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Knowledge and Participation of Barranquilla's Citizens in the Colombian Stock Market

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KNOWLEDGE AND PARTICIPATION OF BARRANQUILLA'S CITIZENS IN THE COLOMBIAN STOCK MARKET

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ABSTRACT

This paper empirically examines the level of awareness and participation of citizens of Barranquilla in Colombia's stock market. To do this, we surveyed 800 individuals distributed in five locations in the city. Using a logit model type factors influencing the level of market knowledge of small investors as well as the variables that influence the probability of investment are estimated. The results show that the income range is the variable with the greatest influence on the level of knowledge and investment in the stock market. Finally, it is confirmed that this is a market with very specific characteristics in which, in most cases, enter those with a full knowledge of investments they put in.

Keywords: Barranquilla, citizens, market knowledge, financial culture

JEL classification: C25, G1, G11, G15

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1. Introduction

The development of capital markets has allowed, in emerging and developed countries, deepening and diversification of domestic financial systems. These markets are a source of funding for the productive sector; offer investment options for savings, and provide mechanisms for the transfer of financial risk. In this regard, the largest share, segmentation and interaction of operators favor a further deepening of the capital markets that enable their development. This is why many countries, including Colombia, have developed financial education programs to promote knowledge and participation of citizens in the financial system, particularly in the stock market. However, the participation of citizens in this market presents great delays, because most know the basics of its operation, thus affecting the "Trade off" savings and investment in the capital market. Moreover, the extensive information and documentation in the stock market that exists in Colombia contrasts with the limited literature devoted to the study of the determinants of market knowledge. Ariza and Giraldo (2013) descriptively analyse the stock market and suggest strategies to promote financial education from the school base; and proposing mechanisms for SMEs investing in this market. Among its findings highlight deficits saving the Colombian population as a constraint to enter the market and shortcomings in the supply of products according to the needs / expectations of investors and businesses that require funding. For his part, Uribe (2007) highlights the positive evolution of the Colombian market, above the average of other markets in the region, with a tendency to keep growing. Despite these advances, the stock market remains a highly concentrated market, second only to Mexico and Argentina. Most of these studies analyse the aggregate unexplored incidence stock market citizens as agents of investment market basis. This article examines empirically, the knowledge and understanding of Barranquilla's citizens scale Colombian stock market. The probability of investment based on variables such as income, education, savings and additional information on economic and financial partner that can characterize the investor profile level of Barranquilla's citizen was also evaluated. To do this, an instrument that collects specific information about the stock market and socio economic condition of citizens is designed, using binomial logit models and ordinal for treatment.

2. Literature Review

In the international financial context the increased interaction of operators with the capital market has contributed to the development and maturation of their financial markets. Part of this growth is influenced by the increased participation and financial training with individual investors and the existence of financial education programs including the promotion of investment securities. Some experiments in countries like New Zealand and Australia on financial literacy of the population revealed positive results in the frequency of programs, evidenced by a reasonable level of financial knowledge. Overall, the average citizen in these countries seems to understand the basic concepts of risk, return and diversification reasonably well. However, issues such as limited participation of citizens in the stock market remain a predominant feature in global financial systems. Haliassos, Michael and Lyon (1994) showed, for the families of America, a smaller share of 50% in the stock market, concentrated mostly in a financial product. Similarly, in the case of households in the UK, Attanasio, Banks and Tanner (2002) report that over 75% of these agents have direct investments in the stock market. Mankiw and Zeldes (1991), in a study of income dynamics, found that only a small proportion of households own actions.

Previous studies have suggested that factors such as age, education, occupation, income and attitude toward risk play an important role in the decision to participate or not in asset markets (Ozden and Sungur, 2006). Haliassos and Bertaut (1995) investigate the factors explaining financial education, finding among its results university education influences more weight in the decision to invest in the stock market versus those with lower educational provision, preferring savings deposits as an investment option.

Attanasio, Banks, and Tanner (2002) study the implications of limited participation in asset markets and the stock market. Their results show that the probability of having or invest in assets, is associated with factors such as age, and educational level, although the positive effect of higher education in the stock market tends to decrease over time.

Other studies have documented how financial decisions of individuals are influenced significantly by the absence of basic fundamentals in finance. Bernheim and Garrett (1996) analysed the results of a financial survey of US individuals 30 to 48 years, concluding that savings rates, increased with the provision of financial education specifically found that the probability of participating in certain programs savings was higher for employees with education on retirement respect to those who do not possess.

