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ABSTRACT
Financial inclusion is an important determinant of local economic development. Lack of adequate access to formal financial services can have detrimental effects on households, such as hampering liquidity levels. The benefits of financial inclusion could be especially important in Latin America and Caribbean, a region with modest and volatile economic growth, savings, and investment levels. The objective of this paper was to examine the determinants of financial inclusion in Latin America and the Caribbean region. Overall, our results indicate that greater income and education levels are associated with higher probability of financial inclusion.

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Introduction

Financial inclusion, broadly defined as having access to affordable and useful financial services that meet the needs of individuals and businesses (Demirgüç-Kunt, Klapper, Singer, and Van Oudheusden 2015), has gained momentum as an important determinant of economic development (Allen, Demirguc-Kunt, Klapper, and Martinez Peria 2016).

It is important to point out that the definition above takes into account the fact that useful and affordable financial services may be provided by informal markets. The lower-income population extensively relies on informal financial services that generally coexist with formal institutions, as evidenced by the financial diaries of the poor (Collins et al. 2009). This coexistence is better known as financial dualism and has long been analysed in the literature.

In developing countries financial markets are dualistic markets, organised through an interplay between formal and informal financial services. Taking credit markets, for instance, the available empirical evidence suggests that a significant fraction of credit transactions in developing countries takes place in the informal market. A large number of empirical studies highlights that credit market dualism exists in India, China, Indonesia, Nepal, Nigeria, and Mexico (Bhattacharjee and Rajeev 2010; Chin 2015).

Another example of dualism is the importance of the cash economy. India is an emblematic case: despite the rapid process of digitalisation of its payment systems, cash use remains high (Chandrasekhar and Ghosh 2018; Shree et al. 2021). Rural India, for instance mainly depends on cash rather than digital payments to meet daily needs, pointing to the importance of the cash economy to GDP (Chandrasekhar and Ghosh 2018). Although there seems to be a link between reduced cash usage and higher *per capita* incomes, there is no clear relation between *per capita* income and the value of currency in circulation (Chandrasekhar and Ghosh 2018). The episode of demonetisation in India showed that in the absence of adequate infrastructure in terms of both banking and connectivity, digitalisation may be counterproductive, for instance, if it represents an additional form of

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generating profits through high transactions fees charged to the lower-income population (Chandrasekhar and Ghosh 2018).

Altogether, the reasons above imply high access costs to customers, who may prefer informal mechanisms (Chandrasekhar and Ghosh 2018). The latter may therefore have a positive impact by increasing broader access to financial services. In addition, both formal and informal financial services coexist, as being formally included does not lead to a decrease in the use of informal finance (De Koker and Jentzsch 2013).

Details regarding the importance of informal markets and the cash economy in many different countries go beyond the scope of this article that instead aims to contribute to the discussion of access to financial services in formal markets. In this sense, inclusive financial systems benefit low-income households by encouraging investments in productive activities (Honohan 2008); exclusive financial systems may prolong inequality and limit growth since individuals have to rely on limited informal financial sources (Beck, Levine, and Loayza 2000; Klapper, Laeven, and Rajan 2006). Expanding access to basic financial services is a policy priority to reduce poverty and increase economic development.

Access to financial services can also drive development by facilitating investments in education, health, and businesses as well as assisting managing financial emergencies. There is increasing evidence that the ownership of bank accounts increases savings (Ashraf, Karlan, and Yin 2006), female empowerment (Ashraf, Karlan, and Yin 2010), and consumption and productive investment of entrepreneurs (Dupas and Robinson 2013). In addition, not having a bank account can have detrimental effects on households as lack of access to a bank account not only increases the probability of payment default and hampers liquidity levels, but cash transactions present a financial risk for unbanked individuals, including risk of stolen funds (Rhine and Greene 2006; Rhine, Greene, and Toussaint-Comeau 2006).

With regard to poverty reduction, Bruhn and Love (2014) point out that financial inclusion leads to economic benefits as individuals with access to financial services are able to invest in education and entrepreneurial activities, contributing to poverty reduction and income increase. Beck, Demirgüç-Kunt, and Levine (2007) show that financial development increases the income of the poorest quintile and reduces income inequality. Financial inclusion also allows individuals to save and borrow money and to contract insurance that will mitigate the negative effects of economic shocks or uncertainties (Han and Melecky 2014).

Recent studies have investigated financial inclusion in developing economies, but little attention has been paid to the determinants of financial inclusion in Latin America and the Caribbean (LAC) at the individual level. Using data from the 2014 World Bank's Global Findex database, this paper aims to examine the determinants of financial inclusion in the region. Based on recent investigations (Allen et al. 2016; Fungáčová and Weill 2014; Zins and Weill 2016), we assessed the impact of individual determinants, such as gender, age, income, and education, among others, on the three main indicators of financial inclusion: ownership of a bank account, saving via a bank account, and use of bank credit. In addition, we examined the impact of determinants of informal borrowing as well as the main reasons for not owning a bank account in formal markets.

