICT, and multiplying the ICT factor with other variables, is common in financial inclusion studies (Demir et al., 2020; Mushtaq & Bruneau, 2019; Omar & Inaba, 2020).

As shown in Table 3, most combinations are negative and significant, which demonstrates that the expansion of traditional financial services coupled with the expansion of mobile subscriptions (i.e., access to technology) is a powerful tool to decrease poverty and inequality. Arguably, these results are in line with previous scholars (Demir et al., 2020; Mushtaq & Bruneau, 2019; N'Dri & Kakinaka, 2020) that defend the idea of digitalization and the 'mobile money' phenomenon as useful tools to decrease social problems. Although the interactions employed in our models serve only as a proxy, they suggest LATAM can benefit from digitalized finance. The results for the variables regarding the usage dimension are particularly relevant, as they demonstrate that the adoption of financial services coupled with the adoption of mobile services negatively impact the poverty and inequality levels. Therefore, our findings support H2 (*H2: The combined effect of financial inclusion*

Table 3 The effects of financial inclusion

Variables	Dependent: inequality													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
	FE-GLS	LIML	FE-GLS	FE-GLS	FE-GLS	LIML	FE-GLS	LIML	LIML	FE-GLS	FGLS	FE-GLS	FE-GLS	FE=GLS
FL_1	-0.294*** (0.0462)							-0.0456*** (0.00853)						
FL_2	-0.0592 (0.0580)							0.0317 (0.0307)						
ATMS		-0.382*** (0.0896)						-0.0486*** (0.0123)						
DEPIK			-0.796*** (0.138)						-0.0645*** (0.0179)					
ACCIK				-0.566*** (0.109)							-0.0192* (0.0110)			
BORIK					-0.145 (0.112)							0.0147 (0.0135)		
LOANS						-0.933*** (0.195)							-0.0652*** (0.0159)	
DEPGDP														-0.0470** (0.0183)
GDPPIK	-0.642 (0.643)	-1.160** (0.469)	-0.587 (0.535)	-0.721** (0.350)	-1.815*** (0.330)	-1.335*** (0.417)	-1.577*** (0.243)	-0.0630 (0.139)	-0.148** (0.0643)	-0.0997 (0.0699)	0.00528 (0.0259)	-0.385*** (0.0503)	-0.0885** (0.0349)	-0.124*** (0.0366)
FEM	0.423 (1.487)	1.074 (1.297)	0.605 (1.289)	-0.644 (0.816)	-0.453 (0.788)	1.043 (1.253)	-0.948 (0.732)	-0.635*** (0.233)	-0.356** (0.178)	0.205 (0.206)	-0.256** (0.111)	-0.259* (0.144)	-0.0951 (0.134)	-0.0757 (0.137)
RURAL	2.094*** (0.710)	1.690*** (0.532)	2.376*** (0.586)	1.998*** (0.496)	1.256*** (0.399)	1.472*** (0.509)	1.238*** (0.355)	-0.0702 (0.110)	-0.0131 (0.0729)	0.270*** (0.0781)	0.0388 (0.0317)	0.00770 (0.0598)	0.151*** (0.0466)	0.171*** (0.0489)
MOB	0.118 (0.0985)	0.0764 (0.0921)	-0.0223 (0.0854)	-0.0399 (0.0505)	-0.0496 (0.0622)	-0.0179 (0.0786)	-0.0498 (0.0430)	0.00832 (0.0160)	0.00893 (0.0126)	0.00773 (0.0106)	-0.0314*** (0.00984)	-0.0171** (0.00840)	-0.0160* (0.00823)	-0.0181** (0.00828)
UNEMP	0.373** (0.173)	0.411*** (0.155)	0.495*** (0.136)	0.574*** (0.0921)	0.373*** (0.0780)	0.342** (0.146)	0.427*** (0.0712)	0.0539* (0.0278)	0.0111 (0.0212)	0.0495*** (0.0182)	0.0233 (0.0143)	0.0115 (0.0154)	0.0167 (0.0116)	0.0174 (0.0131)

Table 3 (continued)

	Dependent: inequality													
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Variables	FE-GLS	LIML	FE-GLS	FE-GLS	FE-GLS	LIML	FE-GLS	LIML	LIML	FE-GLS	FGLS	FE-GLS	FE-GLS	FE=GLS
ROL	0.119 (0.198)	-0.655*** (0.216)	-0.154 (0.153)	-0.373*** (0.143)	-0.306** (0.151)	-0.254 (0.208)	-0.408*** (0.127)	0.151** (0.0607)	0.0147 (0.0296)	0.0316 (0.0213)	-0.000564 (0.0192)	0.0609*** (0.0220)	-0.00160 (0.0166)	0.00345 (0.0177)
INF	-0.00536 (0.00535)	0.00228 (0.00776)	-0.00262 (0.00512)	-0.00295 (0.00397)	-0.00618 (0.00392)	-0.0176*** (0.00635)	-0.00159 (0.00273)	-2.45e-05 (0.00101)	-7.36e-05 (0.00106)	-0.00127* (0.000667)	-0.000644 (0.000599)	-0.00240*** (0.000648)	-0.00103*** (0.000390)	-0.00129*** (0.000406)
Constant											4.869*** (0.569)			
Hausman	53.25***	13.38*	29.69***	21.98***	14.53*	68.19***	69.08***	47.78***	12.22	39.21***	3.66	35.89***	22.65***	32.94***
Mod.	46.9***	1481.6***	774.66***	263.9***	1759.0***	205.5***	429.6***	1110.8***	404.3***	279.8***	487.2***	73.70***	583.0***	197.3***
Wald														
Wooldridge	69.43***	10.50***	25.66***	11.97***	11.88***	9.99***	9.85***	7.25**	7.84**	7.54**	14.08***	8.68**	7.09**	7.27**
Endog- nely	1.318	7.563***	0.000	1.238	2.193	4.619**	0.003	9.780***	13.533***	0.105	0.278	0.356	1.063	0.389
Wald	3371.67***		4546.93***	17,582.00***	21,910.10***		35,472.21***				3,024.518***	47.96***	3,167,303***	6,266,923***
Chi2														
F	37.90***	68	101	120	111	129	142	68	129	101	120	111	142	142
Observa- tions	76	68	101	120	111	129	142	68	129	101	120	111	142	142
Countries	8	8	10	12	11	13	13	8	13	10	12	11	13	13