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The relationship between the stock market and financial education levels, analyzed by Van Rooij, Lusardi and Alessie (2007), exhibits particular behaviours, for financial education and investment decision differs substantially depending on education, age and gender of individuals, leading the authors to suggest that any program for financial education will be more effective if targeted at specific groups of the population. Similarly, the lack of economic / financial knowledge decreases the probability of participating in the securities markets, affecting the decision to participate in the stock market. Meanwhile, Bucker-Koenen and Lusardi (2011) identified the direction of causality from previous questions measuring financial literacy for participation in the stock market; inferring that it is financially knowledge which have a positive and significant effect on the financial decisions, and not vice versa.

Hilgert, Hogarth and Beverly (2003) use data from the monthly consumer survey from the University of Michigan and note that debt management and credit is correlated with the financial knowledge of individuals. The results of this study demonstrate the existence of a positive correlation between financial literacy and household wealth accumulation. In turn, found that the two basic channels that contribute to this positive relationship are, firstly, the

provision of financial literacy favourably induces individuals to invest in equities and, on the other hand, these same individuals have a greater propensity to be planned financially for retirement.

In Colombia, studies such as the document "National Strategy for Economic and Financial Education" (2010), prepared by FOGAFIN, Banco de la República, FOGACOOP, Ministry of Finance, Ministry of Education and the Financial Superintendence reveal, among other things, the need to combat financial illiteracy among Colombians from programs to promote economic and financial education. More specifically, the diagnosis as to the market knowledge described as deficient in the financial culture of Colombian citizens. In the study of financial inclusion of ASOBANCARIA (2013) evidenced as 30% of adults Colombians do not have any financial product, contrasting with the increase in savings rates in recent decades, rising from 14.1% of GDP in 2000 to 21% in 2010. In turn, the increase in savings in the economy favoured the evolution of financial savings, generating significant growth of the loan portfolio of financial institutions, whose share rose from 22.7% to 32.2 % in 2012. All this has contributed to the emphasis on funding based on the capital market, the volume of transactions and is close in size to credit institutions, with 30.3% of GDP in 2010. Regarding the not intermediated market, issuance and trading of debt and equity dominate the market. According to figures from the World Federation of Exchanges (WFE), the value of shares traded and capitalization of companies listed on the stock exchange - which in 2012 was 208 billion dollars to Colombia placed fourth largest in Latin America after Brazil, Mexico and Chile. However, the number of companies listed on the Stock Exchange of Colombia is reduced, limiting funding to a few companies. Works like Ariza and Giraldo (2013) descriptively analyse the stock market and suggest strategies to promote financial education from the school base; and proposing mechanisms for SMEs investing in this market. Among its findings they highlight deficits in savings in the Colombian population as a constraint to enter the market and shortcomings in the supply of products according to the needs / expectations of investors and businesses that require funding. In turn, Uribe (2007) highlights the positive evolution of the Colombian market, above the average of other markets in the region, with a tendency to keep growing.

However, as already mentioned, it remains a highly concentrated market, second only to Mexico and Argentina.

The work of Roncallo (2009) notes the lack of knowledge of the general public and businesses, as the causes of backwardness of the Colombian capital market compared to developed countries, several Asian and Latin American countries. It also highlights that the creation of specially designed for the strengthening and development of this market, such as the Centre for development of the capital market institutions has failed to make a real impact on your target audience (businesses and the general public), evidenced in the lack of knowledge about the functioning and importance of the capital market. Similarly, Londoño and Londoño (2008), in a work applied to the context of the coffee belt on the market for financial products, found that the small investor has little appetite for risk and therefore choose investments fixed income. As a result of such behaviour they highlight the low amount of investment for these securities and the low level of training on the behaviour of the stock market, coupled with the few strategies for disseminating the Colombia Stock Exchange and financial intermediaries with programs focused on expanding the market for this customer segment. Vargas (2013) develops a work on promoting the participation in the stock market in layers 2 and 3 of Bogotá. Among its findings are barriers to educational, financial and personal kind. The lack of dissemination of investment alternatives offered by the market in Colombia, largely explains the low participation of investors belonging to layers 2 and 3; plus a little stock culture and high risk aversion. The main reasons for not participating in the stock market are: lack of information, risk aversion, high investment and ignorance of the market. However, the study reveals that most of the population of these strata, has resources available for investment, with 91% of the population surveyed save between $ 100,000 and $ 1,000,000, which are addressed to the traditional banking market.