Background

From a theoretical perspective, the fundamental role of financial institutions and markets is to facilitate coordination and reduce transaction costs. Financial service providers fulfil this role by offering means of payment solutions, allocating savings to finance investments at different scales, mitigating informational problems, and diversifying risk (Beck, Demirgüç-Kunt, and Martinez 2008; Beck, Demirgüç-Kunt, and Pería 2011; Levine 2005). Currently, 1.7 billion people around the world do not have access to formal financial services (Demirgüç-Kunt, Klapper, Singer, Ansar, and Hess 2018).

Financial inclusion can favour disadvantaged and poor people by providing credit for income generation activities, which in turn may favour employment. For instance, access to financial

services, such as having a bank account, enables individuals and firms to smooth consumption, manage risk, and invest in education, and health (Demirgüç-Kunt et al. 2015). In addition, increased access to finance results in higher employment growth, especially among micro, small, and medium enterprises (Ayyagari, Demirgüç-Kunt, and Maksimovic 2008).

While firm financial inclusion in LAC countries is comparable to development levels in other emerging economies, household financial inclusion continues to lag with low levels of account ownership, savings, and borrowing from formal financial institutions (Demirgüç-Kunt et al. 2018). Only 52% of women have an account in the region, compared to 59% of men. Gender issues also affect savings patterns, as men are 6% more likely to save in formal financial institutions than women (Demirgüç-Kunt et al. 2018). The limited supply and demand for financial services reflect the region's socio-economic constraints and vulnerabilities in the macroeconomic environment in terms of income *per capita*, gender differences, and education, combined with a low degree of export diversification and a large shadow and informal economy (Dabla-Norris et al. 2015).

The benefits of financial inclusion could therefore be especially important in LAC, a region with modest and volatile economic growth, savings, and investment levels. Nearly half of the adult population is deprived of basic financial services in LAC, such as having an account in a financial institution, mainly because of market failures, such as moral hazard and adverse selection, in addition to high coverage costs, geographical remoteness, lack of infrastructure, and strict documentation requirements (De Olloqui, Andrade, and Herrera 2015). For instance, lack of contract enforcement between creditors and debtors directly reduces depositors' incentives to entrust funds to formal financial institutions.

Methodology

We use the World Bank's 2014 Global Findex database to conduct our econometric analyses. We chose the 2014 rather than the latest (2017) Global Findex dataset available because some variables of interest were not in the 2017 dataset, such as the frequency of withdrawing cash. The database includes individual level data originating from a survey of nearly 150,000 adults in 143 countries. Using randomly selected, nationally representative samples, the survey comprises approximately 1000 adults in each economy. The Global Findex database provides a large number of indicators of financial inclusion that enables the assessment of the amount of account penetration – the percentage of adults who have individual or joint ownership of a formal account, use of financial services, reasons for not owning accounts, and alternatives to formal finance. It also provides micro-level individual information, such as gender, age, income, and education. We are using a random sample of 16,536 adults in 18 countries in Latin America and the Caribbean for our analysis.[1] Each LAC country has a representative sample of approximately 1000 adults except for Haiti, Jamaica, and Belize. These countries have a representative sample of 504 adults each.

Consistent with previous literature (Demirgüç-Kunt and Klapper 2013; Fungáčová and Weill 2014; Zins and Weill 2016), we performed probit estimations in order to evaluate the determinants of financial inclusion in Latin America through the following equation:

$$\begin{aligned} inclusion_{ic} = & \beta_0 + \beta_1 \times income_{ic} + \beta_2 \times education_{ic} + \beta_3 \times age_{ic} \\ & + \beta_4 \times age_{ic}^2 = \beta_5 \times gender_{ic} + \gamma \times country_i + \varepsilon_i \end{aligned} \quad (1)$$

Dependent variables

Inclusion mainly comprises four dummies. *Account*, the first outcome dummy variable that measures financial inclusion, refers to the ownership of an account in a formal financial institution, such as banks, credit union, cooperatives, or microfinance institutions and *i* represents a given individual in LAC country *c*. The survey question used in this case is "do you currently have a bank account at a formal financial institution?"

Since we only observe whether an individual uses a bank account to save and borrow if he or she owns an account at a formal financial institution, estimating the use of an account to both save and borrow involves estimating probit models with Heckman sample selection, proposed by Van den Ven and Van Praag (1981), to consider potential endogeneity issues. These models are joint models for two binary outcomes that generalise the index function model from one latent variable to two latent variables that may be related via correlation of the error terms that appear in the index function model formulation of the binary outcomes (Imbens and Wooldridge 2009). As in Allen et al. (2016), we estimate two probit equations (selection and outcome equations), where error terms also follow a bivariate normal distribution.

