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CEO OVERCONFIDENCE AND LEVERAGE RATIO: EVIDENCE FROM THE
FOUNDER MEMBERS OF MILA

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Abstract

The study investigates the impact of the managerial overconfidence bias on the capital structure of a sample of 78 firms from Chile, Peru and Colombia, during the years 1996-2014. We infer that there is a positive relation between the leverage ratio and a) the overconfidence; b) the experience and c) the male gender of the executive. Overconfidence is measured according to the status of the CEO (entrepreneur or not-entrepreneur) and the hypotheses are tested through dynamic panel data model. The empirical results show a highly significant positive correlation between overconfidence and leverage ratio and between gender and leverage ratio while, in contrast, the relation between experience and leverage ratio is negative.

Keywords – *Behavioural finance, Overconfidence, Capital structure.*

1. INTRODUCTION

“The over-weening conceit which the greater part of men have of their own abilities, is an ancient evil remarked by the philosophers and moralists of all ages. Their absurd presumptions in their own good fortune, has been less taken notice of. It is, however, if possible, still more universal.”

Adam Smith (1776)

How do emotions influence the decision-making process? The majority of research in the corporate finance field is founded over the assumption that markets are efficient. It implies that managers and investors are selfish, rational, that they take decisions always based on an expected utility maximization criteria and that, when thinking on returns and risk, they only focus on mean and variance. However, these traditional assumptions are in contrast with what has been observed in reality. In fact, behavioural biases can produce irrational behaviour: according to the prospect theory, given a set of alternatives, people are taking decisions based on potential value of losses and profit rather than on the final outcome; they tend to avoid lower tail outcomes; and, finally, they take into consideration other people.

Behavioural biases have an impact on the allocation of capital as well as on the redistribution of wealth. One of the biases whose effects are more visible is the overconfidence of CEOs, meaning the overestimation of the outcome of a situation. In particular, it can lead to undertake projects with negative NPVs, affecting the firm's value. Consequently, in the presence of the bias, firms will prefer higher levels of leverage than they would if they were completely rational, according to what is observed in literature.

The purpose of the study is to investigate the impact of the CEOs overconfidence on the leverage ratio of Chilean, Peruvian and Colombian (founder members of MILA) firms, a sample that has not yet been explored by literature. Moreover, the impact of two other factors on the firm decision-making process is examined: the gender and the experience of the executive. In particular, we test three hypotheses: 1) the overconfidence bias has a positive impact on the leverage ratio of the firm; 2) more experienced CEOs are more likely to present the bias, leading to higher risk-taking behaviours; 3) the bias tends to affect male executives more than female ones.

The work is organised as follows: Section 2 offers a brief literature review, Section 3 a detailed description of the sample and of the methodology, Section 4 is an explanation of the empirical model, Section 5 presents the results and Section 6 the conclusions of the study.

2. LITERATURE REVIEW

2.1 Definition of overconfidence

The definition of overconfidence comes from psychology and consists in an individual's overestimation of his personal abilities. Findings enhance that, when we invite people to rate their own skills regarding a specific activity, we can expect them to self-evaluate their performances as better than the average and than how they objectively are. Another manifestation of the bias is the belief that they can count on asymmetric information to forecast better the future and take decisions that are more successful. This leads people to undervalue risks and to develop the illusion of control, which is the credence that their influence on events is larger than it actually is [Langer, 1975].

From a statistical perspective, overconfidence is recognisable as an exaggeration of the mean resulting in a positive skewness of the probability distribution [Skala, 2008]. Moreover, the underestimation of risk involves an underestimation of the volatility [Ayres and Di Miceli, 2008].

2.2 Consequences of CEO's overconfidence

Overconfidence produces various effects on CEOs' choices and firms' results. It leads to an overestimation of future positive cash flows and to an underestimation of the negative ones [Ahmed and Duellman, 2012] and, as Malmendier and Tate have enhanced, it provokes a higher reactivity of investment to cash flows. Overconfident directors are prone to undervalue costs and to assume a long term overlook, since they trust in the future developments of their business [Pirmoradi et al., 2013]. They perceive the risk of bankruptcy as less probable than what it really is, and that contributes to the decision of undertake higher levels of debt, compared to what it would be optimal and to what their non-overconfident peers do [Hackbarth and Dirk, 2009]. Moreover, the bias seems to be positively correlated to the emission of excessively promising earnings forecasts that then turn out to be missed, due to the overestimation of the managements' own skills and to the underestimation of unexpected circumstances [Hribar and Yang, 2010].

Executives affected by the bias believe that the stocks of their firms are underestimated by the market. As a consequence, when looking for means to finance new projects, they will prefer not to issue new equity. They will only lean on internal resources, whether is possible; otherwise they will appeal to debt securities [Malmendier and Tate]. This evidence is in accordance to the pecking order theory, which will be reminded later on in the paper.