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. FE-GLS: Fixed-Effects Generalized Least Squares with country-specific dummy-variables and no intercept. LIML: Limited Information Maximum Likelihood estimation using lagged values as instruments, no constant is reported. FGLS: Feasible Generalized Least Squares

Table 4 The combined effects of financial inclusion and mobile use

Variables	Dependent: inequality													
	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
	FE-GLS	LIML	FE-GLS	FE-GLS	LIML	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	LIML	FE-GLS	FE-GLS
FL_1 x MOB	-0.0731*** (0.0159)							-0.00412***						
FL_2 x MOB	-0.0512 (0.0562)							(0.00132) -0.00211 (0.00196)						
ATMS x MOB		-0.0492*** (0.0136)							-0.00576*** (0.00186)					
DEPIK x MOB			-0.0148 (0.0118)							0.000346 (0.00314)				
ACC1K x MOB				-0.0137*** (0.00638)							-0.00482*** (0.00129)			
BOR1K x MOB					-0.0779* (0.0417)							-0.00381 (0.00366)		
LOANS x MOB						-0.0255*** (0.0106)							-0.00783*** (0.00191)	
DEPGDP x MOB							-0.0228** (0.0111)							-0.00614*** (0.00200)
GDPPC	-0.0899 (0.799)	-1.594*** (0.435)	-1.568*** (0.461)	-1.677*** (0.247)	-2.096*** (0.718)	-1.712*** (0.219)	-1.817*** (0.205)	-0.148** (0.0574)	-0.215*** (0.0661)	-0.428*** (0.122)	0.0134 (0.0256)	-0.428*** (0.0825)	-0.111*** (0.0383)	-0.140*** (0.0388)
FEM	-1.155	1.241	0.620	-0.0932	1.214	-0.326	-0.311	-0.189	-0.327	-0.210	-0.260**	-0.519**	-0.0672	-0.0519

Table 4 (continued)

Variables	Dependent: inequality													
	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
Dependent: poverty	FE-GLS	LIML	FE-GLS	FE-GLS	LIML	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FGLS	LIML	FE-GLS	FE-GLS
RURAL	(2.240) 0.591 (0.969)	(1.263) 1.129* (0.599)	(1.436) 1.992*** (0.544)	(0.749) 1.555*** (0.449)	(1.715) 0.612 (1.064)	(0.713) 1.212*** (0.345)	(0.709) 1.218*** (0.344)	(0.207) -0.0527 (0.0729)	(0.197) -0.0776 (0.0934)	(0.336) -0.106 (0.122)	(0.112) 0.0472 (0.0304)	(0.242) -0.216** (0.105)	(0.130) 0.156*** (0.0479)	(0.133) 0.171*** (0.0490)
UNEMP	0.464 (0.291)	0.314** (0.136)	0.450*** (0.140)	0.372*** (0.0742)	0.284 (0.176)	0.359*** (0.0606)	0.358*** (0.0619)	0.0380* (0.0211)	-0.00128 (0.0229)	0.00840 (0.0363)	0.0246* (0.0142)	-0.00197 (0.0256)	0.0123 (0.0117)	0.0157 (0.0122)
ROL	-0.0975 (0.478)	-0.617*** (0.225)	-0.259 (0.168)	-0.511*** (0.145)	-0.670** (0.334)	-0.431*** (0.128)	-0.425*** (0.127)	0.0170 (0.0272)	0.0225 (0.0335)	0.0561 (0.0502)	-0.00347 (0.0172)	0.0531 (0.0415)	-0.00376 (0.0163)	0.00330 (0.0165)
INF	-0.00783 (0.00888)	-0.00596 (0.00857)	-0.00738 (0.00556)	-0.00485 (0.00394)	-0.0191** (0.00939)	0.000223 (0.00280)	-0.000241 (0.00279)	-0.00112 (0.000693)	-0.00121 (0.000920)	-0.00188* (0.00101)	-0.000645 (0.000600)	-0.00151** (0.000723)	-0.00119*** (0.000384)	-0.00135*** (0.000396)
Constant											4.662*** (0.564)			
Hausman	56.35***	12.47*	22.09***	20.29***	14.31**	15.71**	17.13**	50.96***	13.96*	43.74***	8.26	40.0***	15.74**	17.8**
Mod.	113.53***	1140.79***	540.53***	540.24***	1846.40***	1032.28***	1101.33***	269.10***	422.03***	170.24***	316.59***	98.91***	605.01***	405.68***
Wald														
Wool-	65.870***	11.489***	13.485***	8.179**	16.338***	10.004***	9.405***	6.614**	8.104**	8.010**	15.763***	8.388**	7.031**	7.283**
dridge														
ity	Endogene-3.484	3.605*	0.611	0.002	4.207**	0.233	0	2.315	0.433	0.395	0.79	2.840*	0.002	0
Wald Chi2	23757***		6787***	24.859***										
F	26.51***				25.53***									
Observa-	76	116	101	120	89	142	142	76	142	101	120	89	142	142
tions														
Countries	8	13	10	12	11	13	13	8	13	10	12	11	13	13

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. FE-GLS, Fixed-Effects Generalized Least Squares with country-specific dummy-variables and no intercept; LIML, Limited Information Maximum Likelihood estimation using lagged values as instruments, no constant is reported; FGLS, Feasible Generalized Least Squares

and mobile use is negatively associated with poverty and inequality). Expanding financial services and technology access will arguably generate a complementary effect on both poverty and inequality levels. Thus, financial inclusion has the potential to decrease inequality, which is a critical problem in LATAM.

5.2 Robustness Checks

To further evaluate if our assumptions are true (i.e., consistent), we test the effects of the financial inclusion under alternative specifications. The procedures to ensure the consistency of the results are twofold. First, we estimated the main results using alternative instrumental variables. The finance literature argues that natural resource endowment helps explain the financial development of underdeveloped regions, as the need for finance and development is higher in areas depending more on natural resources (Hermes, 2014; Lacalle-Calderon et al., 2019). Therefore, we estimate the models including natural rents (i.e., mineral rent as percentage of GDP) as an instrument for the financial inclusion variables.

Results from Table 5 suggest that, again, many financial inclusion variables hinder the poverty and inequality levels of our sample. As shown, results suggest that all three dimensions affect the poverty and inequality levels of the LATAM countries included. Moreover, we see that endogeneity is not an issue for most models, and the LIML, as previously explained, presents robust results even with small samples.