Specifically, the two outcomes are determined by two unobserved latent variables,

$$y_1^* = \boldsymbol{x}_1^{'}\boldsymbol{\beta}_1 + \varepsilon_1$$

$$y_2^* = \boldsymbol{x}_2^{'}\boldsymbol{\beta}_2 + \varepsilon_2$$

The errors ε_1 and ε_2 ae jointly normally distributed with means of 0, variances of 1, and correlations of ρ, and we observe the two binary outcomes:

$$y_1 = \begin{cases} 1 \; if \; y_1^* > 0 \\ 0 \; if \; y_1^* \leq 0 \end{cases}$$

$$y_2 = \begin{cases} 1 \; if \; y_2^* > 0 \\ 0 \; if \; y_2^* \leq 0 \end{cases}$$

As a result, the second financial inclusion indicator, formal saving, is based on the saving behaviour using an account at a formal financial institutional in the past year. This is defined using the following question, "have you saved or set aside money in a bank account in the past 12 months?"

The third measure of financial inclusion, formal borrowing, considers the usage of bank credit and refers to the borrowing behaviour of individuals from a formal financial institution, excluding credit card use. To understand individual borrowing behaviour, the survey asks the question, "have you borrowed from a bank or another type of financial institution in the past year?" All three variables are dummies equal to one if the person responded "yes" and zero otherwise.

We also follow Allen et al. (2016) and include dummy variable withdrawals as an outcome variable in order to understand the basic use of formal accounts. It takes the value of one if funds are withdrawn at least three times in a typical month, and zero otherwise. We focus on withdrawals rather than deposits because account owners actively initiate withdrawals, whereas other parties, such as employers or governments, might initiate deposits.

The survey asks account owners the following question, "in a typical month, about how many times is money taken out of your personal account(s)?" Categorical responses include whether individuals conducted zero withdrawals, one to two withdrawals and three or more withdrawals per month. Adults who report one to two withdrawals in a typical month may have an account to receive wages, government payments, or money from friends and relatives. In addition, obstacles to account access, such as high withdrawal fees or distance to bank branches, may create disincentives to using the accounts for daily cash management operations. Unlike adults who report fewer than two monthly withdrawals, those who report withdrawing three or more times in a month may be more likely to use their accounts to store cash and make formal electronic payments (Anzoategui, Demirgüç-Kunt, and Martínez Pería 2014).

Likewise, we also use a similar model as in equation 1 to estimate the indicators for card ownership and use. Debit card ownership is an outcome dummy variable that refers to debit card ownership, while debit card use indicates the use of debit card in the past year. Likewise, credit card ownership and credit card use refer to debit card ownership and use, respectively.

Explanatory variables

The explanatory variables of interest comprise different groups of individual characteristics provided in the Global Findex dataset: income, education, age, and gender. Income includes four dummy variables that indicate income levels in quintiles, ranging from the first (poorest 20%) to the fourth (fourth 20%). The omitted category is the fifth income quintile, richest 20%. Education includes two dummies for individuals' completion of zero to eight years of schooling (primary education) and nine to 15 years of schooling (secondary education). The omitted variable corresponds to completion of a four-year university degree (tertiary education). We also include both age, defined in terms of number of years, and squared age in the estimations in order to consider potential non-linearity in the relation between age and financial inclusion. Finally, we take into account gender by including a dummy variable equal to one if the individual is a woman (female) as well as country fixed effects to take into account potential heterogeneity among countries.

Obstacles to account ownership

Investigation of the motives for financial exclusion requires careful analysis of the reasons individuals give for not owning an account at a formal financial institution. In LAC, over 9000 individuals were asked the reasons for not having an account at a formal financial institution. The survey provides some insights about the main obstacles to financial inclusion, allowing multiple choices out of seven potential responses for financial exclusion. For instance, answer choices for financial exclusion include the financial institution being too far away, too expensive, lack of documentation, lack of trust, inability to get one due to lack of sufficient earnings, religious reasons, another family member already having a bank account, and no need for financial services.

Allen et al. (2016) distinguish between voluntary and involuntary self-exclusion. On the one hand, individuals who responded with the latter three reasons are more likely to be voluntarily self-excluded from formal financial systems; they may choose not to participate due to lack of adequate earnings, for cultural and religion reasons, or having a formal account not being necessary. On the other hand, individuals may be involuntarily self-excluded because of obstacles – distance from bank branch or high costs, for instance – that arise as a result of market imperfections, such as asymmetric information. The distinction between voluntary and involuntary financial exclusion is critical for policy implications since only the reasons associated with involuntary exclusion help us identify obstacles to financial inclusion that can be reduced through adequate public policy (Claessens 2006; Roa 2015).

As a result, we include as dependent variables the respective dummy variables for each of the four obstacles associated with involuntary financial exclusion since they may help the identification of obstacles to financial inclusion that can be minimised through adequate public policies. In addition, we create a fifth dummy variable to take into account whether individuals responded that lack of adequate earnings was the only reason for not having an account at a formal financial institution.