Optimist CEOs easily detect new opportunities [Solberg Nes and Segerstrom, 2006], with the risk of investing in more projects than what it would be advisable, and with an increased hazard of incurring into conflicting goals situations. They also seem to be more inclined to get involved in mergers and acquisitions operations, often investing in mergers that will produce negative cash flows and, besides, paying in excess for the target firm [Malmendier and Tate, 2007].

In summary, all the previous elements support the evidence that there is a negative correlation between the presence of the bias in the CEOs and the results of their firms [Hmieleski and Baron, 2009].

3. METHODOLOGY

3.1 General approaches to overconfidence

In literature, there are two distinct ways to investigate on behavioural corporate finance issues. The first is to consider that investors are acting irrationally while management is rational, and the second consists in adopting exactly the opposite scenario. Irrationality means, in both cases, that the actor exercises an impact on securities prices. When CEOs are irrational, their decisions are frequently far from being optimal but they firmly believe that all of their actions will comport a maximization of the utility [Baker et al, 2012].

In this paper, we focus on the manifestation of the bias in the management, assuming that investors are rational, even though, in reality, both biases could be present at the same time.

3.2 How to measure overconfidence

Overconfidence is not directly observable; therefore, we need to rely on variables that are correlated to it. Several examples are present in literature, among them:

- a. *“Relieved beliefs”* argument. The level of diversification of the portfolio is used as a measure of overconfidence. According to this approach, if CEOs are affected by the bias, then their personal portfolios will not be sufficiently diversified. That is a consequence of their excess of trust about the results of their own companies and about their own capacity to influence them in order to make profit. Moreover, overconfident CEOs will hold in-the-money options instead of exercising them and they will buy, while they should sell, company stocks [Malmendier and Tate, 2005]. A drawback of this method is the difficulty of getting information about personal CEO’s portfolios.
- b. *“Press-based”* argument. Based on the image that the press shows of the CEO. This procedure calculates the level of overconfidence analysing the number of times particular key-words like “confident”/”confidence”, “optimist”/”optimism” (versus “conservative”, “reliable”, “cautious” and similar) appear on articles referring to a CEO in a defined time span [Malmendier and Tate, 2005]. This methodology is costly and difficult to implement.
- c. *“Survey-based”* argument. The chosen sample is asked to fill a psychological questionnaire whose score will give information about the degree of overconfidence. The most common example, in literature, is the Revised Life Orientation Test (LOT-R) [Scheier et al, 1994].
- d. Evidence from research shows that the bias is present when the CEO is also the entrepreneur of the company: for instance, in the case of ventures, the majority of the entrepreneurs, when asked to rate the probability of their own business to succeed, replies with a number that is higher than the historical average.

Moreover, they declare that similar businesses have less chances to last in time than their own [Cooper et al, 1988]¹.

3.3 Overconfidence bias in CEOs

The greater the experience of a person in a particular field, the greater his/her level of overconfidence, as proved through a study conducted by Lewis Goldberg, Senior Scientist at the Oregon Research Institute. He tested his hypothesis in a clinical environment, asking to experienced neurologists and to their administrative assistants to formulate diagnosis concerning the nature of brain damage's cases. He observed that even though both categories had the same level of accuracy, neurologists showed a higher degree of confidence, due to the experience collected in the field.

Analogously to the neurologists in Goldberg's study, CEOs who are also entrepreneurs can be considered as being experienced in the business sector and result to be affected by the bias, as it has been investigated by several researchers. In particular, entrepreneurs have a deep belief that their achievements are a direct consequence of their actions, and they have a tendency to disregard the influence of external factors that are out of their control. Simultaneously, people with this mind-set are more likely to start new businesses [Evans and Leighton, 1989]. The launch of a new activity is indeed a situation characterised by a high degree of uncertainty, an ideal environment for entrepreneurs who, in fact, think that the higher the risk the higher the potential gain [Palich and Bagby, 1995].

¹ Specifically, a venture has a probability of 50% to survive to its first eight years [Bygrave, 1997] and 35% to reach year 10, according to the U.S. Bureau of Labor Statistics and to the Ewing Marion Kauffman Foundation. However, most of the interviewed entrepreneurs declare that their own business has at least 70% of chances to survive and that a similar business owned by competitors would have 60% chances to last [Cooper et al, 1988].

Baron (2000) measured the optimism and overconfidence level in three groups of people: entrepreneurs, potential entrepreneurs and not entrepreneurs. His investigation revealed that entrepreneurs have the highest degree of the bias, together with potential entrepreneurs. In addition, other studies proved that entrepreneurs present the bias to a greater extent than professional managers [Busenitz and Barney, 1997].

Regarding the gender, a recent finding is that the bias manifests significantly more in male executives than in female executives [Huang and Kisgen, 2012; Kuppaswamy and Mollick, 2015], according to the extensive literature in the psychological field that has tested how, in various contexts, males are more confident than females.

3.4 Capital structure and firm's value

The value of a firm is strictly linked to the value of its shares, keeping in mind the exigence to make profit for the stakeholders. The conduct of the management, especially concerning capital structure and dividend policy, is the main driver of the prices of the stocks [Sinai and Rezaeian, 2005]; therefore, the presence of biases can generate important repercussions.

