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Towards financial inclusion: determinants of international bank account ownership

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Abstract

This paper explores the drivers of bank account ownership, which represent a main access path to financial inclusion, considered by the United Nations as a fundamental pillar of economic growth and social inclusion in its 2030 agenda for sustainable development. The objective of the current study is to identify the supply and demand elements that affect bank account ownership internationally and use this information to build a dynamic panel that allows to validate them statistically.

Given some socio-economic characteristics of potential users of financial products, bank account ownership relies not only on the access channels of these services, but also on the country's success to preserve citizen's savings incentives, such as the reduction of asymmetric information within the financial sector, as well as the preservation of the international purchasing power of the domestic currency. As a result of this study, it was also determined that while more economic agents enter to the financial system, their access channels are multiplied at the same pace the information inequalities are diluted; hence these determinants of financial inclusion are of endogenous nature.

This research contributes to the standardization of the study of financial inclusion which is relevant yet little explored. The findings are crucial to provide guidance to government, banking, and supranational entities among others, towards more effective actions to promote the financial development, particularly in emerging countries.

Resumen

En este documento se analizan los factores que impulsan la propiedad de las cuentas bancarias, que representan una vía principal de acceso a la inclusión financiera, considerada por las Naciones Unidas como un pilar fundamental del crecimiento económico y la inclusión social en su programa de 2030 para el desarrollo sostenible. El objetivo del presente estudio es identificar los elementos de la oferta y la demanda que afectan a la propiedad de las cuentas bancarias a nivel internacional y utilizar esta información para construir un panel dinámico que permita validarlos estadísticamente.

Dadas algunas características socioeconómicas de los potenciales usuarios de productos financieros, la propiedad de las cuentas bancarias depende no sólo de los canales de acceso a estos servicios, sino también del éxito del país en la preservación de los incentivos de ahorro de los ciudadanos, como la reducción de la información asimétrica dentro del sector financiero, así como la preservación del poder adquisitivo internacional de la moneda nacional. Como resultado de este estudio, también se determinó que mientras más agentes económicos ingresan al sistema financiero, sus canales de acceso se multiplican al mismo ritmo en que se diluyen las desigualdades de información; por lo tanto, estos determinantes de la inclusión financiera son de naturaleza endógena.

Esta investigación contribuye a la estandarización del estudio de la inclusión financiera, el cual es relevante pero poco explorado. Los hallazgos son cruciales para orientar al gobierno, la banca y las entidades supranacionales, entre otros, hacia acciones más efectivas para promover el desarrollo financiero, particularmente en los países emergentes.

Keywords- financial inclusion, sustainable economic growth, dynamic panel, asymmetric information, precarious work

Palabras clave: inclusión financiera, crecimiento económico sostenible, panel dinámico, información asimétrica, trabajo precario

Classification JEL: *O16, G21*

1. INTRODUCTION

Financial inclusion is considered by the United Nations a fundamental pillar of economic growth and social inclusion in its 2030 agenda for sustainable development (UN, 2016). The objective of this paper is to identify the supply and demand elements that affect bank account ownership internationally and use this information to build a model that validates them statistically.

This work constitutes a significant progress in the literature regarding financial inclusion, by the work developed on evaluating quantitatively financial access and its possible determinants in the global sphere with a multidimensional vision. It also represents an indispensable guide to government, banking and supranational entities, among others, towards more effective actions fields to promote the beginning of the financial inclusion.

The hypothesis to be proven is that given certain socioeconomic characteristics of potential financial customers, their bank account ownership relies not only on the access channels to these services, but also on the country's success on preserving the incentives to local currency savings, such as the reduction of information constraints, as well as international purchasing power stability. It's expected that as the country's financial development improves, the number of channels multiply and the information asymmetries dilute, hence these financial inclusion determinants are considered of endogenous nature, where the use of a dynamic panel model is preferred.

The structure of this paper is as follows: First, the importance of account ownership raised in the financial inclusion context is presented in the theoretical framework, to then describe its actual status at a global level. Subsequently, the elements that affect the decision of individuals and firms to open and own a bank account, as well as the conditions that inhibit or promote this decision are explored. Those sections enable the identification of variables to include in the model introduced next, which seeks to verify the factors that determine the tenancy of a bank account. It's important to notice that the different statistical sources limit the choice of the variables, of the sample, as well as the period of analysis; while the nature of the collected data and its relationship among them determines the methodology to follow, particularly in terms of the endogenous or predetermined nature of some of the explanatory variables. Hence, the period of analysis is limited to the years of 2006 – 2016 and to commercial banks; the sample includes 55 countries, while the relevant estimation method is a dynamic panel. The statistical analysis and results are exposed afterwards. Finally, results and conclusions are given, recommendations are outlined and the main limitations and future possible lines of research are discussed.