The second part of our robustness check section refers to specification issues. The majority of previous financial inclusion-related studies focus on the contemporary effects of financial inclusion on their dependent variables. Yet, we argue that the channels through which financial inclusion may operate (e.g., access to savings, loans, and credit services; personal investments in health and education) may need time to impact the poverty and inequality levels. An unbanked person may need time to learn how to use the services offered to him/her, for example. Therefore, we include the estimations employing one and two-years lagged values of all financial inclusion variables as robustness checks, as they may be closer to reality. Tables 6, 7 and 8, 9 show the results for the financial inclusion variables and the combined effect of finance and technology, considering both one and two years of lag, respectively.

As shown by Tables 5, 6, 7, 8, 9, our results are robust. De facto, financial inclusion is shown to be a powerful tool to diminish poverty and inequality in LATAM, and this effect also holds true for the combination of finance and ICT. Our robustness checks section, once more, demonstrates support for H1 and H2. Thus, LATAM can largely benefit from investments towards banking the unbanked population. These findings result in important policy implications, which shall be discussed in the next section.

6 Discussion and Policy Implications

Our results indicate that financial inclusion is a powerful tool to reduce poverty and inequality in Latin America, therefore benefiting the overall human development aspect of the region. Our findings are aligned with previous scholars that also empirically tested the effects of financial inclusion (Demir et al., 2020; Fouejieu et al., 2020; Koomson et al., 2020; Mushtaq & Bruneau, 2019; N'Dri & Kakinaka, 2020; Omar & Inaba, 2020).

Table 5 Robustness check employing alternative instrumental variables

Variables	Dependent: inequality													
	Dependent: Poverty													
	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)
	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML
FL1	-0.330*** (0.105)							-0.271 (0.390)						
FL2	0.107 (0.155)							-0.164 (0.237)						
ATMS		-0.372*** (0.0947)						-0.0490*** (0.0114)						
DEPIK			-1.270*** (0.477)					-0.155*** (0.0546)						
ACCIK				-1.105*** (0.242)					-0.209*** (0.0375)			0.0247 (0.0445)		
BORIK					0.253 (0.347)									
LOANS						-0.869*** (0.189)							-0.156*** (0.0204)	
DEPGDP							-0.674** (0.323)							-0.172*** (0.0313)
GDPPIK	-0.436 (1.542)	-0.962* (0.561)	1.540 (1.723)	0.623 (0.762)	-3.099*** (0.660)	-1.233*** (0.370)	-1.851*** (0.360)	2.531 (4.270)	-0.158** (0.0747)	-0.0216 (0.199)	0.229* (0.117)	-0.519*** (0.0808)	-0.141*** (0.0513)	-0.216*** (0.0454)
FEM	0.122 (2.735)	0.332 (1.371)	1.117 (2.847)	1.697 (1.399)	0.674 (1.544)	0.591 (1.040)	0.684 (1.173)	-0.562 (1.342)	-0.401* (0.208)	-0.120 (0.292)	-0.303* (0.172)	-0.348 (0.217)	-0.411*** (0.145)	-0.457*** (0.164)
RURAL	1.835* (1.078)	1.456** (0.591)	2.823*** (1.051)	3.264*** (0.873)	1.117 (0.711)	1.200** (0.601)	1.221** (0.585)	0.545 (0.941)	-0.0776 (0.0868)	0.0164 (0.129)	0.0671 (0.131)	-0.153* (0.0858)	-0.105 (0.0810)	-0.0891 (0.0785)
MOB	0.111 (0.148)	0.0342 (0.0867)	-0.155 (0.159)	-0.0210 (0.0815)	-0.0661 (0.110)	-0.0627 (0.0790)	-0.134* (0.0766)	0.0293 (0.0733)	0.00374 (0.0137)	0.00958 (0.0178)	-0.0179 (0.0134)	0.00883 (0.0108)	-0.00368 (0.0108)	-0.0133 (0.0120)
UNEMP	0.420 (0.336)	0.435** (0.177)	0.678** (0.318)	0.586*** (0.185)	0.307* (0.170)	0.307** (0.153)	0.299** (0.149)	0.124 (0.225)	0.00524 (0.0262)	0.0192 (0.0428)	0.0364 (0.0262)	-0.0222 (0.0220)	-0.00814 (0.0206)	-0.00467 (0.0214)

Table 5 (continued)

Variables	Dependent: inequality													
	Dependent: Poverty					Dependent: inequality								
	(29)	(30)	(31)	(32)	(33)	(34)	(35)	(36)	(37)	(38)	(39)	(40)	(41)	(42)
	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML	LIML
ROL	0.273 (0.449)	-0.597*** (0.225)	-0.569 (0.366)	-0.628*** (0.202)	-0.0159 (0.312)	-0.205 (0.227)	-0.274 (0.232)	-0.0211 (0.241)	-0.00120 (0.0329)	0.0301 (0.0465)	-0.0114 (0.0281)	0.0715** (0.0319)	0.0596** (0.0273)	0.0562** (0.0272)
INF	-0.0113 (0.00931)	0.000971 (0.00969)	-0.0134* (0.00732)	-0.0128** (0.00524)	-0.0179** (0.00869)	-0.0197*** (0.00670)	-0.0218*** (0.00778)	0.0102 (0.0174)	-0.000163 (0.000931)	-0.00143 (0.00108)	-0.00102 (0.000852)	-0.00230*** (0.000781)	-0.00301*** (0.000816)	-0.00374*** (0.000936)
Endogene-ity	0.217	2.411	0.802	2.951*	0.153	2.424	0.003	9.830***	3.336*	0.81	0.238	0.023	2.168	1.006
F	49.13***	49.28***	49.38***	57.83***	43.66***	69.01***	52.49***	2.07*	22.81***	19.08***	27.56***	29.91***	38.61***	31.18***
Observa-tions	60	112	75	91	92	112	112	60	112	75	91	92	112	112
Countries	7	11	8	10	10	11	11	7	11	8	10	10	11	11

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$. LIML: Limited Information Maximum Likelihood estimation using lagged values and the countries' natural rents (i.e., mineral rents as percentage of GDP) as instruments, no constant is reported

Table 6 The effects of financial inclusion (employing one-year lagged variables)