Finally, the reviewed literature provides evidence of the poor levels of education and financial literacy of the Colombian population. However, there is very little literature of market knowledge associated to citizens; so the study of the degree of market knowledge

and explanatory factors among the citizens of London, is the main contribution of this work.

3. Data and Methodology

The data used in this paper come from a survey of citizens of the towns that make up the District of Barranquilla. The sample consisted of 800 individuals selected from a stratified simple random sampling. With a significance level of 5%, a sample error of 3.71% and a response rate of 95% was constructed a database with 697 concluding observations (ruled 103 to present statistical bias) distributed in the localities in proportion to its size (105 South east, South West 105, 233 North historic centre, 172 Riomar and 82 metropolitan area).

For the empirical study a questionnaire containing specific and complementary information regarding the characteristics of the citizen and his financial situation was developed. This instrument is divided into three sections and includes closed multiple-choice questions, dichotomous, scalar-valued. In the first section of the citizen socio-demographic characteristics were explored. In the second section, questions were asked about economic information and financial habits. In the third section, the level of ownership and knowledge of the Colombian stock market and the factors that favour its development was analysed.

In chart 1 the general characteristics of the sample are presented. The composition of the sample, by sex, displayed 56.53% of men and 43.47% women; nearly half of respondents was in the range of 18-35 years old. By socioeconomic status, socioeconomic level 2 had the highest participation while the socioeconomic level 6 the lowest. By educational level, 38.31% of the sample has a university degree, followed by a 20.52% had technicians or technologists titling a 17.52% with postgraduate training and about 24% secondary education or less.

INSERT FIGURE 1 HERE

Regarding knowledge of the stock market and investment instruments, 52.7% of those surveyed indicated ignore it (Figure 2). This ignorance is accentuated when referring to specific funding instruments (70.47%). Meanwhile, only 16.5% said the national strategy for economic and financial education (EEF). In terms of gender, the data show a gender gap in terms of market ignorance, placing it at 63% for women and 37% for men. Regarding the link between education and market knowledge, greater ownership is evident with increasing scale formation. This ratio is closer to examine the degree of knowledge of the stock market and the proportion of people who invest according to their educational level (Figure 3).

INSERT FIGURE 2 AND FIGURE 3 HERE

While at the aggregate level data provide insight of the subject matter and relationships between variables of analysis; these are not sufficient to statistically confirm the relationship between them, which were complemented by estimating an econometric model. In this sense, to examine the factors that influence the knowledge and participation of individual economic agents Barranquilla in the stock market, we proceeded to estimate a series of discrete choice models (binary logit and ordered logit), in order analysed: i) the variables that influence the knowledge of the stock market by individual economic agents; ii) the variables that influence the degree of knowledge possessed by agents regarding the market and, iii) the variables that influence the likelihood of investing in the stock market. (Table 1)

The econometric model is estimated using a logit, for the binary nature of the dependent variable (Greene, 2003), examining the probability of occurrence of an event for each of the independent variables that comprise it. Following Long and Freese (2006), the logit model can be expressed in probabilistic terms, where the prediction of the probability of occurrence of an event X, Pr (y = 1 | x) is restricted to values between 0 and 1. To restrict the predictions of probability that range, the linear probability model may be

$$\Pr(y = 1|x) = x\beta + \varepsilon \qquad (1)$$

Where x are the independent variables observed and ε is the random error term. First, the probability becomes reasons,

$$\Omega(x) = \frac{\Pr(y=1|x)}{\Pr(y=0|x)} = \frac{\Pr(y=1|x)}{1-\Pr(y=1|x)} \qquad (2)$$

Formulation indicates the frequency of occurrence of an event (y = 1) with respect to the non-occurrence (y = 0), so that, Pr (y = 1 | x) ┤ = 0 to ∞ and Pr (y = 1 | x) ┤ = 1. The log or logit reason is in the range -∞ to ∞, and assumes the form of a linear logit whose interpretation often focuses on changes in the odds ratios.

$$\ln \Omega(x) = x\beta$$

The second model to be estimated (ordered logit), introduced by McKelvey and Zavoina (1975) is characterized by having, in his response variable, a finite set of alternatives that are sorted naturally and weighted in relation to the value obtained.