Traditional corporate finance refers mainly to two theories in order to explain managements' choices in terms of leverage: *trade-off* and *pecking order theories*. According to the trade-off theory, capital structure is the result of a compromise between costs and gains that the different financing options involve; especially, it is a trade-off between costs of financial distress and benefits of tax shield, it means between the advantages and disadvantages deriving from debt issuance. Therefore, the aim is to find an optimal debt ratio. Instead, the pecking order theory does not aim to the achievement of an optimal debt ratio. It is centred in the hypothesis that, when managers issue new

equity, investors think that the shares of the firm are overvalued and that managers are trying to get a profit out of it; therefore, they perceive the equity issuance as less valuable than it is. Given this evidence, managers will turn to equity only as a last resort while they will accord their preference to, in order, internal resources and debt.

Both theories assume that all the actors involved are automatically taking rational decisions, ignoring the impact of behavioural biases and the importance of taking them into account when defining the drivers of capital structure.

3.5 Data

The study investigates the impact of CEOs overconfidence on firm's value in three South American growing economies: Peru, Colombia and Chile. Peru has an average growth rate of around 7% per year, the second highest in Latin America and this led the country to be ranked as the one with the most optimistic business men by Grant Thornton International in 2012². According to the IMF, Chile is expected to have a growth of about 3% in 2015, which will probably increase in 2016, and its executives are the third most optimistic in the world. Colombia will see as well a growth between 3.4% and 3.7% in the following two years.

In order to investigate, data is gathered mainly through Economatica, a database that includes information about the capital markets of Latin America and United States. The study is focus on a sample of companies listed in the Bolsa de Valores de Lima (BVL), Bolsa de Valores de Colombia (BVC) and Bolsa de Comercio de Santiago (BCS) in the period going from the 1st of January 2006 until the 31st of December 2014. The three stock

² The survey included 40 countries, 11.500 CEOs, and other senior executives among 10 industries and it assigns a number from 1 to 100. Peru got 78 points, followed by Brazil (74), Chile (52) and Mexico (50).

exchange markets are the founder members of the MILA, *Mercado Integrado Latinoamericano*. Data is collected quarterly on the months of March, June, September and December.

We exclude from our sample banks, insurance, investment and intermediaries companies and we apply a minimum liquidity index requirement of 75%. The resulting sample includes seventy-eight firms operating in fifteen different industries³. The information related to the executives and the Chairmen of the companies (their age, gender, years of experience and whether they are founders or heirs of the business) have been extracted from the Quarterly and Annual Financial Reports of the firms.

3.6 Variables

3.6.1 Dependent variable

The leverage ratio is the dependent variable chosen for the study. Its value depends on the components listed below.

3.6.2 Independent variables

According to the capital structure theories stated above, the most employed determinants of capital structure that, therefore, exercise an impact over the leverage ratio, are: size, profitability, tangibility, volatility, growth opportunities and non-debt tax shield. Traditional corporate finance models do not take into account the influence of behavioural corporate finance. We will include the *overconfidence* bias, which will be measured considering the status of the CEO in the company, i.e. if he is entrepreneur or not, namely, if he is also the owner of the business or not. According to the literature, the bias should

³ According to the classification of Economática, which groups all the companies in the market into twenty sectors.

be present if the CEO is also an entrepreneur. Even if the CEO has in most cases the highest impact on decisions, it has been noticed that in several companies of the sample the Chairman of the Board of Directors is the founder, especially in the case of family controlled firms. In that scenario, the Chairman becomes the most influent figure in the firm. Therefore, likewise Ayres and Di Micaeli (2007)'s approach to the variable, we infer a presence of the bias if the CEO or the Chairman, or both, is a founder of the business or one of the heirs. An alternative proxy of the variable that will be used is the CEOs' portfolio composition, in order to see how much they are investing in their own firms. In the presence of overconfidence, they tend to diversify less than what they rationally should and to include too many shares of their own companies. Following the first methodology, the *overconfidence* bias will be measured by a dummy explanatory variable, which will assume value 1 if we are in the presence of the bias, otherwise 0. About the second proxy, we will follow the approach of Ayres and Di Miceli (2008) and consider there is overconfidence if the CEO holds, and maintains in time, the largest participation in the company. If that is the case, the binary variable will equal 1, otherwise its value will be 0.

Regarding the other variables, the *size* has been proved to have a strong positive relation with our dependent variable (Frank and Goyal, 2007). This can be explained referring to the evidence that the risk of bankruptcy is higher for smaller companies, while it decreases for bigger firms. Therefore, the latter are more incline to issue debt than the former.

The *profitability* is positively or negatively related to the leverage, depending on the theory we are following. According to the pecking order theory, if a firm is profitable then there are available internal resources, so the company will not issue new debt. On the other hand, for the trade-off theory, there is a positive relation between the two

variables. In fact, a high level of profitability reduces the risk of insolvency and increases the benefits of the tax-shield.