Variables	Dependent: poverty										Dependent: inequality				
	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)	
	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FGLS	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS	
FL_1 t-1	-0.203*** (0.0396)							-0.0331*** (0.00539)							
FL_2 t-1	-0.0877* (0.0472)							0.00139 (0.00855)							
ATMS t-1		-0.145** (0.0610)						-0.0255*** (0.00757)							
DEPIK t-1			-0.341*** (0.116)							-0.0670*** (0.0163)					
ACCIK t-1				-0.394*** (0.105)							0.0175 (0.0108)				
BORIK t-1					-0.291*** (0.0873)							-0.0248*** (0.0118)			
LOANS t-1						-0.594*** (0.104)							-0.0852*** (0.0154)		
DEFGDP t-1							-0.504*** (0.126)							-0.0533*** (0.0191)	
GDPCC	-1.110* (0.589)	-0.204 (0.193)	-1.432*** (0.472)	-1.296*** (0.331)	-1.765*** (0.303)	-1.159*** (0.229)	-1.554*** (0.193)	0.0167 (0.0786)	0.0136 (0.0246)	-0.197*** (0.0685)	0.00397 (0.0260)	-0.345*** (0.0472)	-0.133*** (0.0392)	-0.211*** (0.0413)	
FEM	0.678 (1.511)	0.877 (0.729)	0.543 (1.509)	1.227 (0.771)	-0.212 (0.783)	0.120 (0.743)	-0.359 (0.718)	-0.496** (0.195)	-0.181 (0.111)	-0.389* (0.212)	-0.323*** (0.113)	-0.427*** (0.141)	-0.254* (0.137)	-0.145 (0.148)	
RURAL	1.603** (0.731)	1.516*** (0.209)	1.694*** (0.557)	1.581*** (0.502)	0.961** (0.416)	1.340*** (0.316)	0.992*** (0.340)	-0.0538 (0.0714)	0.0888*** (0.0184)	0.0496 (0.0826)	0.0377 (0.0300)	-0.0842 (0.0595)	0.0617 (0.0499)	0.0678 (0.0540)	

Table 6 (continued)

Variables	Dependent: inequality													
	(43)	(44)	(45)	(46)	(47)	(48)	(49)	(50)	(51)	(52)	(53)	(54)	(55)	(56)
Dependent: poverty	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FGLS	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS
MOB	-0.0144 (0.103)	-0.236*** (0.0733)	-0.0723 (0.0781)	-0.130** (0.0538)	-0.0726 (0.0650)	-0.0504 (0.0454)	-0.110*** (0.0375)	-0.0152 (0.0123)	-0.0240** (0.0117)	0.0122 (0.0110)	-0.0415*** (0.0109)	0.00835 (0.00818)	-0.0127 (0.00847)	-0.0206** (0.00863)
UNEMP	0.558*** (0.173)	0.471*** (0.0964)	0.440*** (0.139)	0.416*** (0.0825)	0.347*** (0.0799)	0.467*** (0.0788)	0.394*** (0.0798)	0.0811*** (0.0221)	0.0243* (0.0141)	0.0424** (0.0195)	0.0195 (0.0157)	0.00604 (0.0148)	0.0177 (0.0131)	-0.00553 (0.0143)
ROL	-0.325 (0.238)	-0.621*** (0.130)	-0.307 (0.193)	-0.517*** (0.148)	-0.375** (0.153)	-0.400*** (0.124)	-0.468*** (0.130)	0.0679* (0.0358)	0.0114 (0.0154)	0.0806*** (0.0270)	0.00350 (0.0206)	0.0594** (0.0238)	0.0295 (0.0183)	0.0318 (0.0199)
INF	-0.00591 (0.00518)	0.000135 (0.00427)	-0.00803* (0.00475)	-0.00669* (0.00393)	-0.00638 (0.00407)	0.000219 (0.00386)	-3.75e-05 (0.00379)	0.000414 (0.000717)	-0.000453 (0.000567)	-0.00232*** (0.000662)	-0.000989 (0.000670)	-0.00214*** (0.000653)	-0.00139** (0.000602)	-0.00191*** (0.000664)
Constant	-4.584 (4.054)								4.291*** (0.534)		5.184*** (0.571)			
Hausman	45.72***	11.62	25.59***	19.98**	16.05**	70.47***	75.46***	49.98***	11.99	42.21***	3.74	36.78***	26.84***	37.39***
Mod.	569.46***	435.9***	1754.3***	359.2***	532.9***	1011.1***	208.0***	116.30***	1116.6***	2570.8***	276.74***	2706.4***	3592.5***	3431.8***
Wald	59.35***	5.32**	12.65***	4.43*	13.01***	5.39**	4.98**	1.67	5.38**	3.77*	11.68***	5.78**	4.91**	5.49**
droidge														
Wald	4036***	333.9***	4618***	21,238***	12,401***	23,979***	39,095***	4,092,442***	167.01***	2,779,307***	60.39***	4,190,753***	5,917,670***	4,199,467***
Chi2														
Observations	69	129	91	109	100	129	129	69	129	91	109	100	129	129
Countries	8	13	10	12	11	13	13	8	13	10	12	11	13	13

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$. FE-GLS, Fixed-Effects Generalized Least Squares with country-specific dummy-variables and no intercept; FGLS, Feasible Generalized Least Squares

Table 7 The effects of financial inclusion (employing two-years lagged variables)

Variables	Dependent: inequality													
	(57)	(58)	(59)	(60)	(61)	(62)	(63)	(64)	(65)	(66)	(67)	(68)	(69)	(70)
	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FGLS	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS
FL_1 t-2	-0.202*** (0.0438)							-0.0365*** (0.00487)						
FL_2 t-2	-0.0780*** (0.0398)							0.0154 (0.00941)						
ATMS t-2		-0.183*** (0.0670)							-0.0306*** (0.00735)					
DEPIK t-2			-0.504*** (0.170)							-0.0688*** (0.0191)				
ACCIK t-2				-0.602*** (0.104)							-0.0201* (0.0106)			
BORIK t-2					-0.219*** (0.0621)							-0.0276** (0.0125)		
LOANS t-2						-0.578*** (0.0961)							-0.0592*** (0.0162)	
DEPGDP t-2							-0.384*** (0.127)							-0.0547*** (0.0183)
GDPPIK	-1.551** (0.665)	-0.175 (0.203)	-1.735*** (0.612)	-0.425* (0.228)	-1.568*** (0.294)	-1.289*** (0.205)	-1.474*** (0.256)	0.0123 (0.0755)	0.00928 (0.0237)	-0.221*** (0.0696)	-0.00385 (0.0258)	-0.337*** (0.0473)	-0.177*** (0.0431)	-0.203*** (0.0405)
FEM	0.813 (1.478)	1.200 (0.758)	1.599 (1.552)	1.517** (0.678)	1.099 (0.844)	1.613*** (0.592)	0.744 (0.669)	-0.562*** (0.179)	-0.209** (0.0951)	-0.420** (0.194)	-0.320*** (0.104)	-0.407*** (0.152)	-0.324** (0.141)	-0.244* (0.140)
RURAL	0.592 (0.940)	1.546*** (0.217)	1.793** (0.708)	2.247*** (0.434)	1.508*** (0.476)	1.816*** (0.344)	1.493*** (0.407)	-0.209*** (0.0791)	0.0979*** (0.0166)	-0.126 (0.0805)	0.0284 (0.0307)	-0.0898 (0.0674)	0.0324 (0.0576)	0.0372 (0.0562)