2. ACCOUNT OWNERSHIP AND FINANCIAL INCLUSION: THEORETICAL FRAMEWORK

Financial inclusion implies the access, intensity and constancy of use, by all segments of society, of a wide range of financial services, affordable, timely and adequate, in a context of competition, transparency and financial education, to promote the welfare of its users and systemic stability, thus contributing to a sustainable economic development that promotes economic and social inclusion (Pavón, 2016).

By including elements of systemic nature in the definition, we ensure that financial stability and inclusion are compatible objectives, when alerting on creating instruments such as subprime mortgages in the United States, which even though they were created for purposes other than social inclusion, they provided indiscriminate access to real estate credit to families previously excluded from the financial system and helped detonate the global financial crisis of 2008 (OECD, 2013). In this context, financial inclusion does not mean financial services and products for all at any cost: attempts to subsidize or liberate them have proven to be counterproductive, as they can lead to micro-economic distortions such as consumerism, an excessive risk-taking and over-indebtedness, creating instability. Financial inclusion is not a recent concern, although it takes a primary role while global inequality, environmental deterioration, and the ambivalent role of technological progress spreads worldwide, showing consistently that economic growth is only a necessary condition, but not enough to achieve greater wellbeing. This observation has driven the literature on sustainable growth and inclusive development models (Spence, 2012; Rodrik, 2017) where economic progress is integrated into the analysis framework of endogenous growth. Under this perspective, environmental care and equity are not simply desirable results of growth, but required inputs for longer-term sustainability (Agenor *et al.*, 2017).

One of the pillars of growth of this nature is financial inclusion, as it stabilizes and promotes it, while it softens the evolution of private investment and exchange rates (Aghion *et al.*, 2009), while activating it to the extent that it expands the entrepreneurial behavior, particularly around productivity improvement (King and Levine, 1994; Roa *et al.*, 2014), a more efficient capital assignment, and a better risk management. For companies, particularly the smallest and youngest, subject to greater restrictions (Friedline *et al.*, 2014), the access to financial services is associated with innovation, job creation, and the development of their capacities, or in other words, with its productive insertion (Pérez and Titelman, 2018).

These relationships are even more relevant, as it is shown in literature the non-linear relationship between economic activity and financial penetration, whose diminishing returns subtract resources to other sectors, when it is not accompanied by financial development (GPFI, 2011) and that they could even be the reason why, as Minsky points out, over-indebtedness and financial crises can be the endogenous products of economic growth (Minsky, 1982).

Hence, in recent analysis it is emphasized that financial inclusion should be addressed, not only through the traditional concept of financial deepening (measured as the ratio

between credit or deposits on gross domestic product), but also by incorporating greater access to these services to traditionally excluded sectors.

Another argument in favor of financial inclusion as an input for sustainable growth relies in the strong correlation between poverty and exclusion from the formal financial sector (Roa *et al.*, 2014). The latter contributes to the persistence of inequality and marginalization, since it implies that the potential of people to invest in their education and generation of better employment opportunities are determined in great extent by their initial situation, since they are unable to transfer resources between time periods.

The most disadvantaged sectors of the population, both individuals and small businesses, benefit greatly from the basic payments system of savings and insurance, therefore account ownership constitutes a first step to meet development priorities, as poverty and inequality abatement, including gender gap and rural underdevelopment. While rural communities need financial services the most, for a range of productive (as working capital) and protective purposes (such as risk exposure mitigation, including health issues), they still remain the largest unserved market for financial services. Ensuring their financial inclusion can enhance their development and alleviate their poverty, by reducing precarious work, and therefore income instability (ILO, 2017).

Governments also notice an enabler for reduction of informality and money laundering by opening and owning a bank account while improving efficiency in the payment and taxation system through digital instruments (Demirgüç-Kunt *et.al*, 2018; Allen *et al.*, 2016). These are a great support to financial access, as they allow their users to store and transfer funds easily through a mobile phone, reducing the cost to receive payments, while avoiding the risk of cash (Demirgüç-Kunt *et.al*, 2018; McCartney and Roy, 2016).

For the providers of these services, financial inclusion begins to be conceived as a business, since diversification of credit portfolios reduces risk and improves their expected benefits, as their margins are saturated at a corporate and governmental level (Chauvet and Jacolin, 2015).