If a company holds tangible assets, it can use them as a guarantee for a loan, decreasing the risk of insolvency. Therefore, the debt issuance is less risky for the company when assets are more tangible, which make us infer a positive correlation between the *tangibility* variable and the leverage ratio [Rajan and Zingales, 1995].

The *volatility* of the firm's cash flows is negatively related to the level of debt: the possibility of a drop in the earnings of the company makes the debt issuance riskier, because it increases the insolvency risk [Antoniou et al, 2008].

According to DeAngelo and Masulis (1980), elements like tax deductions for depreciation and investment tax credits can influence debts, being substitutes for the tax benefits of debt financing. Consequently, the *non-debt tax shield* presents a negative relation with the leverage.

The *growth opportunities*, similarly to the profitability, can be negatively or positively related to the leverage. According to the pecking order theory, there is a positive relation because if a firm has many opportunities, it has higher chances of incurring in a shortage of all of its internal resources and, therefore, it will need to issue new debt to keep financing its projects [Fama and French, 2002]. For the trade-off theory, instead, there is a negative relation: growth opportunities increase the cost of financial distress, which implies a higher risk of insolvency. Therefore, firms are less incline to issue debt.

3.7 Hypothesis

3.7.1 Overconfidence and leverage ratio

Hypothesis 1: *There is positive relation between overconfidence and leverage ratio of the firm.*

As it has been discussed in the above sections, especially in the paragraph 2.3, overconfidence leads to the underestimation of the risk and to the overinvestment, due to excessively positive forecasts of future cash flows. The new projects are preferably financed through internal resources, if available, otherwise through debt issuance. Equity is the last resource, due to the belief that the financial market is underestimating the stocks of the company. Therefore, in the presence of the bias the leverage ratio is expected to be higher than otherwise.

3.7.2 Overconfidence and experience

Hypothesis 2: *There is positive relation between the years of experience of a CEO and the leverage ratio of the firm.*

As introduced in the paragraph 3.3, the degree of experience of a person has an impact on his/her perception of his/her ability to influence future results and will lead him or her to excessively trust in his/her own opinions and skills. In particular, the larger the experience, the higher the overconfidence bias. In the case of a CEO, a good measure is the years that (s)he has held in his/her executive position in the firm or the total year of experience collected in the firm. Moreover, experience generally increases with the age, so the level of overconfidence should be higher in older CEOs. Both the three proxies (years as a CEO, years in the company and age) will be used in the study.

3.7.3 Overconfidence and gender

Hypothesis 3: *There is positive relation between the leverage ratio of the firm and the gender of the CEO or CFO when the CEO or CFO is a male.*

The research in psychology illustrates that men are characterised by a higher confidence level than women. Even in a scholastic context, boys are more confident about their grades than girls [Jakobsson et al, 2013]. This evidence could even explain why women are less likely to start a business [Kuppuswamy and Mollick, 2015].

Huang and Kisgen (2012) apply the above findings to the business environment, proving that men issue more debt securities and do more acquisitions, while women are more reluctant when analysing the possibility of taking a new project.

The choice of considering both CEOs and CFOs is due to two factors: the limited number of CEOs that are female in the sample, and the weight that CFOs have in the financial decisions of the firms.

4. EMPIRICAL MODEL

To analyse the linear relations between the leverage ratio and its components and, in particular, to test if the overconfidence bias is positively related to it, as we assume in **Hypothesis 1**, we run the following dynamic panel data model:

$$(1) L_{j,t} = \alpha + \beta_1 L_{j,t-1} + \beta_2 OC_{j,t} + \beta_3 S_{j,t} + \beta_4 P_{j,t} + \beta_5 T_{j,t} + \beta_6 V_{j,t} + \beta_7 NDTS_{j,t} + \beta_8 GO_{j,t} + u_{j,t}$$

Where j ($j= 1, 2, 3, 4, \dots, N$) indicates the cross sections that are the companies of the sample, and t ($t = 1, 2, 3, 4, \dots, T$) is the time-period that is the trimester of consideration. The variable L is the leverage ratio, measured as net debt to equity; S is the size of the firm, calculated as the natural logarithm of the total assets; P stands for the profitability,

given by the return on assets (ROA); T indicates the tangibility, the ratio between tangible and total assets. The variable V is the income volatility, calculated as the standard deviation of ROA; $NDTS$ represents the non-debt tax shield that means depreciation to total assets; GO is the growth opportunities, given by the change in total assets.

OC is the overconfidence variable: it assumes values 1 if the Chief Executive Officer or the Chairman of the Board of Directors is (one of the) the founder(s) or a heir of the business, otherwise 0. We consider CEOs and Chairmen due to the elevate impact of both in the decision-taking process of the firms, as explained in paragraph 3.6.2. u_{jt} is a random disturbance term.