Table 7 (continued)

	Dependent: inequality													
	(57)	(58)	(59)	(60)	(61)	(62)	(63)	(64)	(65)	(66)	(67)	(68)	(69)	(70)
Variables	Dependent: poverty													
	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FGLS	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS
MOB	-0.164 (0.147)	-0.252*** (0.0958)	-0.0348 (0.118)	-0.233*** (0.0823)	-0.182** (0.0762)	-0.0896 (0.0553)	-0.157*** (0.0546)	-0.0355** (0.0151)	-0.0343** (0.0134)	-0.0113 (0.0125)	-0.0630*** (0.0132)	-0.000694 (0.0102)	-0.0231** (0.00995)	-0.0334*** (0.00997)
UNEMP	0.353** (0.161)	0.505*** (0.0988)	0.465*** (0.148)	0.560*** (0.0751)	0.392*** (0.0761)	0.533*** (0.0589)	0.368*** (0.0757)	0.0997*** (0.0212)	0.0282** (0.0137)	0.0458** (0.0193)	0.0253 (0.0158)	0.00997 (0.0151)	0.0250* (0.0148)	-0.00172 (0.0137)
ROL	-0.0988 (0.236)	-0.547*** (0.133)	-0.101 (0.228)	-0.448*** (0.145)	-0.428*** (0.139)	-0.482*** (0.113)	-0.534*** (0.137)	0.0833** (0.0343)	0.0214 (0.0156)	0.117*** (0.0302)	0.0244 (0.0228)	0.0629*** (0.0220)	0.0307 (0.0196)	0.0269 (0.0188)
INF	-0.00175 (0.00582)	-0.00361 (0.00609)	-0.00199 (0.00376)	-0.00431 (0.00376)	-0.00743** (0.00369)	-0.00469 (0.00295)	-0.00318 (0.00371)	0.000776 (0.000706)	-0.000574 (0.000607)	-0.000901 (0.000749)	-0.000839 (0.000691)	-0.00154** (0.000646)	-0.00129** (0.000625)	-0.00150** (0.000644)
Constant	-5.948 (4.226)								4.467*** (0.465)					
Hausman	39.53***	12.46	25.17***	15.56**	19.48**	72.70***	55.23***	42.20***	12.12	45.53***	3.42	36.67***	29.34***	39.12***
Mod.	6003***	689***	6663***	34,000***	20,860***	37,754***	660***	13.59*	809***	153***	224***	115***	415***	303***
Wald	25.10***	13.34***	21.39***	14.09***	12.59***	9.74***	10.15***	5.17*	5.24**	21.81***	38.10***	5.01**	6.83**	6.12**
dridge														
Wald	194,829***	303***	4631***	441,973***	13,430***	24,779***	21,459***	3,760.367***	397.6***	3,883.465***	72.38***	7,166.634***	5,232.211***	6,059,777***
Chi2														
Observations	62	116	81	98	89	116	116	62	116	81	98	89	116	116
Countries	8	13	10	12	11	13	13	8	13	10	12	11	13	13

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.01$. FE-GLS, Fixed-Effects Generalized Least Squares with country-specific dummy-variables and no intercept; FGLS, Feasible Generalized Least Squares

Table 8 The combined effects of financial inclusion and mobile use (employing one-year lagged variables)

Variables	Dependent: Inequality													
	(71)	(72)	(73)	(74)	(75)	(76)	(77)	(78)	(79)	(80)	(81)	(82)	(83)	(84)
	FE-GLS	FGLS	FE-GLS	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS
(FI_1 x MOB) t-1	-0.0451*** (0.00896)							-0.00493*** (0.00126)						
(FI_2 x MOV) t-1	-0.0275*** (0.00949)							-0.00147 (0.00183)						
(ATMS x MOB) t-1		-0.0519*** (0.0109)							-0.00571*** (0.00105)					
(DEPIK x MOB) t-1			-0.0173 (0.0121)							0.000743 (0.00179)				
(ACCLIK x MOB) t-1				-0.0137** (0.00638)							-0.00482*** (0.00129)			
(BORIK x MOB) t-1					-0.0573*** (0.0136)							--0.00102 (0.00158)		
(LOANS x MOB) t-1						-0.0477*** (0.00933)							-0.0107*** (0.00187)	
(DEPGDP x MOB) t-1														-0.00761***

Table 8 (continued)