INSERT TABLE 1 HERE

4. Analysis of results

The influence of the explanatory variables on the probability of having knowledge about the stock market in Colombia was analysed by implementing a binomial logit model and an ordered logit model. The results confirm a large extent, the information displayed by the descriptive data. First, the results of the logit model, shown in Table 2 allow us to see the positive influence of the different ranges of income in the knowledge of the stock market. Have incomes between $ 1,179,001 - $ 2,358,000 (rank 2), increases the chance of knowing the stock market at 2,042. This probability is further increased if the person has income above $ 3,537,000 (rank 3). This is equivalent to saying that the ratio likely to know the stock market, for a range of revenue $ 1,179,001 - $ 2,358,000, increased 104% and

revenues exceeding $ 3,537,000 increased by 115% compared to the probability that is generated when revenues are rank 1 (Ceteris paribus). Moreover, the results show that the odds ratio to meet the market increased by more than 200% when the education level is college or higher degree, which shows that the possession of a college degree has a greater impact yet to economic characteristics. .

Third, the incidence of savings on the likelihood of market knowledge is also positive, increasing the odds ratio of knowing the market by 88% compared to those who do not save (Ceteris paribus), which seems coincide with the findings of Bernheim, Garrett and Maki (1997). Additionally the odds ratio of having knowledge market decreases by 37% when it comes to female persons.

INSERT TABLE 2 HERE

We also analyze the results from the perspective of the marginal effects, in this case, discrete effects. Table 3 shows the variation observed in knowledge likely to own stock when income ranges change. For the range 1-2 the increase is 15.3%; range 1-3 increases by 6% (although no statistical significance), and the range 1-4 increases by 16.5%.

Moreover, changing the probability decreases when 9.29% woman. Having a university or higher level of education increases the probability of meeting the market by 23.5% (Ceteris paribus).

INSERT TABLE 3 HERE

To assess model fit measures the ROC curve showing the existing "tradeoff" between sensitivity (true positive rate or probability of correctly detecting the individual market knowledge when you have them) and specificity (true negative rate was used or the probability of correctly detecting the stock knowledge when the individual does not have them).

According to the ROC curve model, plus the area under the curve relative to the 45 degree line is very wide, which predicts better to have adjusted well, measuring close to 75% (the model predicts everything correctly = 1) (des) market knowledge.

INSERT FIGURE 4 HERE

4.1 *Ordered logit model results*

To analyse the determinants of the degree of knowledge of the stock market an ordered logit model was used, thus preserving the order of the responses on the dependent variable. The results are presented in Table 4.

Ordered logit follows the course proportional odds, i.e., it is assumed that the relationship between each pair of the group responses in the dependent variable is the same, ie coefficients of the ratio of a high degree of knowledge versus regular grade is the same as those describing the relationship between a low degree of knowledge and a regular grade. To test this, the A1 and A2 table (see Appendix) show the results of a test and likelihood ratio test Brant respectively. In both results, the null hypothesis (no difference between the coefficients of the models), does not violate the assumption of proportional odds.

INSERT TABLE 4 HERE

4.2 *Determinants of the possibility of investing in BVC*

Finally, to establish what kind of characteristics influence likely to invest in the BVC, the results presented in Table 5. First were obtained, the positive influence of different age ranges considered observed. Likely invest in BVC is 4.43 times higher when it is greater than 70 years and 3.87 times higher when in the range 51 to 70 years, compared with those found in the age range 18-35, (*ceteris paribus*). This probably is associated with higher income, wealth or savings achieved during the most productive years of people and that is capitalized when older age a range is acquired. Surprisingly, the different income levels are not statistically significant. On the other hand, have a university degree or above 2.75 multiplied by the probability of investing in the BVC, while the probability of investing is 2.74 times more for those who save, (Ceteris paribus).

INSERT TABLE 5 HERE

Analysing the marginal effects, shows that the change in the probability of investing in the BVC increased 19.7%, when the age range is 18-35 for over 70 years. On the other hand, when you have a university or other higher degree, the change in the probability increases by 12.7%.

INSERT TABLE 6 HERE

Similarly to the first logit model, the ROC curve is presented, with a ratio of AUC of 79%, leading to the conclusion that the model fits properly.