All these considerations have led the United Nations to see financial inclusion as a primary source of growth and social inclusion, which favors 7 of the 17 Sustainable Development Goals (SDG). Based on the Millennium Goals, these are already of universal application not only for developing countries, but also for all other countries as well. At the same time, more attention is paid to the path to achieve it, such as the mobilization of financial resources, the development of capacities and databases, as well as technologies (UN, 2016).

Therefore, despite their differences, the consensus between theoretical and empirical literature that economic growth depends on the capacity of a country to develop and distribute capital efficiently, increases. Savings and the proper channeling to investment that translates into the accumulation of quality capital (physical, human, natural, and social) is an essential part in this process, therefore financial inclusion

represents a crucial requirement to alleviate the liquidity restrictions implicit on it (Pavón, 2018).

3. ACCOUNT OWNERSHIP WORLD WIDE

As it is possible to have an oversized and non-inclusive financial system, a first estimation of a country's financial development from a more social perspective, requires knowing the percentage of people who access these services (Beck, Demirgüç-Kunt and Levine, 2007; Cole, 2009). This access is favored with the presence of channels, bank branches or Automated Teller Machines (ATM's), among others, and then through opening a bank account. Subsequently, it is necessary to promote greater opportunity and relevance of the financial services as well as to induce their effective and widespread use (financial Inclusion), as some economic agents can have a wide range of services of this nature within reach and not use them, while others with potential demand may not have access to them. This section briefly describes the current state of account ownership at an international level, and then dives into its possible determinants.

The opening of an account can be done in a financial institution or through a mobile money provider. According to figures from the Global Survey FINDEX (Demirgüç-Kunt *et.al*, 2018), currently bank accounts are used widely in the world, while the microfinance accounts or of other type of regulated financial institutions, are used in a lesser extent. Mobile money accounts are even less frequent, except in some countries in Africa, where they have been growing at unprecedented rates in recent years.

The latest figures published by the World Bank, show that 69 percent of the adults of the planet own an account, either at a financial institution or through a mobile money provider, compared to 62 percent at 2014 and 51 percent in 2011. This means that 1 700 million adults remain unbanked. Furthermore, these are not evenly distributed, as the level of financial access varies widely worldwide. Hence, while at high income countries the possession of an account is almost universal, since 94 percent of adults have one, in developing economies this figure only reaches 63 percent (Demirgüç-Kunt *et.al*, 2018). In the specific case of the European Union, according to data from the World Bank, the level of account ownership is generally elevated: for example, 99% in Germany and 98% in Spain. By contrast, in the Middle East and North Africa, four out of five adults are unbanked.

There are also important differences among the diverse population segments, where in financial terms some are more excluded than others: the poor, the women, the youngest, the less educated, those who are out of the workforce, and people in remote and sparsely populated rural areas, which tend to face greater obstacles in accessing services of this nature. As the World Bank points out, unbanked adults tend to have a lower level of education in the developing world, due to roughly half of all adults having primary education or less, among unbanked the ratio is close to two-thirds. Likewise, the active economic population, either employed or seeking work, is more likely to have an account than those who are out of the labor force: throughout the world, 74 percent of adults who are active in the labor force have an account, while 59 percent of those who are out of it have one (Demirgüç-Kunt *et.al*, 2018).

Among the companies, the smallest and most recent face more unavoidable obstacles when they want to go beyond the bank account ownership and access a credit. In emerging economies, for example, 35% of small firms state that access to financing is one of its main obstacles, compared to 25% of large companies of these economies and 8% of these in advanced economies (WB, 2018a).

The type of account used is not homogeneous. Even though, in general, people have it in a bank, or in a lesser extent, in a microfinance agency or in another type of regulated financial institution, figures indicate that one of the main triggers of the recent increase in the number of accounts is due to the use of technology, especially through mobile money accounts quickly expanding, particularly in African nations, in Bangladesh, in the Islamic Republic of Iran, in Mongolia, and in Paraguay (Demirgüç-Kunt *et.al*, 2018). This phenomenon is also due to the transfer and wage payments on behalf of the public sector through electronic media; for instance in Latin America and the Caribbean, where 68% of transfer's beneficiaries receive them in an account (IDB, 2017).

As far as for the temporary evolution of these indicators, there are also significant differences among countries. According to the database of Global FINDEX, between 2014 and 2017, 515 million of adults opened accounts, and 1 200 million have done the same since 2011. At the same time, while in some economies the number of account holders has significantly increased, as in most of the OECD members, in other countries as Pakistan advances have been more modest, often limited by disparities that persist, both nationally and internationally.