Alternative sources of borrowing

The 2017 Global Findex dataset also enables the measurement of important sources of borrowing other than credit from formal financial institutions. This informal borrowing information includes dummy variables for credit from stores, from family and friends, and other private lenders, such as employers. Hence, the information regarding these different sources of informal borrowing is also included as dependent variables in order to capture the determinants for these alternative sources of borrowing.

Results

Table 1 displays the descriptive statistics. In terms of financial inclusion, 44% of individuals in LAC have access to an account from a formal financial institution. The percentage of individuals that save or borrow are much lower. For instance, 14% formally save while only 9% formally borrow. In addition, 27% of individuals withdraw money three or more times per month from their account, 29% have a debit card, and 13% have a credit card. The main obstacles to having a bank account are lack of money (58%), cost of financial services (37%) and lack of trust in financial institutions (24%). The most common alternative source of borrowing is from family, relatives, or friends (16%). In terms of individual characteristics, individuals are in the third quintile of the income distribution, and have secondary education, on average. In addition, 43% of individuals are women and the average age is 40 years.

Table 2 displays the correlation matrix among the variables. The correlation table shows that the main explanatory variables used in the model – income, education, age, and gender – have low correlation among each other. Additionally, variance inflation factors (not shown here) are close to 1, indicating that imperfect multicollinearity is not an issue in the models.

Determinants of financial inclusion

Table 3 displays the results and the marginal effects of the model estimations for the main indicators of both financial inclusion, such as formal account, account use through frequency of withdrawals, formal savings and formal borrowing. Overall, we observe that all individual characteristics have a statistically significant relation with financial inclusion. First, our findings indicate that greater income levels are associated with higher probability of financial inclusion and withdrawals. Compared to the richest 20%, all other income quintiles are less likely to own accounts, save and borrow from formal financial institutions, as well as withdraw money less frequently. The difference in probability is larger between the richest and the poorest 20%, although the poorest 20% are more likely to borrow than the second 20%.

Table 1. Descriptive statistics.

	Mean	Standard Deviation	Minimum	Maximum
Financial inclusion				
Account	0.44	(0.50)	0.00	1.00
Savings	0.14	(0.35)	0.00	1.00
Borrowing	0.09	(0.29)	0.00	1.00
Frequency	0.27	(0.45)	0.00	1.00
Debit card	0.29	(0.45)	0.00	1.00
Debit card (use)	0.61	(0.49)	0.00	1.00
Credit card	0.13	(0.33)	0.00	1.00
Credit card (use)	0.82	(0.39)	0.00	1.00
Obstacles to financial inclusion				
Religious reasons	0.05	(0.21)	0.00	1.00
Family member has account	0.19	(0.39)	0.00	1.00
Lack of money	0.58	(0.49)	0.00	1.00
Financial institution is too far away	0.18	(0.38)	0.00	1.00
Financial services are too expensive	0.37	(0.48)	0.00	1.00
Lack of documentation	0.19	(0.39)	0.00	1.00
Lack of trust	0.24	(0.43)	0.00	1.00
Alternative sources of borrowing				
Borrowed from a store	0.07	(0.26)	0.00	1.00
Borrowed from family/friends	0.16	(0.36)	0.00	1.00
Borrowed from private lender	0.06	(0.24)	0.00	1.00
Individual characteristics				
Income	3.13	(1.42)	1.00	5.00
Education	1.72	(0.64)	1.00	3.00
Female	0.43	(0.50)	0.00	1.00
Age	40.46	(17.79)	15.00	99.00
N	16536			

Table 2. Correlation matrix.

Variables	(1)	(2)	(3)	(4)	(5)
Account	1.000				
Income	0.212*	1.000			
Education	0.224*	0.264*	1.000		
Age	0.073*	0.052*	−0.287*	1.000	
Female	0.066*	0.091*	0.010	0.014	1.000

*$p < 0.01$.

Likewise, higher levels of schooling are associated with greater likelihood of being financially included as well as higher withdrawal frequency. Individuals who completed a four-year college degree are more likely to both have access to all three indicators of financial inclusion and withdraw three or more times from the account than those who complete either high school, or primary school. Our results also suggest a non-linear relation between age and the indicators of financial inclusion and frequency of use. While age is positively related to financial inclusion, age squared has a negative coefficient. This indicates that older people are more likely to be financially included, although the probability of financial inclusion decreases after a certain age. In addition, women are more likely to have access to a bank account, and to save and borrow from formal financial institutions, than men as well as use the account more often. This indicates that being a woman is less of an obstacle to account ownership and having access to saving and borrowing mechanisms from banks as well as using the account more often.

Table 4 reports the main determinants of debit and credit card ownership and use. Overall, all individual characteristics have a statistically significant relationship with debit and credit card ownership and debit card use. Conversely, the second 20% income quintile, primary education, and age are statistically significant determinants for use of credit card. Our main findings indicate that greater income and education levels are positively related to the likelihood of owning and using both debit and credit cards. We also found a significant non-linear relationship between

Table 3. Determinants of financial inclusion.