In order to test **Hypothesis 2**, we modify the model including a new discrete variable, E , that gives information about the experience of the current CEO of the company at the year t .

$$(2) L_{j,t} = \alpha + \beta_1 L_{j,t-1} + \beta_2 OC_{j,t} + \beta_3 S_{j,t} + \beta_4 P_{j,t} + \beta_5 T_{j,t} + \beta_6 V_{j,t} + \beta_7 NDTS_{j,t} + \beta_8 GO_{j,t} + \beta_9 E_{j,t} + u_{j,t}$$

The variable E indicates the experience of the CEO. In the study, we measure the experience in three alternative ways: a) the number of years during which the CEO has held his executive position; b) the number of years of the CEO in the company; c) the age of the CEO.

Finally, we test **Hypothesis 3** introducing the dummy variable *Gender*, which assumes value 1 if the CEO and/or the CFO are males, 0 otherwise.

$$(3) L_{j,t} = \alpha + \beta_1 L_{j,t-1} + \beta_2 OC_{j,t} + \beta_3 S_{j,t} + \beta_4 P_{j,t} + \beta_5 T_{j,t} + \beta_6 V_{j,t} + \beta_7 NDT S_{j,t} + \beta_8 GO_{j,t} + \beta_9 Gender_{j,t} + u_{j,t}$$

5. RESULTS

5.1 Descriptive statistics

The sample presents a higher concentration of firms listed in the *Bolsa de Comercio de Santiago (BCS)*, whose number is almost twice the one of the companies listed in the *Bolsa de Valores de Lima (BVL)* and more than four times the one of the firms listed in the *Bolsa de Valores de Colombia (BVC)*. The BCS is, in fact, the third biggest stock exchange in Latin America, after Brazil and Mexico. Regarding the industries, the higher concentration is between the mining and the electric power sectors, which together include the 24% of the firms in the sample, while the lowest are textile, software and data, pulp and paper and chemical, which overall represent the 6%. Most of the CEOs and Chairmen in the sample are not founder or heir of the business, and the majority of CEOs/CFOs are male, even if it is more common for a woman to be a CFO than a CEO. The average chief executive officer is fifty-three years old, has been in the company for twelve years and has held his managerial position for seven years.

The companies in the sample do not present, on average, an elevated debt to equity ratio, whose value is 42.8%, even though the variable is characterized by high volatility.

Around 44% of the sample firm's assets are tangible, with a peak of above 90% and a minimum of almost 0. The companies are, overall, profitable even though the average return on assets corresponds to less than 2%. A complete summary of descriptive statistics is presented in **Table 2**.

The descriptive statistics related exclusively to the group of firms affected by the overconfidence bias do not present any relevant difference, a part than the fact that overconfident CEOs tend to be relatively younger but with more experience than their not overconfident counterparts. In fact, their average age is of fifty years old, they have held their position for nine and a half years and they have been in the company for fourteen years.

5.2 Empirical results and robustness check

A first test of Hypothesis 1 is conducted using panel data fixed effect model: all the variables are significant at least at 10%, except from non-debt tax shield; the overconfidence is significant at 10% and presents a positive sign. However, a low value in the R-squared indicates that the model might not be the best fit, suggesting looking for a more suitable one.

Following the approach of Ayres, Di Miceli (2008), we decide then to build a dynamic panel data model. The choice to implement such a model derives mainly from the assumption that our response variable, the leverage ratio, depends on its past realisations and that our explanatory variables are not all strictly exogenous, meaning they present a correlation with past and possibly current realisations of the error. Moreover, our sample is characterized by: a) "small T, large N" panels; b) fixed individual effects; c) heteroscedasticity and autocorrelation within individuals, but not across them. The

Arellano-Bond system generalized method of moments estimator is, therefore, identified as the most appropriate for the sample object of the study. Leverage ratio, tangibility, income volatility, non-debt tax shield, profitability, growth opportunities and size have been linearly transformed in order to avoid negative values and, then, their natural logarithm are used to run the regression.

The results of the robust one-step regression are shown in **Table 3**. We define tangibility, income volatility and non-debt tax shield as predetermined but not strictly exogenous variables; profitability and growth opportunities as endogenous; and overconfidence and size as exogenous. All the variables appear to be significant at least at 5%: among them, the ones that show higher significance level are the first lag of the leverage ratio, the tangibility (with its first lag), the size, the profitability, the first two lags of the growth opportunities and, finally, the explanatory variable of higher interest for this study, the overconfidence. All of their coefficients have the sign we suspected due to the review of the literature. In particular, the coefficient related to overconfidence presents a positive sign, confirming the hypothesis that a growth in the variable corresponds to a higher leverage ratio. The Arellano-Bond test for serial correlation is used to verify the validity of the model, proving the absence of serial second-order autocorrelation.

To verify the robustness of the results, we split the overconfidence regressor into two variables: overconfidence of CEO, which assumes value 1 if the CEO is also an entrepreneur or heir of the business, and overconfidence of the Chairman, which assumes value 1 if the Chairman is also an entrepreneur or heir of the business. Running two different regressions, one including the former and the other including the latter, we find out that the overconfidence of the Chairman is characterised by higher significance level and is positively related to the leverage ratio, while the overconfidence of the CEO seems

to be negatively related to it and not significant. This evidence could suggest that the presence of the bias in the Chairman has a higher impact on the decision-making process of the firms in the sample than when the bias is present in the CEO. Results are visible in **Table 3**.