In 2017, according to the same source, 72 percent of men owned an account while the figure dropped to 65 per cent for women, a gender gap of 7 percentage points that has remained unaltered since 2011 and reaching 9 percentage points in the case of developing countries. The gap between rich and poor account owners hasn't been reduced either. Among adults belonging to the 60 percent of the richest households within economies, 74 percent have an account. But among those that form the 40 percent of the poorer, just 61 percent have one, which leaves a global gap of 13 percentage points. The difference is similar in developing economies, with no significant change since 2014 (Demirgüç-Kunt *et.al*, 2018).

4. POTENTIAL DETERMINANTS OF THE BANK ACCOUNT HOLDING IDENTIFIED IN THE THEORETICAL AND EMPIRICAL LITERATURE

As the previous sections suggest, the decision to open a bank account involves both supply and demand factors of financial services, factors that are analyzed below. On one hand, the supply data relates to the available access channels, such as bank branches, ATM's or point-of-sale terminals, as well as to the characteristics of the available financial products. On the other hand, the demand figures have to do with population's socio-economic features, which are obtained through the application of surveys, such as Financial Access Survey (FAS) of the International Monetary Fund

(IMF, 2018), Enterprise Surveys (ES) of the World Bank or national economic censuses, among others.

The access channels are important in the financial inclusion, since the existence of an infrastructure accessible in time, form and distance, facilitates the decision to open an account. The number of ATM's and bank branches per inhabitants are the most commonly used indicators in the literature on this subject (Roa *et al.*, 2014). The first indicator works better, since even when bank accounts are activated in branches, the use of financial services greatly depends on the geographic availability and temporal efficiency of the channels, which is easier and more economical to achieve through ATM's or electronic banking¹. The model estimated here is not the exception, so it is the chosen access indicator, as even when in the last few years the use of bank correspondents has expanded as a cost-effective alternative to bring financial services to the population in emerging countries, it has only been used for cash withdrawals by 1% of the adults with a world-wide account (WB, 2018). Mobile devices associated with a bank account should also be mentioned, because even though it still does not reach high levels, its use has increased around the world; on average, only 16% of banked adults reported having used their cell phone in the last year to access their account and make a transaction. However, the expansion of mobile accounts in Sub-Saharan Africa, where it is not necessary to have an account associated with a financial institution to have mobile banking, has led to the countries in this region, along with those located in the OECD, to report the highest percentage of adults with this type of devices: about 20% each (CONAIF, 2017 and OECD, 2017).

As the main channels of access to financial services have been reviewed, what follows is to explore the barriers and inductors to hold and use a bank account.

To understand more clearly why adults do not demand banking services, the FINDEX 2017 Global Survey asked them about it. Based on the study, the main driver was not having enough money to use them: two thirds of adults mentioned it as one of the causes and about a fifth part quoted it as the only reason. This implies that these services are either not yet affordable or not designed to fit the needs of the lower income users.

The cost and the distance were named as some of the main reasons to not have a bank account, as well as a family member having an account already. The lack of documentation and the suspicion towards the financial system were reasons mentioned by about one-fifth of adults without a financial institution account, and cultural and religious issues accounted for 6 percent.

It is clear that mistrust of the financial system, credit rationing, and the high cost of financial services are due, to a large extent, to market failures such as information problems or concentration, but also to the heavy regulatory burden or barriers, which make these services more expensive and even inaccessible (WB, 2014).

¹ Only South Asia uses more bank branches than ATM's.

In the case of the productive sector, more than 200 million micro, small and medium-sized enterprises (MSME's), formal and informal, in emerging economies, mentioned lacking adequate funding to develop (WB, 2018b; FAEDPYME, 2018).

The elements considered as inducers of a bank account opening, have been partially validated in the literature through different studies with statistical tests. The World Bank only proves that there is a positive relationship between the income level (measured through GDP per capita adjusted by purchasing power parity) and holding accounts at a global level, by obtaining a correlation coefficient between the two variables of 0.74 (Demirgüç-Kunt *et.al*, 2018).