	Account	Savings	Borrowings	Withdrawal
Income: Poorest 20%	−0.198***	−0.171***	−0.0588***	−0.0743***
	(0.012)	(0.012)	(0.012)	(0.022)
Income: Second 20%	−0.168***	−0.134***	−0.0462***	−0.0805***
	(0.012)	(0.012)	(0.012)	(0.020)
Income: Third 20%	−0.129***	−0.103***	−0.0140	−0.0664***
	(0.011)	(0.011)	(0.011)	(0.018)
Income: Fourth 20%	−0.0687***	−0.0605***	−0.00750	−0.0447***
	(0.011)	(0.011)	(0.011)	(0.017)
Primary Education	−0.374***	−0.251***	−0.117***	−0.158***
	(0.013)	(0.014)	(0.014)	(0.021)
Secondary Education	−0.217***	−0.137***	−0.0532***	−0.0749***
	(0.012)	(0.013)	(0.013)	(0.018)
Female	0.0556***	0.0484***	0.0390***	0.0705***
	(0.007)	(0.007)	(0.007)	(0.012)
Age	0.0142***	0.00538***	0.0153***	0.00509**
	(0.001)	(0.001)	(0.001)	(0.002)
Age Squared	−0.000127***	−0.0000857***	−0.000181***	−0.0000736***
	(0.000)	(0.000)	(0.000)	(0.000)
_cons	0.652***	−0.0667	−1.285***	−0.589***
	(0.086)	(0.086)	(0.088)	(0.164)
N	16493	5044	16493	16493
Chi-Sq	2904.6	2075.4	1162.8	297.1
Country FE	Y	Y	Y	Y

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Dependent variables: formal account, account withdrawals, formal savings, formal borrowing.
Robust standard errors in parentheses.
Marginal effects as coefficients.

Table 4. Determinants of the debit and credit card ownership and use.

	Debit card ownership	Debit card use	Credit card ownership	Credit card use
Income: Poorest 20%	−0.182***	−0.117***	−0.113***	−0.00131
	(0.010)	(0.024)	(0.008)	(0.031)
Income: Second 20%	−0.155***	−0.147***	−0.0992***	−0.0683**
	(0.010)	(0.023)	(0.008)	(0.031)
Income: Third 20%	−0.110***	−0.0878***	−0.0863***	−0.0481*
	(0.010)	(0.020)	(0.008)	(0.027)
Income: Fourth 20%	−0.0571***	−0.0670***	−0.0476***	0.00426
	(0.010)	(0.017)	(0.008)	(0.021)
Primary Education	−0.328***	−0.238***	−0.176***	−0.119***
	(0.013)	(0.022)	(0.011)	(0.030)
Secondary Education	−0.203***	−0.0979***	−0.101***	−0.0311
	(0.012)	(0.017)	(0.010)	(0.020)
Female	0.0637***	0.0506***	0.0343***	0.00631
	(0.006)	(0.013)	(0.005)	(0.017)
Age	0.0115***	0.00926***	0.0101***	0.00703**
	(0.001)	(0.002)	(0.001)	(0.003)
Age Squared	−0.000111***	−0.000130***	−0.000107***	−0.0000823***
	(0.000)	(0.000)	(0.000)	(0.000)
_cons	0.436***	0.708***	−0.758***	0.898***
	(0.090)	(0.162)	(0.114)	(0.278)
N	16334	4669	16285	2026
Chi-Squared	3267.3	664.7	1678.7	137.6
Country FE	Y	Y	Y	Y

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Dependent variables: debit card ownership, used debit card in past year.
Credit Card Ownership, Used Credit Card in past year.
Robust standard errors in parentheses.
Marginal effects as coefficients.

age and account use, suggesting a positive relation between age and account use only up to a certain age. In addition, women were significantly more likely to own debit and credit cards and use debit cards than men. However, they were less likely to use credit cards than men although the result is not statistically significant.

Determinants of obstacles to financial inclusion and informal borrowing sources

Table 5 displays the determinants of the obstacles to financial inclusion. Panel A includes the obstacles that represent voluntary exclusion, such as religious reasons, and account ownership by other family members. The findings of this study indicate that lower levels of income have a positive effect in reporting religious reasons as an obstacle to financial inclusion, although the results are only marginally significant for the poorest 20% income quintile at the 10% level. We also found that lower levels of education had a positive relationship with the religion obstacle that deters financial inclusion, although only primary education is statistically significant.

Conversely, individuals with lower levels of income and education are less likely to report account ownership of family members as the reason for not owning an account. The results are statistically significant for the two lowest income quintiles as well as primary and secondary education. In addition, the findings of this study also indicate that, as expected, individuals with lower levels of income are more likely to report that lack of money is an obstacle to financial inclusion. Likewise, lower levels of education have a positive impact on the likelihood of reporting lack of money as a constraint for financial inclusion. Both income quintiles and education are statistically significant although secondary education is marginally significant at the 10% level.

Gender and age were also found to have significant effects. Although women were found to be more likely to report religion as an obstacle to financial inclusion, they were less likely to report

Table 5. (Panel A): Determinants of voluntary self financial exclusion.