In order to conduct further checks to the robustness of these results, we run the same regressions using an alternative measure of overconfidence: this time we consider the CEO/Chairman as overconfident if he/she holds the largest participation in the company, as explained in section 3.6.2. Results are similar to the ones shown in **Table 3**, confirming the significance of the overconfidence variable, as well as the other explanatory variables, in the model. The Arellano-Bond serial correlation test shows the validity of this alternative of the model. Similarly to the previous case, we split the overconfidence variable in overconfidence of the CEO and overconfidence of the Chairman, finding that only the latter is significant.

To test Hypothesis 2, we run three identical versions of the model, using each time an alternative measure of the experience: a) years of experience as a CEO of the company, b) years of experience in the company, c) age of the CEO. All of them appear to be negatively related to the leverage ratio and the age of the CEO is more significant than the other two proxies, suggesting perhaps a bigger impact of the age than of the years of experience (**Table 4**). Also in this case, as well as for Hypothesis 1, we run again the model using the alternative measure of overconfidence, confirming the previous results. This evidence, in contrast with our hypothesis, can be explained thinking that CEOs tend to undertake higher levels of risk in the earlier stages of their life and career [Graham, Harvey and Puri, 2013], while they become more risk-averse with the age.

Finally, in order to test Hypothesis 3, we include the binary variable *gender* to the model, which assumes value 1 if the CEO and/or the CFO is a male, otherwise 0. The regression shows that the variable is highly significant and that it is positively correlated to the leverage ratio. This evidence supports our hypothesis, according to which male CEOs/CFOs are more likely to be overconfident than female CEOs/CFOs, implying a higher level of leverage ratio. Results are summarized in **Table 4**. Moreover, we split the variable *gender* into gender of the CEO and gender of the CFO, observing that only the latter is highly significant. As well as for the previous hypotheses, we confirm the validity of the results by using the alternative measure of overconfidence: also in this case results appear to be similar.

Finally, the random-effects GLS regression is run, in order to compare its results with the ones obtained through the Arellano-Bond dynamic model. The main differences are the followings: the non-debt tax shield and the volatility become significant respectively at 5% and 1% and the first two measures of experience (years as a CEO and years in the company) have a positive coefficient, while the age maintains a negative one. The overconfidence variable does not present any variation in its significance level and sign, confirming its robustness. OLS and fixed-effects regressions confirm, as well, the significance of the overconfidence variable, with little variations regarding the behaviour of the other regressors. In both cases, the variables related to the experience present the same signs of the random-effects regression: negative for the age, positive for the years as an executive and for the years in the company.

6. CONCLUSIONS

The study investigates the impact of one of the behavioural biases, the managerial overconfidence, on the capital structure of a sample of Chilean, Peruvian and Colombian companies (founder members of MILA). While research is growing on this topic, this same sample has not been investigated before and, in general, the only similar work related to a South American country, specifically Brazil, is the one of Ayres and Di Miceli (2008).

Three hypotheses are formulated: 1) and 2) the overconfidence of the CEO and his/her experience are positively correlated to the leverage ratio and 3) male executives tend to present the bias more than their female counterparts. Findings confirm the first and the third hypotheses: the Arellano-Bond dynamic panel data model and the robustness checks show the highly significance of the overconfidence bias and its positive impact on the leverage ratio, as well as for the gender. Moreover, the bias seems to have a higher significance when it is present in the Chairman than in the CEO. These results suggest not only that overconfidence can be one of the explanations for situations in which managers are not taking optimal decisions, but also that the gender might have an influence: male executives tend to undertake more risks and to prefer a higher leverage ratio than female ones. However, the limited number of female executives that are present in the sample does not allow the formulation of absolutely reliable conclusions about the impact of the gender on corporate decisions.

Regarding the second hypothesis, one of the main innovations of the study is that it offers three measures of the experience: the number of years of the CEO holding his/her position, the years he/she has been working for the company and his/her age. They appear to be, contrary to our expectations, negatively related to the leverage ratio, evidence that can be justified by the section of literature which proves that people become gradually

more risk averse in later stages of their lives. However, since the study reveals the high influence of the Chairman in the decision-making process of South-American firms, it would be interesting, in further studies, to analyse how his/her experience affects the leverage ratio.

Finally, to reply to the question stated in the introduction, the study supports the evidence that emotions, specifically overconfidence, influence corporate decisions, leading the management to make choices that can be very far from optimal.