As previously mentioned, when the World Bank analyzes worldwide the possession of an account according to the individual characteristics, it observes inequalities especially against women, and adults with low levels of education and income. Among the adults who are located within 40% of the lowest income of a country, about half (46%) do not have an account, while within 60% of the adults with the highest income, this figure falls to 33%. In the case of women, 58% reported having an account, while 65% of the men reported owning one. Another individual characteristic that influences the access to an account is the age. Global FINDEX found that adults under the age of 25 are less likely to have an account compared to elder ones, and that having paid work improves too the odds of being included financially, as it happens in the case of companies when formalized. In that regard, it is observed that paying wages or transfers through deposits in bank accounts, represents one of the most effective instruments for advancing in financial inclusion. Currently, 67% of the adults working in the public sector get paid this way, while in the private sector that figure falls to 33%. Regarding transfers in developing countries, one out of four adults have indicated that the account where they received this support was the first one they opened (CONAIF, 2017). Globally, 21% of the adults who received their salary in an account identified this account as their first one, also opened on purpose.

5. METHODOLOGY

As mentioned at the beginning of this work, the objective of the present study is to identify which supply and demand elements affect bank account ownership internationally and build a model that allows to validate them statistically. The hypothesis to prove is that, under some given socio-economic circumstances of the potential users of financial products, their banking account ownership relies not only on the channels of access to these services, but also on the country's success to preserve the savings incentives for their citizens. It is to be expected that as the country's financial development improves, the access channels are multiplied and the information irregularities dilute. Therefore, given the cross-sectional and temporal nature of the data, as well as the dual relationship of some of the model components, it is likely that the selected method is a dynamic panel, especially in terms of the endogenous or predetermined nature of some of the explanatory variables.

Sources of information are the World Bank (WB), the International Labor Organization (ILO), the World Economic Forum (WEF), Hofstede, Hofstede and Minkov (2010), the International Monetary Fund (IMF) and The Economist Intelligence Unit and Inter-American Development Bank (2016). Tying databases forces to discard several years and countries and to estimate some missing isolated data by means of a linear extrapolation (Armstrong and Collopy, 1993). It also prevents the study from being carried out by separating companies from individuals or by distinguishing firms by size like the World Bank in their *Enterprise Surveys*, as within these databases countries present two or three observations in time for different indicators. Besides, not all of them publish on the same timeframe.

Hence, the period of analysis is limited to the years of 2006 – 2016, to commercial bank; the sample includes 55 countries: The countries finally included in the sample were: Argentina, Azerbaijan, Bangladesh, Belize, Botswana, Brazil, Brunei Darussalam, Burundi, Cape Verde, Colombia, Democratic Republic of Congo, Costa Rica, Croatia, Dominican Republic, Ecuador, Egypt, Estonia, Gabon, Georgia, Ghana, Italy, Kenya, Kuwait, Kyrgyz Republic, Latvia, Lebanon, Lesotho, Madagascar, Malaysia, Moldova, Myanmar, Namibia, Nigeria, Pakistan, Paraguay, Peru, Qatar, Rwanda, Saudi Arabia, Seychelles, Sierra Leone, Singapore, Swaziland, Tajikistan, Tanzania, Thailand, Timor-Leste, Tunisia, Turkey, Uganda, Uruguay, Uzbekistan, Republic of Yemen, Zambia and Zimbabwe.

In previous work (Pavón, 2018), the different international databases were explored to identify barometers as well as potential determinants of financial inclusion. This exploratory analysis allowed to group those indicators by categories: inside the financial sector, such as banking competition, regulation and supervision, consumer protection, collateral requirements, documentation, or dealership costs; and outside the financial framework, such as physical capital (infrastructure), human capital (financial education and training) and social capital (institutions and cultural traits), among others.

6. PANEL DATA ANALYSIS

Once identified some of potential determinants of a bank account ownership in the review of literature and in the recent empirical evidence, the next step is to validate them statistically. The model estimation is made through a dynamic panel to work simultaneously with cross-section data and time-series, and at the same time, be able to include the detected endogeneity.

According to the criteria suggested by Roodman (2008), the panel is made up from a relatively small number of countries ($n = 55$), according to the years considered ($t = 11$)². However, this balanced panel has a similar structure and is consistent with that of other macroeconomic studies, as Labra and Torrecillas (2014) pointed out, therefore

² According to Roodman (2008), it is desirable to use databases with a high number of individuals (> 100 of preference) and a small period of time (close to 10).

it's considered appropriate, even though it requires taking care of a possible proliferation of instruments.