INSERT FIGURE 5 HERE

5. Conclusions

In Colombia, particularly among the citizens of Barranquilla, there is little knowledge and participation in the stock market; situation explained by factors associated with ignorance and disinformation on financial issues, restrictions on income and savings, poor stock market culture, risk aversion, information asymmetry, combined with the structure of the market and its limitations in size, depth and liquidity.

While some institutions campaigns and educational programs on economic and financial issues, the results are not very satisfactory, because these efforts are made in isolation and disjointed. Moreover, the vast majority have a very limited range in terms of coverage; Proof of this is the lack of financial education program in a large part of the population (85%). In turn, the population considered of great interest and importance to incorporate financial content in the curricula of secondary education (88%).

Literature and works analyse in detail the behaviour of micro agents to Colombia stock market is relatively small, so that the results of this study represent an advance in the literature of the stock market, to corroborate the relationship posed, poorly analysed in previous work.

The results reveal greater ownership of the stock knowledge among citizens with better economic and educational endowments compared to other agents having significant lags. It was also possible to note at the aggregate level a negative correlation between income level and securities investment. In this sense, the overall results highlight the need for financial and educational strategies delivered directly to promote greater participation, encouraging and generating interest on financial variable that influences known issues in the dynamics of the stock market; hence the importance of management training, financial literacy and promote greater access to investment channels for all segments of the population. Finally note the importance of the trend of financial education programs worldwide and the impact on stock market investing.

Conflict of interests

The authors declare no conflict of interest

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Figure 1. Socio-economic characteristics of the sample