	Religious reasons	Relative has one	Lack of Money
Income: Poorest 20%	0.138*	−0.259***	0.325***
	(0.076)	(0.051)	(0.043)
Income: Second 20%	0.0236	−0.143***	0.282***
	(0.079)	(0.050)	(0.043)
Income: Third 20%	−0.0466	−0.0441	0.200***
	(0.080)	(0.048)	(0.043)
Income: Fourth 20%	0.0650	0.0157	0.128***
	(0.078)	(0.049)	(0.044)
Primary Education	0.327***	−0.392***	0.244***
	(0.120)	(0.068)	(0.062)
Secondary Education	0.156	−0.165**	0.148**
	(0.119)	(0.065)	(0.060)
Female	0.108**	−0.0578*	−0.0911***
	(0.046)	(0.031)	(0.027)
Age	0.0162**	−0.0253***	0.0166***
	(0.006)	(0.004)	(0.004)
Age Squared	−0.000190***	0.000219***	−0.000169***
	(0.000)	(0.000)	(0.000)
_cons	−2.843***	0.695***	−0.319***
	(0.261)	(0.128)	(0.119)
N	9751	9703	9777
chi2	194.7	425.4	518.6
Country FE	Y	Y	Y

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Dependent variables: religious reasons, family member has account, lack of money.
Robust standard errors in parentheses.
Marginal effects as coefficients.

account ownership of family members and lack of money as reasons for not being financially included. There is also a non-linear relation between age and voluntary financial exclusion. While older individuals are more likely to report lack of money and religion as constraints up to a certain age, which decrease after this age threshold, a reverse effect was found for the account ownership of family members.

Panel B of Table 6 includes the obstacles to financial inclusion that represent individuals who are involuntarily excluded since they do not use formal financial services due to obstacles that arise because of market failures. Among these obstacles, individuals report accounts to be too expensive, too far away, to lack the necessary documentation, and to be discouraged by a lack of trust in banks. Our findings indicate that individuals with lower income and education levels are more likely to report being involuntarily excluded from accessing formal financial services, in terms of distance from bank agencies, costs of opening accounts, and lack of adequate documentation. Conversely, individuals with lower income levels are more likely to report lack of trust in the financial system as an obstacle although the result is statistically significant only at the third income quintile. Women are more likely to report being involuntary excluded from formal financial services, while the non-linearity of age is consistent with the previous results of this study.

Table 7 displays the main determinants for informal sources of borrowing, including credit from stores, family and friends, and other private lenders, such as employers and moneylenders, among others. The findings of this study suggest that lower income quintiles have a negative relationship with obtaining credit from stores although the relationship between lower levels of income quintiles and credit from family and friends and private lenders is positive. This indicates that, while individuals with lower income levels are less likely to use store credit as an alternative source of informal credit, they are more likely to use family, friends, and private lenders. In terms of education, both primary and secondary education are significantly negative in explaining the likelihood of borrowing from informal sources. This finding suggests that more educated people borrow less from informal

Table 6. (Panel B): Determinants of involuntary financial exclusion.

	Far away	Expensive	No Documents	Distrust
Income: Poorest 20%	0.373***	0.190***	0.140***	−0.0446
	(0.053)	(0.045)	(0.051)	(0.048)
Income: Second 20%	0.240***	0.139***	0.112**	−0.00582
	(0.054)	(0.045)	(0.052)	(0.047)
Income: Third 20%	0.175***	0.0431	0.0313	−0.132***
	(0.054)	(0.045)	(0.051)	(0.047)
Income: Fourth 20%	0.123**	0.0404	0.0565	−0.0414
	(0.055)	(0.046)	(0.052)	(0.048)
Primary Education	0.336***	0.357***	0.385***	0.0299
	(0.080)	(0.067)	(0.081)	(0.070)
Secondary Education	0.105	0.299***	0.287***	0.104
	(0.078)	(0.065)	(0.078)	(0.067)
Female	0.0413	0.0267	0.0832***	0.117***
	(0.032)	(0.028)	(0.031)	(0.029)
Age	−0.00231	0.0274***	−0.0522***	0.0308***
	(0.004)	(0.004)	(0.004)	(0.004)
Age Squared	−0.0000135	−0.000262***	0.000433***	−0.000317***
	(0.000)	(0.000)	(0.000)	(0.000)
_cons	−1.790***	−1.766***	−0.590***	−2.066***
	(0.156)	(0.125)	(0.150)	(0.144)
N	9754	9664	9744	9679
chi2	579.3	697.8	571.0	596.3
Country FE	Y	Y	Y	Y

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Dependent variables: too far away, too expensive, lack documentation, lack trust.
Robust standard errors in parentheses.
Marginal effects as coefficients.

sources, such as store credit, family and friends, and other private lenders. In addition, women are more likely to borrow from informal sources of lending while older people are more likely obtain loans from informal sources up to a certain age.