TABLE 1. DYNAMIC PANEL DATA

GMM Dynamic Panel Data-Two Step – Robust Standard.					
Dependent Variable: Depositor with Commercial Banks / 1.000 Inhabitants Index ^{a)}					
Variable		Coefficient			Corrected Std. Err.
Vulnerable Employment (Percentage of Total Employment) _{t-1}		-0,35302 ***			0,125928
Education Quality Index _{t-1} ^{b)}		2,87357 ***			0,978433
Depth of Credit Information Index _{t-1} ^{c)}		1,43873 **			0,833430
ATM/ 100,000 Inhabitants Index t-1		0,47377 ***			0,154529
Exchange Rate vs. US Dollar (2006= 100) _{t-1}		-7, 99e-10 ***			3, 06e-10
Constant		10,95750			9,18045
Wald Chi Test ²	Chi ²	54,41000	Prob > Chi ²	0,000	
Hansen Test	Chi Test ²	42,03000	Prob > Chi ²	0,193	
Arellano Bond in First differences	Ar (1) Ar (2)	z = 1,29 z =- 0,83		Prob > z Prob > z	0,196 0,405
Observations/Groups			536 / 55		
Instruments			41		

Notes: * Significant at 10%; **Significant at 5%; *** Significant at 1%.

- a) Depositors with commercial banks are the reported number of deposit account holders at commercial banks and other resident banks functioning as commercial banks that are resident nonfinancial corporations (public and private) and households. The major types of deposits are checking accounts, savings accounts, and time deposits. (WB, 2017b).
- b) Education Quality measures schooling and range of skills of current workforce (WEF, 2018).
- c) Depth of Credit Information measures rules affecting the scope, accessibility, and quality of credit information available through public or private credit registries (WB, 2018a).

Initially, a static panel is run, but its inability to treat the endogeneity present in the model (Dosi, 1988), forces to use another more sophisticated methodology. However, this previous step in the analysis allows to guide the variables that could effectively explain the phenomenon under study.

Various options of dynamic panels are calibrated, until the best alternative is found. As seen in table 1, this work finally uses one of the style Arellano- Bover (1995) developed by Roodman (2006) and named *Xtabond2*, which integrates an equation system (*System GMM*), where the estimation is done only by differences, using the first lag of explanatory variables and without incorporating the lagged dependent variable, in order to avoid the model's over- identification. For the same purpose, the *collapse* command is included as a restriction, to create only a single instrument for each explanatory variable and lag, instead of one for each period, variable and lag. The analysis is done through the *robust* and *two step* mechanism, which uses the heteroscedastic weights matrix, indicated in this case, being more efficient in avoiding bias in the estimation due to the absence of homoscedasticity.

The subsequent application of different tests allows to validate the model.

First, the instruments are verified. In a simple sight, the number of instruments (41) is considerably lower than the number of groups (55), hence the model does not show signs of over identification. However, for greater certainty the Hansen test is performed, which allows to detect the over identification problem when the heteroscedastic weights matrix has been used in the estimation, which is the case. In the estimated model, the value of the prob. > Chi² is within the optimal range³ (0, 193), so it is no longer necessary to add more restrictions.

Second, the absence of autocorrelation is verified, in order for the estimation to be consistent and to justify the dynamic model used, which includes the lags in differences as instruments and requires the errors to not be serially correlated. This is proved with the Arellano and Bond test, where none of the lags, particularly the second, is significant, which rules out a unit root.

Third, the explanatory power of the model is evaluated. The Wald Test shows⁴ that the estimation of the model is correct and that the variables properly explain the dependent variable.

Finally, the significance of all explanatory variables shows that these have been well selected and properly expressed, therefore it can be concluded that the model meets the necessary conditions to be valid.

7. RESULTS AND DISCUSSION

As far as the selection of variables concerns, this is done in two stages: In the first one, the dependent variable is chosen as well as their possible determinants, and, in the second, it is defined how the explanatory variables will be treated (endogenous, predetermined, or exogenous) and under which restrictions.

³ The value of prob. > Chi² must be located in the interval $0,05 \leq \text{prob.} > \text{Chi}^2 < 0,8$, although Roodman (2009) suggests that it would be best to find the prob. > Chi² in the following range: $0,1 \leq \text{chi}^2 < 0,25$.

⁴ With a prob. > Chi² = 0,000

In regards to the first stage, the selection of variables is based on the collected information in the specialized literature, whose synthesis has already been exposed in previous sections. Once the representative variable of account ownership is defined, bank accounts per thousand inhabitants, a statistical analysis of factorial type is done, which allows to choose the indicators according to their explanatory power and by its grouping in categories for its possible determinants. Then, through a correlation analysis between the different potential indicators of each group, those who present a similar behavior and that might be capturing the same information are excluded.