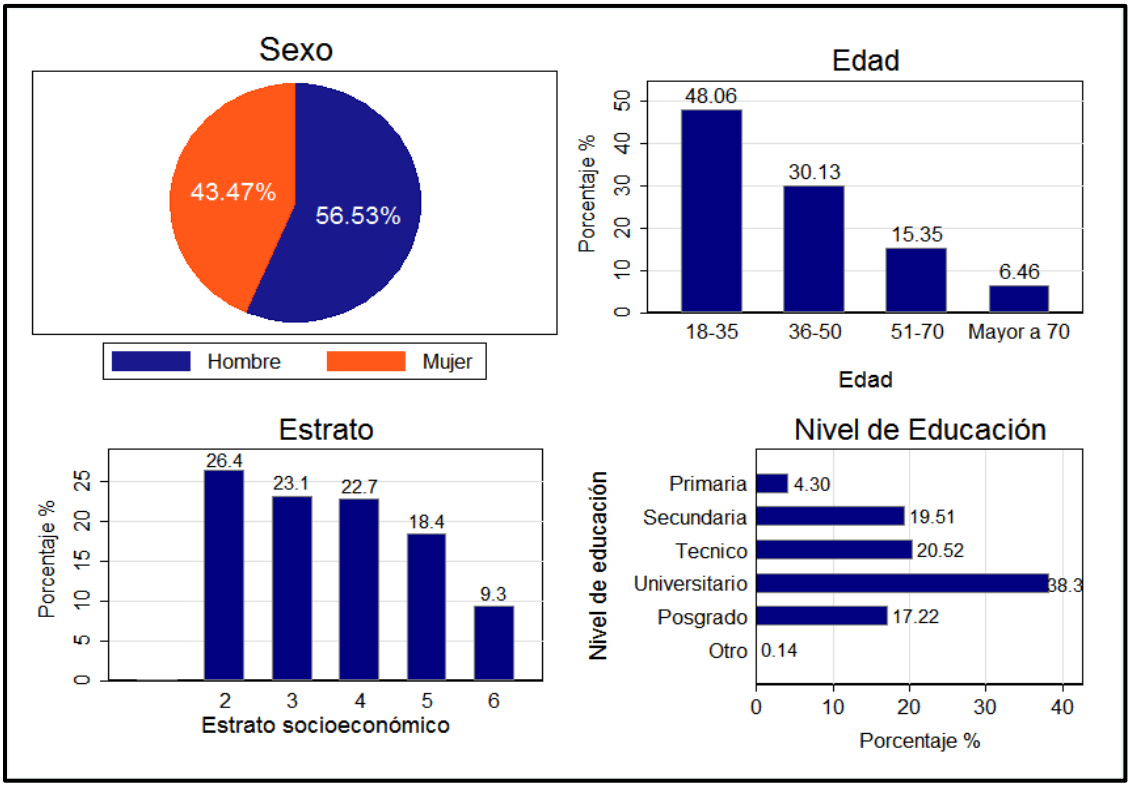


Figure 2. Knowledge of stock market by sex and educational level

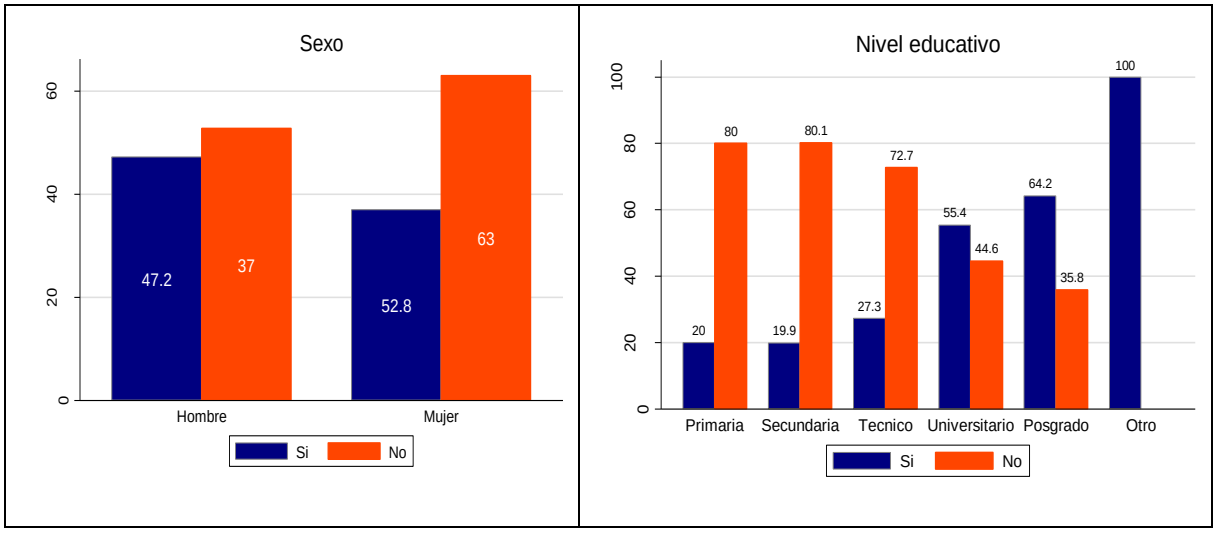


Figure 3. Investment in BVC by level of education and level of stock market knowledge