Table 7. Determinants of informal sources of borrowing.

	Store credit	Family or friends	Private lender
Income: Poorest 20%	−0.257***	0.0135	−0.0330
	(0.051)	(0.041)	(0.058)
Income: Second 20%	−0.258***	0.0831**	0.116**
	(0.051)	(0.041)	(0.055)
Income: Third 20%	−0.148***	0.170***	0.156***
	(0.046)	(0.038)	(0.051)
Income: Fourth 20%	−0.0820*	0.0610	0.100**
	(0.044)	(0.038)	(0.051)
Primary Education	−0.353***	−0.168***	−0.0743
	(0.053)	(0.045)	(0.060)
Secondary Education	−0.154***	−0.0630	0.0637
	(0.047)	(0.041)	(0.055)
Female	0.0368	0.136***	0.243***
	(0.031)	(0.025)	(0.034)
Age	0.0487***	0.0193***	0.0577***
	(0.005)	(0.004)	(0.006)
Age Squared	−0.000561***	−0.000321***	−0.000671***
	(0.000)	(0.000)	(0.000)
_cons	−2.224***	−1.762***	−3.674***
	(0.140)	(0.113)	(0.187)
N	16322	16311	16318
chi2	473.4	796.6	749.0
Country FE	Y	Y	Y

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.
Dependent variables: borrowed store credit, family or friends, private lender.
Robust standard errors in parentheses.
Marginal effects as coefficients.

Endogeneity issues

We are aware that endogeneity could be present in our estimations. Not only could the distribution of financial inclusion variables influence policy, but several other factors could also influence policies and financial inclusion simultaneously. In addition, education and income are likely to be endogenous as one of them leads the other one to drive financial inclusion (Kling, Pesqué-Cela, Tian, and Luo 2020). The evidence on literature linking education to financial inclusion tends to be mixed. On the one hand, education could be the actual driver to financial inclusion via either financial literacy, or income via higher-paying jobs. For instance, financial literacy and higher education levels may drive financial inclusion regardless of income (Grohmann, Klühs and Menkhoff 2018). On the other hand, income levels may simply drive financial inclusion, resulting in higher educational levels of that individual. For instance, having a higher income level is sufficient to drive financial inclusion since individuals can afford to use financial services regardless of whether or not they are educated (Morgan and Long 2020).

Our findings suggest that both income and education are important in predicting financial inclusion, so they operate simultaneously. However, the coefficient of education is higher than the coefficient of income. Since we examine individuals with the same income levels but differing education levels, education drives financial inclusion through higher levels of financial literacy. This confirms the results found in the financial literature that education has a stronger effect in financial inclusion through financial literacy (Gibson, McKenzie, and Zia 2014; Grohmann et al. 2018; Lusardi and Mitchell 2014).

As a result, we can only interpret our findings as significant correlations between individual characteristics and measures of both financial inclusion and exclusion rather than causal relationships. Coming up with an identification strategy is a difficult task since we are not able to exploit institutional changes to identify the impact of financial inclusion variables. As an instrument for the likelihood of owning an account, Allen et al. (2016) use the adoption of policies in neighbouring countries as an instrument, assuming that countries may replicate financial inclusion policies of their neighbours. In the context of Latin America and the Caribbean, we are not able to use this instrument since there is not enough variation in policy adoption within the region.

Discussion

This study aimed to examine the main determinants of financial inclusion in Latin America and the Caribbean through the assessment of the impact of individual determinants, such as gender, age, income, and education, on the three main indicators of financial inclusion: ownership of a bank account, saving in a bank account, and use of bank credit. Our main findings suggest that individuals with greater income and education levels are more likely to own an account, save, and borrow from formal financial institutions. Consistent with previous results in China (Fungáčová and Weill 2014), Sub-Saharan Africa (Allen et al. 2014; Zins and Weill 2016), and the region comprising the Middle East and North Africa (Demirguc-Kunt, Klapper, and Randall 2014), the findings for our study point to the benefits of investments in education. Access to secondary and tertiary education may have positive effects on income at the household level.

An interesting finding of this study indicates that the poorest 20% are more likely to borrow than the second poorest 20% although they are less likely to either have a bank account or save in a formal financial institution. As a potential explanation for the higher access to borrowing for households in the poorest quintile, formal microfinance institutions may play a critical role in terms of providing access to loans they would otherwise not obtain (Ghosh 2013). In addition, unlike previous literature (Fungáčová and Weill 2014; Zins and Weill 2016), women were found to be more likely to have access to financial inclusion in terms of bank account ownership, savings, and borrowing as well as use debit and credit cards than men. Our results contradict previous findings which indicate that the probability of financial inclusion between women and men is similar in LAC and the region's comparator countries (Rojas-Suarez and Amado 2014).