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ANNEXES

Table 1: Definition and predicted signs of the main variables

| Variable | Name | Measure | Predicted Sign |
|----------|-------------------|-----------------------------------|----------------|
| L | Leverage Ratio | NetDebt/Equity | - |
| P | Profitability | Return On Assets (ROA) | -/+ |
| S | Size | Natural Logarithm of Total Assets | + |
| GO | Growth Opp. | Change in Total Assets | -/+ |
| T | Tangibility | Tangible Assets/Total Assets | + |
| NDTS | ND tax-shield | Depreciation/Total Assets | - |
| V | Income Volatility | Standard Deviation of ROA | - |
| OC | Overconfidence | Binary variable | + |
| E | Experience | Years as CEO of the firm | + |
| E | Experience | Years in the firm | + |
| E | Experience | Age | + |
| Gender | Gender: female | Binary variable | - |

Table 2: Descriptive statistics of the variables

| VARIABLES | Mean | Standard Dev. | Min. | Max | Obs. |
|--------------|--------|---------------|----------|-------|-------|
| LEVRATIO | 0.428 | 0.564 | -2.00 | 4.07 | 1,776 |
| PROF | 0.0156 | 0.0307 | -0.207 | 0.247 | 2,082 |
| SIZE | 13.99 | 1.554 | 8.568 | 18.10 | 2,605 |
| GROWTHOPP | 0.0308 | 0.106 | -0.953 | 1.144 | 2,540 |
| TANG | 0.441 | 0.235 | 0.00122 | 0.902 | 1,860 |
| NDTS | 2.130 | 1.728 | -2.303 | 9.586 | 1,183 |
| VOL | 0.0142 | 0.0245 | 7.34e-05 | 0.314 | 2,072 |
| EXPASCEO | 7.036 | 7.074 | 0 | 47 | 2,691 |
| EXPINCOMPANY | 12.30 | 9.837 | 0 | 47 | 2,444 |
| EXPAGE | 53.05 | 7.792 | 34 | 76 | 1,160 |

LEVRATIO is the leverage ratio of the company, *PROF* is its profitability, *SIZE* its size, *GROWTHOPP* its growth opportunities, *TANG* its tangibility, *NDTS* its non-debt tax shield, *VOL* its volatility, *EXPASCEO* the years of experience of the CEO in his current executive position, *EXPINCOMPANY* his/her years of experience in the company, *EXPAGE* his/her age. Explanations about how the variables have been calculated are provided in **Table 1**.

Table 3: Arellano-Bond dynamic panel-data estimator - Hypothesis (1)

| VARIABLES | (1) Model 1 | (2) Model 2 | (3) Model 3 |
|-------------------------|------------------------|------------------------|------------------------|
| L.lnLEVRATIO | 0.503*** (0.125) | 0.503*** (0.125) | 0.502*** (0.125) |
| L2.lnLEVRATIO | 0.0312 (0.0466) | 0.0312 (0.0466) | 0.0341 (0.0458) |
| L3.lnLEVRATIO | 0.0740** (0.0293) | 0.0740** (0.0293) | 0.0746** (0.0293) |
| L4.lnLEVRATIO | 0.0379 (0.0658) | 0.0379 (0.0658) | 0.0335 (0.0647) |
| L5.lnLEVRATIO | -0.111 (0.0804) | -0.111 (0.0804) | -0.109 (0.0801) |
| lnTANG | 0.0521*** (0.0129) | 0.0521*** (0.0129) | 0.0525*** (0.0129) |
| L.lnTANG | -0.0253** (0.0116) | -0.0253** (0.0116) | -0.0219* (0.0121) |
| lnVOL | -0.00447 (0.00316) | -0.00447 (0.00316) | -0.00440 (0.00317) |
| lnNDTS | -0.0229 (0.0153) | -0.0229 (0.0153) | -0.0204 (0.0172) |
| L.lnNDTS | -0.0129 (0.0222) | -0.0129 (0.0222) | -0.0167 (0.0220) |
| L2.lnNDTS | -0.0376 (0.0230) | -0.0376 (0.0230) | -0.0394* (0.0226) |
| lnPROF | -0.118*** (0.0448) | -0.118*** (0.0448) | -0.118*** (0.0451) |
| L.lnPROF | -0.0226 (0.0366) | -0.0226 (0.0366) | -0.0232 (0.0368) |
| lnGROWTHOPP | -0.0145 (0.0281) | -0.0145 (0.0281) | -0.0137 (0.0289) |
| L.lnGROWTHOPP | -0.0610*** (0.0225) | -0.0610*** (0.0225) | -0.0556** (0.0222) |
| L2.lnGROWTHOPP | -0.0770*** (0.0257) | -0.0770*** (0.0257) | -0.0743*** (0.0263) |
| L3.lnGROWTHOPP | -0.0729* (0.0409) | -0.0729* (0.0409) | -0.0713* (0.0411) |
| lnSIZE | 1.346*** (0.353) | 1.346*** (0.353) | 1.323*** (0.359) |
| OVERCONFIDENCE | 0.0174** (0.00845) | | |
| OVERCONFIDENCE_CHAIRMAN | | 0.0174** (0.00845) | |
| OVERCONFIDENCE_CEO | | | -0.000519 (0.00197) |
| Observations | 464 | 464 | 464 |
| Number of COMPANY | 56 | 56 | 56 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Model (1), (2) and (3) are the outputs of Arellano-Bond dynamic panel data estimator where: *lnLEVRATIO* is the log of the leverage ratio; *lnTANG* the log of the tangibility; *lnVOL* the log of the income volatility; *lnNDTS* the log of the non-debt tax shield; *lnPROF* the log of the profitability; *lnGROWTHOPP* the log of the growth opportunities; *lnSIZE* the log of the size. *L* indicates the first lag of the variable, *L2* the second and so on. In **Model (1)** we use, as a measure of overconfidence, *OVERCONFIDENCE*, which is measured as the status (entrepreneur or not-entrepreneur) of the CEO and of the Chairman of the company: if one or both of them are the founder or a heir of the business, the binary variable assumes value 1, otherwise 0. In **Model (2)** we consider, as a measure of overconfidence, only the status of the Chairman (*OVERCONFIDENCE_CHAIRMAN*), while in **Model (3)** only the one of the CEO (*OVERCONFIDENCE_CEO*).