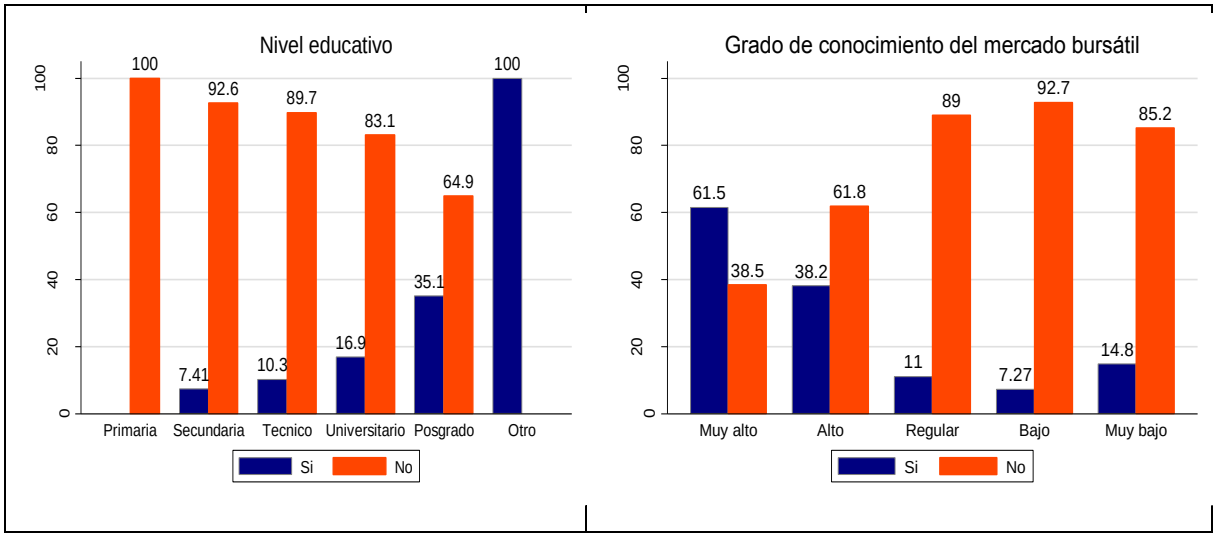


Table 1. Data description

Variables	Description
Knowledge of stock market	Dmmy=1 if individual declare not having knowledge of stock market, otherwise 0.
Level of knowledge of stock market	Categorical variable 1 “very low”, 2 “low”, 3 “medium”, 4 “high” and 5 “very high”
Investment in Barranquilla stock Exchange (BVC)	Dummy variable = 1 if individual declares invest in BVC, otherwise 0 o
Sex	= 1 female, 0 males
Age	= 1if age “18-35”, 2 if “36-50”, 3 if “51-70” and 4 if “older than 70”
Education	= 1 if individual holds a university degree 0 otherwise
Incomes	The following income intervals are defined: Incomes range 1: 0 - 1.179.000 Colombian Pesos Incomes range 2: 1.179.001-2.358.000 Colombian Pesos Incomes range 3: 2.358.001-3.537.000 Colombian Pesos Incomes range 4: higher than 3.537.001 Colombian Pesos
Savings	= 1 individual declares to have savings, 0 otherwise
Credit	1 if the individual states have, at least, one personal loan

Table 2. Logit Model. Determinants of knowledge of stock market

Variable	Coefficients	Odds ratio
Sex	-0,462***	0,630***
	(0,172)	(0,108)
Income range 2	0,714***	2,042***
	(0,220)	(0,449)
Income range 3	0,302	1,353
	(0,326)	(0,441)
Income range 4	0,768***	2,155***
	(0,255)	(0,550)
Education	1,170***	3,222***
	(0,192)	(0,619)
Savings	0,633***	1,883***
	(0,186)	(0,350)
Constant	-1,494***	0,225***
	(0,186)	(0,0417)
Chi square	131,65	
Log-likelihood	-409,957	
Number of Observations	697	697

Note: Standard errors in parenthesis
*** p<0.01

Table 3. Marginal Effects

Variables	Marginal Effects
Sex	-0,0928***
	(0,0340)
Income range 2	0,153***
	(0,0480)
Income range 3	0,0636
	(0,0701)
Income range 4	0,165***
	(0,0570)
Education	0,235***
	(0,0348)
Savings	0,127***
	(0,0363)
Number of Observations	697

Note: Standard errors in parenthesis
*** p<0.01

Figure 4. ROC curve

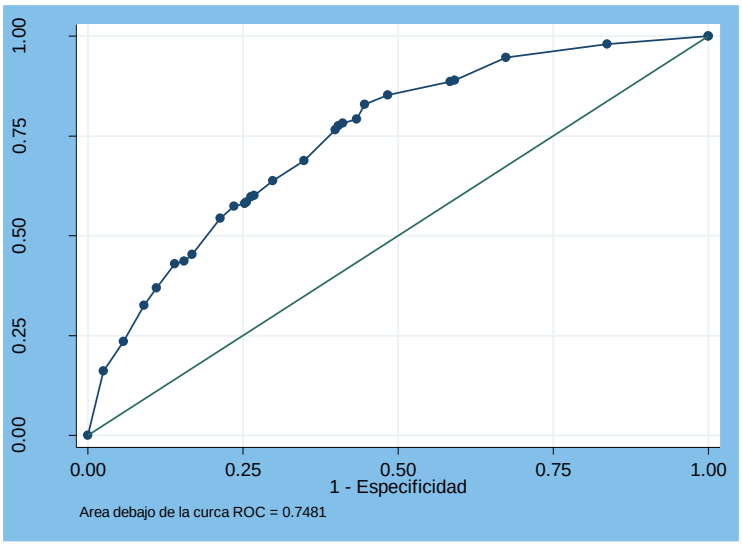


Table 4. Ordered Logit. Level of knowledge of stock market

Variables	Coefficients	Odds ratio
Sex	-0.242	0.785
	(0.221)	(0.173)
Income range 2	0.0525	1.054
	(0.276)	(0.291)
Income range 3	0.0360	1.037
	(0.403)	(0.418)
Income range 4	0.831***	2.296***
	(0.303)	(0.695)
Education	0.838***	2.313***
	(0.273)	(0.631)
Savings	0.265	1.303
	(0.259)	(0.337)
Chi-square	33.44	
Log likelihood	-393.92	
Number of Observations	298	298