In the second stage, it is defined how the potential explanatory variables will be treated (endogenous, predetermined, or exogenous) according to their influence on the explained variable, and under what restrictions, calibrating both its significance and the model's.

Therefore the ATM's are chosen for each hundred thousand inhabitants as the explanatory variable corresponding to the access to financial services, which as the dependent variable, it is incorporated as an index with a value from zero to one hundred to homogenize the scale of the different variables included in the model.

The ATM's are preferred as an indicator by each X inhabitants instead of X kilometers, as it incorporates the demographic density, which cannot be separated from the concept of inclusion⁵. The endogenous nature of this indicator with the explanatory variable should be noticed, to the extent that a greater infrastructure of financial services, as the ATM's, induces a greater account ownership, which in turn increases the presence of financial suppliers with their respective ATM's, as the number of customers expands.

Once the access to the model has been incorporated, the barriers and inductors to the use of financial products of the environment are explored by categories. These can be found within the sector: such as its competition, regulation and supervision; user's protection policies, as well as the obstacles of access as a requirement of guarantees, documentation or intermediation costs. However, they can also be found outside the financial sphere, but having a decisive impact on inclusion, such as: taxation, informality, education, uncertainty, asymmetric information, markets efficiency, cultural traits, and socioeconomic characteristics of potential users, among others.

The variables chosen by its high explanatory power, both individually and together, in addition to the financial services infrastructure indicator (access) already mentioned, are described below.

The index of credit information depth, which measures the coverage of credit reporting agencies or credit bureaus, is included. Its relation to the dependent variable would be expected to be of an endogenous nature, since as less uncertainty and asymmetric information problems are presented, there is greater progress towards financial inclusion, by alleviating the risk of insolvency or illiquidity, both for the user and for the provider of these services. At the same time, this inclusion feeds the information of the credit bureaus, which further reduces the information problems inherent in this sector (Greenwald *et al.*, 1984). The positive and highly significant

⁵ However, this measurement can indicate a wide potential coverage even when there is a low presence in rural municipalities of low demographic density.

relationship of this variable with account ownership and its endogenous nature, is verified in the results and agreed with the ones obtained in other studies (Pérez and Titelman, 2018).

Explanatory variables of non-financial nature, chosen to be treated through their first lag as predetermined, are also included: the vulnerable employment as a percentage of total employment, the index of education quality, and the official exchange rate (base 2006= 100).

The high significance of the index of education quality confirms the importance of the human capital (Mulligan & Sala-i-Martin, 2000; Sarma, 2008) to bring the economic agents closer to the use of these and other services as promoters of growth and development. As being an exogenous requirement of the model to promote financial inclusion, it is included as predetermined in its first lag.

Also included as a barrier to account ownership is the precariousness of employment, which makes it difficult to access financial services and in fact it is most relevant to financial inclusion that the employment itself, because the employment variables are not significant, but its quality is⁶. Employment precariousness is reflected in its dependent informal nature, with no social benefits or regulation, features that create a perception of insecurity and socioeconomic vulnerability on the individual, which prevents him to advance in a life project (2016). The international indicator chosen to approximate job precariousness is the vulnerable employment of the International Labor Organization (ILO, 2017) which is published as a percentage of total employment and that represents self-employed workers or unpaid employed relatives. A high proportion of vulnerable employment may indicate a primary and/or informal economy, sometimes motivated by a low generation of formal jobs. These groups are the most likely to fall into poverty, because they lack of formal labor arrangements, social security or safety nets to protect themselves from economic disturbances, incapacitating them to generate savings or to be subject to credit approval.

Finally, the domestic exchange rate versus the dollar (base 2006=100) is included as a proxy of how the local currency keeps its purchasing power over time against other currencies, since this factor is crucial in financial penetration. Inflation generates pressures on the exchange rate, and the loss of value of financial assets induces savers to seek for alternative instruments that preserve their heritage, such as the inventory accumulation, real estate or foreign assets purchases, stimulating consumption over savings, which causes a process of financial disintermediation. This mechanism is proven in the model, which confirms a negative relationship between bank account ownership and the local currency international price, which becomes highly significant when it is included as a predetermined variable, while considering that the exchange rate is the result of the previous behavioral functions outside the model, according to the purchasing power parity theories (Samuelson and Nordhaus, 2013).

⁶ It is also verified that the variable *education quality* is correlated to a lesser extent with the representative variable of *employment precariousness* than with the dependent variable, for discard any multicollinearity that the temporary component of the database could not have corrected (Gujarati, 2003).