Table 4: Arellano-Bond dynamic panel-data estimator - Hypothesis (2) and (3)

| VARIABLES | (4) Model 1 | (5) Model 2 | (6) Model 3 | (7) Model 4 |
|-------------------|-------------------------|--------------------------|---------------------------|-------------------------|
| L.lnLEVRATIO | 0.536*** (0.133) | 0.463*** (0.142) | 0.597*** (0.127) | 0.503*** (0.125) |
| L2.lnLEVRATIO | 0.00541 (0.0500) | 0.00728 (0.0472) | -0.0170 (0.101) | 0.0312 (0.0466) |
| L3.lnLEVRATIO | 0.0816*** (0.0260) | 0.0837*** (0.0262) | 0.0546*** (0.0198) | 0.0741** (0.0292) |
| L4.lnLEVRATIO | 0.0353 (0.0694) | 0.0413 (0.0583) | 0.0567 (0.0380) | 0.0382 (0.0658) |
| L5.lnLEVRATIO | -0.115 (0.0827) | -0.0513 (0.0831) | -0.0327 (0.104) | -0.111 (0.0803) |
| lnTANG | 0.0538*** (0.0121) | 0.0560*** (0.0124) | 0.0657*** (0.00926) | 0.0522*** (0.0129) |
| L.lnTANG | -0.0287** (0.0115) | -0.0279** (0.0119) | -0.0475*** (0.0153) | -0.0255** (0.0117) |
| lnVOL | -0.00548* (0.00326) | -0.00482 (0.00364) | -0.00367 (0.00300) | -0.00470 (0.00319) |
| lnNDTS | -0.0217 (0.0150) | -0.0212 (0.0186) | -0.0556*** (0.0182) | -0.0227 (0.0153) |
| L.lnNDTS | -0.0138 (0.0221) | -0.0124 (0.0256) | -0.0341* (0.0176) | -0.0122 (0.0222) |
| L2.lnNDTS | -0.0371* (0.0225) | -0.0208 (0.0261) | -0.0333** (0.0149) | -0.0377 (0.0229) |
| lnPROF | -0.122*** (0.0472) | -0.117** (0.0455) | -0.0994* (0.0553) | -0.118*** (0.0447) |
| L.lnPROF | -0.0103 (0.0346) | -0.0169 (0.0344) | -0.0338 (0.0530) | -0.0223 (0.0367) |
| lnGROWTHOPP | -0.0235 (0.0275) | -0.0296 (0.0304) | -0.0836* (0.0430) | -0.0145 (0.0281) |
| L.lnGROWTHOPP | -0.0522** (0.0229) | -0.0550* (0.0284) | -0.0236 (0.0334) | -0.0607*** (0.0226) |
| L2.lnGROWTHOPP | -0.0782*** (0.0262) | -0.0770*** (0.0266) | -0.142*** (0.0387) | -0.0767*** (0.0257) |
| L3.lnGROWTHOPP | -0.0719* (0.0417) | -0.0593 (0.0466) | -0.0157 (0.0382) | -0.0729* (0.0410) |
| OVERCONFIDENCE | 0.0167** (0.00831) | 0.0187** (0.00846) | 0.0821*** (0.0317) | 0.0175** (0.00845) |
| lnSIZE | 1.318*** (0.377) | 1.238*** (0.427) | 0.680 (0.535) | 1.348*** (0.353) |
| EXPASCEO | -0.00108* (0.000958) | | | |
| EXPINCOMPANY | | -0.000715* (0.000629) | | |
| EXPAGE | | | -0.000416** (0.000391) | |
| GENDER | | | | 0.00156*** (0.00934) |
| Observations | 448 | 400 | 214 | 464 |
| Number of COMPANY | 54 | 49 | 24 | 56 |

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Model (4), (5), (6) and (7) are versions of **Model (1)** integrated with the following variables: *EXPASCEO* (**Model (4)**), which is the number of years of the executive as a CEO of the company, *EXPINCOMPANY* (**Model (5)**), the number of years of the executive working in the company, *EXPAGE* (**Model (6)**), the age of the CEO. *GENDER* (**Model (7)**) is a binary variable that assumes value 1 if the CEO and/or the CFO is a male, otherwise 0. An explanation of the other variables can be found in **Table 3**.