Note: Standard errors in parenthesis
*** p<0.01

Table 5. Logit Model. Determinants of investment in Barranquilla Stock exchange (BVC)

	Model 1	
Variables	Coefficients	Odd ratios
Age range 2	0.993**	2.700**
	(0.456)	(1.233)
Age range 3	1.353***	3.868***
	(0.511)	(1.978)
Age range 4	1.489**	4.431**
	(0.591)	(2.619)
Level of knowledge 2	-0.900	0.407
	(0.786)	(0.320)
Level of knowledge 3	-0.477	0.620
	(0.659)	(0.409)
Level of knowledge 4	0.913	2.491
	(0.650)	(1.619)
Level of knowledge 5	2.238**	9.378**
	(0.870)	(8.161)
Income range 2	0.0317	1.032
	(0.473)	(0.488)
Income range 3	-0.463	0.629
	(0.656)	(0.413)
Income range 4	-0.779	0.459
	(0.524)	(0.240)
Education	1.013*	2.752*
	(0.522)	(1.437)
Savings	1.009**	2.743**
	(0.506)	(1.387)
Constant	-3.694***	0.0249***
	(0.801)	(0.0199)
Chi-square	59.45	
Log likelihood	-118.56	
Number of Observations	298	298

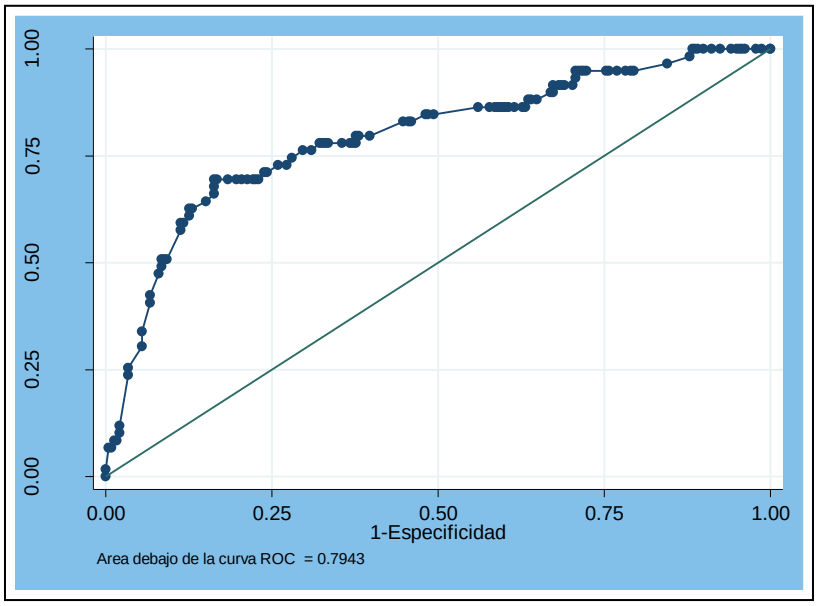
Note: Standard errors in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Table 6. Marginal effects

VARIABLES	Marginal effects
Age range 2	0.117**
	(0.0544)
Age range 3	0.174**
	(0.0708)
Age range 4	0.197**
	(0.0891)
Level of knowledge 2	-0.0904
	(0.0858)
Level of knowledge 3	-0.0547
	(0.0827)
Level of knowledge 4	0.150
	(0.0945)
Level of knowledge 5	0.429***
	(0.154)
Income range 2	0.00429
	(0.0641)
Income range 3	-0.0576
	(0.0782)
Income range 4	-0.0912
	(0.0597)
Education	0.127**
	(0.0643)
Savings	0.126**
	(0.0623)
Number of Observations	298

Note: Standard errors in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Figure 5. ROC Curve



Appendix

Table A.1 Test of proportional odds assumption

Approximate likelihood-ratio test of proportionality of odds across response categories:	
chi2(12)	10.66
Prob > chi2	0.5585

Table A.2 Brant test

Brant Test of Parallel Regression Assumption			
Variable	chi2	p>chi2	Degree of freedom
All	10.51	0.571	12
Sex	0.99	0.804	3
Incomes	6.57	0.087	3
Education	2.58	0.462	3
Savings	1.12	0.772	3

A significant test statistic provides evidence that the parallel regression assumption has been violated