Variables	Dependent: Inequality													
	Dependent: poverty													
	(71)	(72)	(73)	(74)	(75)	(76)	(77)	(78)	(79)	(80)	(81)	(82)	(83)	(84)
	FE-GLS	FGLS	FE-GLS	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FE-GLS	FGLS	FE-GLS	FE-GLS	FE-GLS
GDPPC	-1.597*** (0.498)	-0.170 (0.182)	-1.800*** (0.421)	-1.677*** (0.247)	-0.391** (0.198)	-1.569*** (0.204)	(0.00963) -1.751*** (0.185)	-0.164*** (0.0603)	-0.139*** (0.0459)	-0.371*** (0.0652)	0.0134 (0.0256)	-0.355*** (0.0474)	-0.158*** (0.0400)	-0.227*** (0.0410)
FEM	0.0754 (1.515)	1.281* (0.696)	1.689 (1.433)	-0.0932 (0.749)	1.849** (0.741)	0.522 (0.696)	0.376 (0.674)	-0.606*** (0.213)	-0.229 (0.147)	-0.177 (0.222)	-0.260** (0.112)	-0.409*** (0.147)	-0.185 (0.136)	-0.145 (0.143)
RURAL	0.936 (0.717)	1.610*** (0.198)	1.652*** (0.513)	1.555*** (0.449)	1.332*** (0.154)	1.126*** (0.331)	1.064*** (0.332)	-0.101 (0.0793)	0.0858 (0.0550)	-0.0181 (0.0824)	0.0472 (0.0304)	-0.0896 (0.0630)	0.0601 (0.0520)	0.0599 (0.0542)
UNEMP	0.571*** (0.172)	0.507*** (0.0939)	0.371*** (0.131)	0.372*** (0.0742)	0.755*** (0.102)	0.326*** (0.0693)	0.320*** (0.0697)	0.0697*** (0.0247)	0.00958 (0.0139)	0.0151 (0.0209)	0.0246* (0.0142)	-0.00280 (0.0150)	-0.00246 (0.0123)	-0.00739 (0.0136)
ROL	-0.282 (0.242)	-0.585*** (0.130)	-0.403** (0.191)	-0.551*** (0.145)	-0.790*** (0.144)	-0.506*** (0.123)	-0.511*** (0.124)	0.0728* (0.0389)	0.0127 (0.0188)	0.0681** (0.0299)	-0.00347 (0.0172)	0.0607** (0.0240)	0.0171 (0.0182)	0.0283 (0.0188)
INF	-0.00593 (0.00506)	-0.000326 (0.00469)	-0.00529 (0.00463)	-0.00485 (0.00394)	0.00216 (0.00500)	-0.00172 (0.00367)	-0.00262 (0.00371)	-0.000456 (0.000787)	-0.000661 (0.000592)	-0.00224*** (0.000772)	-0.000645 (0.000600)	-0.00207*** (0.000661)	-0.00163*** (0.000615)	-0.00198*** (0.000652)
Constant		-7.428* (3.869)		-6.784** (3.336)							4.662*** (0.564)			
Hausman	49.66*** (10.24)	10.24 (613.3***)	17.7** (444.9***)	18.1** (837.53***)	11.2 (931.5***)	13.75* (615.3***)	15.60*** (573.2***)	49.47*** (897.6***)	14.27*** (3229***)	39.0*** (2772***)	8.5 (222.5***)	38.0*** (2784***)	17.14*** (3477***)	18.19*** (3394***)
Mod. Wald	10.171*** (34.91***)	6.26** (12.76***)	12.76*** (5.35**)	5.35** (13.95***)	13.95*** (6.74**)	6.74** (6.05**)	6.05** (6.05**)	2.21 (3.89*)	5.58** (3.89*)	3.89* (3.89*)	14.28*** (14.28***)	5.83** (5.83**)	5.68** (5.68**)	6.24** (6.24**)
Wald Chi2	6172*** (355**)	129 (355**)	91 (10.206***)	120 (24.850***)	100 (809***)	129 (28.509***)	129 (36.058***)	69 (3,590,772***)	129 (4,206,089***)	91 (2,812,511***)	120 (48.57***)	100 (3,895,192***)	129 (5,456,669***)	129 (4,627,209***)
Observations	69	129	91	120	100	129	129	69	129	91	120	100	129	129
Countries	8	13	10	12	11	13	13	8	13	10	12	11	13	13

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. FE-GLS, Fixed-Effects Generalized Least Squares with country-specific dummy-variables and no intercept; FGLS, Feasible Generalized Least Squares

Table 9 The combined effects of financial inclusion and mobile use (employing two-years lagged variables)

Variables	Dependent: inequality													
	(85)	(86)	(87)	(88)	(89)	(90)	(91)	(92)	(93)	(94)	(95)	(96)	(97)	(98)
(FL_1 x MOB) t-2								-0.0339***						
(FL_2 x MOV) t-2														
(ATMS x MOB) t-2														
(DEPIK x MOB) t-2														
(ACCIK x MOB) t-2														
(BORIK x MOB) t-2														
(LOANS x MOB) t-2														

Table 9 (continued)

Variables		Dependent: inequality														
		(85)	(86)	(87)	(88)	(89)	(90)	(91)	(92)	(93)	(94)	(95)	(96)	(97)	(98)	
(DEPGDP x MOB) t-2								-0.0312***								-0.00681***
GDP	-2.548*** (0.584)	-0.206 (0.197)	-1.757*** (0.516)	-1.595*** (0.230)	-0.386** (0.170)	-1.608*** (0.171)	-1.602*** (0.218)	-0.207*** (0.0716)	-0.146*** (0.0470)	-0.224*** (0.0597)	-0.00512 (0.0274)	-0.280*** (0.0456)	-0.194*** (0.0450)	-0.215*** (0.0451)		
FEM	0.387 (1.563)	1.173 (0.731)	2.073 (1.613)	1.188** (0.703)	1.990** (0.793)	1.364** (0.654)	1.203* (0.649)	-0.640*** (0.210)	-0.283** (0.138)	-0.315 (0.201)	-0.274*** (0.0983)	-0.382** (0.150)	-0.211 (0.135)	-0.197 (0.135)		
RURAL	0.471 (0.864)	1.557*** (0.208)	2.299*** (0.669)	2.272*** (0.500)	1.336*** (0.145)	1.622*** (0.345)	1.770*** (0.349)	-0.200** (0.0902)	0.0566 (0.0594)	-0.0615 (0.0805)	0.0496* (0.0285)	-0.0595 (0.0677)	0.0521 (0.0579)	0.0456 (0.0579)		
UNEMP	0.293* (0.161)	0.562*** (0.0942)	0.435*** (0.144)	0.377*** (0.0654)	0.858*** (0.106)	0.408*** (0.0536)	0.370*** (0.0558)	0.0626*** (0.0238)	0.0259** (0.0130)	0.0324* (0.0171)	0.0254 (0.0166)	0.0130 (0.0141)	0.0259** (0.0130)	0.0121 (0.0126)		
ROL	-0.113 (0.250)	-0.579*** (0.135)	-0.403* (0.213)	-0.544*** (0.161)	-0.722*** (0.122)	-0.478*** (0.125)	-0.472*** (0.126)	0.103*** (0.0399)	0.0115 (0.0193)	0.0919*** (0.0238)	0.0238 (0.0212)	0.0467** (0.0217)	0.0255 (0.0195)	0.0316* (0.0190)		
INF	-0.00415 (0.00600)	-0.00320 (0.00454)	-0.00468 (0.00537)	-0.00713** (0.00330)	0.00298 (0.00456)	-0.00712** (0.00287)	-0.00688* (0.00301)	0.000147 (0.000844)	-0.000749 (0.000581)	-0.00128* (0.000703)	-0.000478 (0.000698)	-0.00146** (0.000622)	-0.00133** (0.000617)	-0.00148** (0.000623)		
Constant		-6.816* (4.075)			-7.767** (3.590)						4.898*** (0.537)					
Hausman	42.98*** (0.584)	10.65 (0.970)	16.91** (1137***)	16.17** (2676***)	11.22 (1272***)	15.53** (1776***)	17.88** (2588***)	42.62*** (432***)	13.28* (1358***)	37.51*** (793***)	7.27 (1477***)	34.83*** (790***)	16.71** (1350***)	17.80** (1352***)		
Wald	14.44*** (0.0600)	14.45*** (0.0600)	14.83*** (0.0600)	18.54*** (0.0600)	11.25*** (0.0600)	13.63*** (0.0600)	13.37*** (0.0600)	8.68** (0.0600)	6.10** (0.0600)	16.25*** (0.0600)	61.87*** (0.0600)	4.84* (0.0600)	9.92** (0.0600)	9.25** (0.0600)		
Wald Chi2	296.19*** (0.0600)	329*** (0.0600)	5477*** (0.0600)	38,926*** (0.0600)	838*** (0.0600)	57,110*** (0.0600)	43,919*** (0.0600)	1,933,036*** (0.0600)	6,919,726*** (0.0600)	8,997,241*** (0.0600)	82.31*** (0.0600)	7,608,367*** (0.0600)	8,110,782*** (0.0600)	8,089,156*** (0.0600)		
Observations	62	116	81	98	89	116	116	62	116	81	98	89	116	116		
Countries	8	13	10	12	11	13	13	8	13	10	12	11	13	13		