The higher education levels of women in Latin America and the Caribbean, including being both as financially literate and risk averse as men, may explain the greater access to formal financial services (Bucher-Koenen, Lusardi, Alessie, and van Rooij 2017). Financial literacy is a potential mechanism driving the impact of education on financial inclusion since more educated women have higher levels of financial literacy. For instance, Bannier and Schwarz (2018) found that greater financial literacy leads to higher wealth and financial inclusion, with higher education levels considerably strengthening this effect for women.

Another potential explanation indicates that conditional cash transfer programmes in the region may be important to the growth in access to both account ownership and use as women are the main beneficiaries of payments of social benefits (Bebczuk 2008). At the country level, however, the gender gap persists in the access and use of bank accounts at formal financial institutions. For instance, women were found to be financially excluded in Venezuela, Mexico, Costa Rica, and Jamaica, countries where women may have lower levels of education and income (Dabla-Norris et al. 2015).

This study also examined the impact of financial inclusion obstacles associated with individual characteristics by both investigating the main determinants of informal savings and informal credit and studying the motivations for saving and use of credit and their relationship with individual characteristics. Overall, the findings indicate that individuals with lower levels of education and income are more likely to report being either voluntarily, or involuntarily, excluded from having access to formal financial services. The results indicate that both demand and supply effects may constrain financial inclusion (Demirgüç-Kunt and Klapper, 2013). First, demand for formal financial services may be low as individuals may choose not to participate. Second, individuals are also involuntarily excluded from using formal financial services due to obstacles that arise because of market failures and information asymmetries between lenders and borrowers.

Individuals who are financially excluded may resort to informal sources of finance to meet their capital needs. Income and education have a negative effect on informal borrowing, such as store credit, family and friends, and other private lenders. In addition, women are more likely to borrow from informal sources of lending while older people are more likely obtain loans from informal sources up to a certain age. Both a large shadow economy and informal jobs may explain the demand for informal financing for financially excluded individuals. Compared to other emerging markets, the LAC region continues to lag on household financial inclusion in terms of account ownership, savings, and borrowing services from formal financial institutions. The lack of advance in financial inclusion may reflect the region's weak institutional development, such as low levels of rule of law and the large size of the informal economy, as well as low education and *per capita* income levels (Rojas-Suarez, 2016).

Conclusion and policy implications

The objective of this paper was to examine the determinants of financial inclusion in the LAC region. We assessed the impact of individual determinants, such as gender, age, income, and education, among others, on the three main indicators of financial inclusion: ownership of a bank account, saving in a bank account and use of bank credit. Overall, the results indicate that greater income and education levels are associated with higher probability of financial inclusion. In addition, women are more likely to have access to a bank account, save, and borrow from formal financial institutions than men, and age has a non-linear relationship with financial inclusion.

The main policy implications of this study in terms of increasing access to financial inclusion point to targeting public policy to young individuals within the lowest income and education strata. One way to target low-income households is increasing digital payments from governments. For instance, government payments from conditional cash transfer programmes, such as *Programa Bolsa Família* in Brazil and *Oportunidades* in Mexico, are transferred to a bank account rather than cash payments. However, the importance of informal markets and the cash economy points to

the fact that many times formalisation, mainly through digitalisation, may produce services and products that do not meet the needs of the lower-income population who may prefer a variety of informal solutions. In this sense, there is room for incorporating local needs and bottom-up solutions into financial inclusion policies.

Also, country characteristics must be taken into account. There is heterogeneity among the LAC countries. For instance, while nearly 80% of Bolsa Familia recipients in Brazil receive their payments in a bank current account, this percentage is much lower in other LAC countries, such as Mexico, Peru, and Colombia (Demirgüç-Kunt et al. 2018). The use of mobile phones may be adequate but connectivity and digital exclusion has to be taken into account.

Despite not being a panacea, digital technology may play an important role in reducing the number of individuals without a bank account. Evidence indicates that digital technology can not only increase the speed of payments and reduce disbursement costs (Klapper and Singer 2017), but it also enhances payment security, thus lowering the incidence of crime (Wright et al. 2017). Disbursing payments through digital channels may also reduce corruption and increase transparency (Muralidharan, Niehaus, and Sukhtankar 2016).

As a result, potential future areas of study may examine the impact of digital financial technology on financial inclusion. Digital technology alone is not enough to increase financial inclusion. For people to benefit from digital financial services, future research needs to target issues on both physical infrastructure, such as reliable electricity and mobile networks, as people will be less likely to use digital payments if network outages are persistent. Financial infrastructure, including an adequate payments system and digital platforms, is also needed. However, technology and infrastructure are only part of the picture. To ensure that people benefit from digital financial services, future research should target regulation issues as well as consumer protection safeguards. It is also important to examine the determinants of access to the digital technology needed to use these services. Finally, financial services should be tailored to the needs of disadvantaged groups, such as women, low-income households and first-time users who may have low financial education skills.

Note

1. The countries included in our sample are: Argentina, Belize, Bolivia, Brazil, Colombia, Costa Rica, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, Peru, and Venezuela.

Disclosure statement

No potential conflict of interest was reported by the authors.

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