Omitting the constant does not alter the coefficients, the significance of the variables or the explanatory power of the model, therefore it is chosen to keep it even when it is not significant.

It is also worth commenting on some variables that were expected to be significant as determinants of the account ownership and that resulted not to be: financial spread, institutional framework, taxes or financial education, among others.

8. CONCLUSIONS, IMPLICATIONS AND LIMITATIONS

Once the decision to open a bank account using a dynamic panel is analyzed, in this last section the final conclusions and reflections of this paper are included, as well as its limitations and possible future lines of research.

A greater access to financial systems that really contribute to achieve sustainable economic and social development is important. The decision to open an account, which is the subject of this research, is usually the first step to get into these services, whose intensity of use will depend on its adequacy and improvement to fulfill the needs of traditionally excluded economic agents. Financial inclusion carries the continued and profound use of these services, the proper channeling of savings towards productive activities, as well as an efficient payment system that simplifies transactions among economic agents, accompanied by a proper supervision of business risks, which promotes an inclusive economic growth.

Bank account ownership has grown in recent years and this behavior is likely to continue, due to a large unattended market and to its potential diversification; however, it is necessary to address the obstacles in this trend, which have to do with both aspects of supply and demand of financial services.

On the supply side, the obstacles can come from the lack of sufficient access channels, mainly ATM's, but also from market failures. The financial providers concentration, excessive regulatory burdens or information problems such as uncertainty and asymmetric information, make these services more expensive and inaccessible. This causes economic agents, may be families or companies, face greater difficulties in the intertemporal use of money, not being able to have resources in advance or save with an attractive yield. The results of this study confirm those obtained by the literature and suggest that a way to promote financial access is to improve the bank's mechanisms to distinguish the quality of its clients, such as the credit information societies, creating a virtuous circle that promotes its efficiency as information providers. As a result, policies that tend to encourage financial institutions to offer low cost accounts for basic services to potential customers, or those who look to simplify and standardize the necessary documentation to open them, have proven to be effective tools to expand the financial coverage and to palliate the information problems that limit credit towards the poor, young people, women, and MSME's. Likewise, new technologies such as mobile banking, the use of personal identification based on biometric information (fingerprints and iris), constitute another promising

channel to expand the use of financial services, making them more accessible and affordable, as financial security increases. The impact of these new technologies can expand through the adoption, on behalf of the private sector, of business models that complement technological platforms with the support of technology literacy programs. On the demand side, the figures show that it exists a high proportion of individuals and companies that reveal not to have external financial needs; therefore it is necessary to explore the causes of this phenomenon, such a cost-benefit analysis of what it represents for families and business their transition from informality to formality, entrepreneurial culture (whose objectives might not be headed to their growth) or a mismatch of certain characteristics of financial services (costs, conditions, guarantees or other access barriers to financing, among others) related to needs or income level. Several of these elements are out of scope for this work, by not having enough quality and quantity figures, even though it proves that it is crucial that the economic agents have quality education as well as a stable income, which a vulnerable employment does not provide. Without these, individuals and companies can hardly build a long term life project or be subject to credit, being vulnerable to the liquidity restrictions that being unbanked implies. Furthermore, economic agents must trust that their money keeps their purchasing power in time to be encouraged to save and invest in a country. Inflation leads to a recurrent depreciation of the currency and avoids financial development. In this study, it has been proven that stable exchange rate leads to a greater bank account ownership.

In summary, the financial development of a country requires going beyond the financial sphere, considering the peculiarities in the macroeconomic fundamentals in terms of production, employment and prices, as well as the characteristics of its potential users, such as the formation of human or social capital. Financial inclusion that starts through bank account ownership will benefit all, representing a fundamental component of sustainable development (ECLAC, 2016). Following these ideas, and even though this work must be valued for its originality, by evaluating quantitatively financial access and its possible determinants in the global sphere, its weaknesses related to panel models that refer to the suppositions that economies share the same function which is relatively stable during time, must not be avoided (Donoso and Martín, 2009). To palliate this problem, it will be worthwhile to identify more accurately, the channels that promote or inhibit account, through an analysis according to the national development level, or by separating individuals from companies, people from gender and age, or firms by size or sector. Even though most of this information is available already, we will have to wait some years to have transversal and temporal series that could enable its statistical treatment. Meanwhile, this research contributes to the standardization of the study of this topic that is as relevant as little explored. Its main contribution is that it forces to establish tiers on analysis, by considering the sources of information and their limits in a schematic way and by developing an international comparison.

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