Standard errors in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$. FE-GLS, Fixed-Effects Generalized Least Squares with country-specific dummy-variables and no intercept; FGLS, Feasible Generalized Least Squares

Additionally, we see a significant and negative effect on the interaction between financial inclusion-related variables and the ICT variable employed. Thus, our results agree with previous ICT-related findings (Demir et al., 2020; Mushtaq & Bruneau, 2019) by suggesting that technology is important to decrease poverty and inequality, as well as to enhance the effects of financial inclusion. As discussed in the literature, access to technology and to digital financial services (sometimes denominates as 'mobile money') has great importance in diminishing social issues (N'Dri & Kakinaka, 2020). Arguably, this is also the case for LATAM. Here, a multitude of political implications should be discussed.

We argue that governments have a role in the financial inclusion endeavor. If financial inclusion is an effective action to decrease poverty and inequality, then governments should regulate bank activities to facilitate this path. Evidently, government actions will affect the economy (i.e., markets) (Volscho & Kelly, 2012). De facto, much discussion is made on the role of government in the banking sector (along with the overall economy). In recent years, however, there is a rejection of more traditional views stating that the state and the market are two distinct and opposing economic actors (Block & Evans, 2005). The author comments that lessons can be taken from both market-oriented (i.e., liberal) economies and developmental-states, and that success comes from integration. Arun and Kamath (2015) stated that policymakers, central bankers and regulators play important roles in unlocking the economy and improving financial inclusion.

In this sense, policymakers should create encourage the expansion of financial services to all, as governments are interested in tackling poverty (Ndlovu & Toerien, 2020), and have the institutional capabilities to facilitate the financial inclusion process (Arun & Kamath, 2015; Ozili, 2018). Although our results suggest benefits coming from financial inclusion, the population of LATAM still presents low numbers of financial inclusion when compared to developed economies (Carballo, 2017). In this sense, we agree with Vacaflor (2018) that this encouragement should consider isolated communities, as their isolation makes it difficult to fight poverty (e.g., rural areas with lower levels of financial awareness). Hence, fostering bank outreach to these areas should be an indispensable feature of the poverty-reduction strategy, as indicated by Iqbal et al. (2020) and Munyegera and Matsumoto (2016). We defend that this process may involve multiple actors (e.g., governments, banks and other financial institutions) to mutually invest in these areas. As Block and Evans (2005) commented, development should be seen as the result of an intricate relationship between the state, the economy and the society. Moreover, policies should aim to remove obstacles to the adoption of financial services, especially considering that half of the LATAM population has no account ownership (Carballo, 2017).

Concerning the combined effects of financial inclusion and ICT, we argue that investing in technology outreach and digital financial services will result in positive outcomes for LATAM. However, investing in new technologies (only) is incapable of solving social issues. There are already plenty of examples of 'FinTech' or 'mobile money' technologies in operation. A few examples (in recent years) are "*Cuenta Móvil*" in Chile, "*Daviplata*" and "*Ahorro a la Mano*" in Colombia, "*Mi Billetera Móvil*" in Argentina, "*Zuum*" in Brazil, among others (Carballo, 2017), resulting in an ever-growing list of digital finance solutions. However, Carballo (2017) comments that -possibly- a fair amount of account owners makes limited use of the available services, and in some cases use it to receive salaries only. With this, we argue that new policies should aim to increase financial literacy so that people can use their financial services effectively. Indeed, the financial literacy issue was previously commented by Park and Mercado (2017), Grohmann et al. (2018) and Adetunji and David-West (2019). Also, Carballo (2017) comments on how the complexity of financial services drives people away from its use and from optimal choices. Besides, even with

the advancement of digital finance, the population of LATAM still faces eligibility issues, which should be further discussed by policymakers. Without effective dissemination -and use- of financial services, the poverty traps in existence will not be eliminated.

Still on the dissemination of financial services, we agree with Neaime and Gaysset (2018) and their statement that an underdeveloped financial system (e.g., low accessibility, few bank branches, or low levels of competition) will not provide incentives (e.g., interest rates) to poorer groups to save and invest. Thus, the concentration of finance may be a challenge to overcome in LATAM (Rojas-Suarez e Amado, 2014).

Indeed, competition is traditionally viewed as a facilitator of credit *inter alia* due to cost reduction and availability of services (Álvarez & Bertin, 2016; Owen & Pereira, 2018). To exemplify, Leon (2015) found that competition facilitates the access to credit. In other words, bank concentration may result in financing obstacles (Owen & Pereira, 2018). Nonetheless, some scholars argue that some level of concentration is necessary as market power may be necessary to invest in lending activities (Álvarez & Bertin, 2016; Presbitero & Rabellotti, 2016). In any case, bank concentration is not homogeneous within LATAM (Matos, 2017), and 'FinTech' may be a powerful tool to boost financial inclusion at a low cost, as shown by the multiple examples given earlier (e.g., 'Mi Billetera Móvil' in Argentina). We argue that policymakers should consider 'FinTech' and other 'mobile money' solutions as reasonable strategies to deal with the complex bank concentration issue in LATAM. Although not the topic of our paper, Wójcik (2020) argues that the COVID-19 pandemic resulted in debates arguing that financial technologies (i.e., 'FinTech' solutions) kept the financial system working, and that the pandemic may accelerate the development of the digital infrastructure. Thus, policymakers should be even more vigilant on their policies involving financial inclusion and technologies.

Moreover, the recent history of LATAM suggests that the government has great potential to fight poverty and inequality through social programs. A few examples are the '*Bolsa Familia*' and the '*Benefício de Prestação Continuada*' programs in Brazil or the '*Jefes y Jefas de Hogar Desocupados*' in Argentina. In both countries, state mediation, especially in the late 2000s, was important to fight social issues (Campoli et al., 2020; Lustig et al., 2013). We argue other LATAM countries should invest in programs like the ones presented here, as social inclusion is necessary for a high-functioning society (Block, 2008), and large private banks may not be interested in providing financial services without guarantees and high fees (Schönerwald & Vernengo, 2016).

Besides, the government plays a key institutional role within the financial context. Better institutional quality is already known to improve government efficiency (Fligstein, 1996) and, therefore, reduce complex issues such as inequality (Volscho & Kelly, 2012). All issues contemplated in our study (e.g., fintech, bank availability, and eligibility) are arguably dependent upon the local government's capabilities to deliver an efficient institutional environment that facilitates financial inclusion-related policies' development and adoption. Yet, we argue that institutional efficiency also has an effect on macroeconomic issues (e.g., inflation, volatility, financial regulation, and the financial network structure) (Fligstein et al., 2017; Liliانا Rojas-Suarez & Amado, 2014) that may either harm or promote the financial inclusion-path. In this sense, further investigation on the effects of inflation on poverty and inequality are necessary, as our results show that increases in inflation may decrease poverty and inequality, which is not the expected outcome. Yet, previous scholars have demonstrated insignificant or even negative effects of inflation on inequality, especially in poorer regions (Demir et al., 2020; Kim et al., 2018; Park & Mercado, 2017). Arguably these results show that inflation is -at least to some extent- unstable in LATAM and deserves country-specific research.

Other -and more straightforward- examples of the governmental role in fighting poverty and inequality within the financial inclusion context was presented by Bebczuk (2008). The author comments on the role of the '*Caixa Economica Federal*', a government-owned bank in Brazil that drastically expanded financial services by creating accounts and cards to thousands of people, while offering financial services in local state-owned lotteries. The author also comments on the '*La Banca de las Oportunidades*' program in Colombia, which facilitated regulatory changes, cut costs, and co-financed and assisted private banks and other financial institutions, following the Brazilian case. Following these examples, policies may encourage retailers and all sorts of service providers to participate in credit (and other financial services) dissemination. As Bruhn & Love (2014) argues, flexible lending practices are important to expand services, particularly to low-income individuals.

Finally, it is important to comment on the possible negative ramifications of financial inclusion. Too much credit (e.g., credit cards, car loans, personal loans, and mortgages) may not have the promised positive effect on human development and related indicators. These services represent low-risk high-commissions for the banks and funds. Thus, these service providers might extract precious resources from the poorest population, and any real economic transformation may not arise. Also, this credit and micro-credit situation can result in disastrous financial challenges for poorer populations during crises (Correa & Girón, 2019; Gutiérrez-Nieto et al., 2017). Again, the state has a role in regulating loans, credit and other bank activities in an attempt to avoid future crises (Gorton, 2009; MacKenzie, 2011). Although our study will not further discuss the state-market issue, future scholars should investigate this topic and possible policy implications in LATAM.

7 Conclusion and Future Research Agenda

Considering a large portion of the population is still unbanked and that access and usage of financial services has the potential of diminishing social issues, our study attempted to study the effects of financial inclusion on the poverty and inequality levels of Latin America. Namely, we studied these effects in Argentina, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Honduras, Panama, Paraguay, Peru, and Uruguay. We performed our analysis by employing empirical country-level data and econometric tools. Also, we discussed policy implications to help future scholars and policymakers when dealing with the complex and dynamic social reality of LATAM.

In sum, the results are aligned with previous literature (Demir et al., 2020; Fouejieu et al., 2020; Koomson et al., 2020; Mushtaq & Bruneau, 2019; N'Dri & Kakinaka, 2020; Omar & Inaba, 2020) as we found significant and negative effects of financial inclusion on poverty and inequality. Therefore, as financial inclusion increases, poverty and inequality decrease. Additionally, the combined effects of financial inclusion and technology use (in our study represented by mobile use) are also beneficial do LATAM. With these findings, LATAM countries have the potential to diminish social issues by investing in financial inclusion and the 'democratization' of finance. Thus, the joint effort of the state and the market, specifically the financial sector, is of great importance for the region.

Yet, our analysis presents limitations and future research is necessary. As discussed before, LATAM still presents high levels of poverty and inequality, and the latter is persistent within time. Additionally, there is considerable heterogeneity between the countries of LATAM. Thus, future research should perform country-specific research to better comprehend the effects of financial inclusion and its policy implications. Also, some scholars

have argued that both macroeconomic and individual aspects (e.g., age and education) may have an influence on the use -and the effects- of financial inclusion. Dependent upon data availability, future studies regarding LATAM or other developing groups could employ a financial inclusion-related census to gather new information. Moreover, many LATAM countries present relentless inequality levels, which will arguably take time to decline. Concurrently, financial inclusion may also take time to present positive effects. Thus, future studies should revisit the effects of financial inclusion in LATAM while considering a higher time frame.

Future studies should also consider additional variables to represent financial inclusion. As discussed in our paper, several already-in-use variables are mostly unavailable for LATAM, and some countries only started registering information in very recent years. This is the case of ‘mobile money’ and ICT-related variables linked to finance. Using only the traditional bank-related variables may result in limited discoveries. Scholars should revisit this issue in the future.

Finally, scholars may continue the research on the finance-poverty-inequality nexus in LATAM by employing other econometric tools. Both non-parametric (e.g., Data Envelopment Analysis) and other econometric tools (e.g., threshold regression) could result in valuable implications for the region. Additionally, field experiments should be performed considering LATAM-specific features, as finance solutions found elsewhere may not work in LATAM.

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Availability of data and material The data that support the findings of this study are available upon reasonable request.

Declarations

Conflicts of interest The authors declare that they have no conflict of interest.

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