Master Thesis Financial Economics

"Overconfident CEOs and Capital Structure"

An empirical research on the US market

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Abstract

This study aims to investigate how does CEO overconfidence and other firm specific characteristics affect the decision making process regarding the capital structure of the firms. Trade-Off Theory, Pecking Order Theory and Market Timing Theory are the main capital structure theories that the analysis is based. The sample data includes 1.757 US public listed firms and 2.217 non identical CEOs. Panel Regression Analysis is implemented in order to derive the results. Two stock option-based proxies of overconfidence have been constructed (Over and Over2). The results predict that the time invariant measure (Over) has a positive but insignificant effect on book leverage ratio, whereas the time variant measure (Over2) has a negative and significant effect on book leverage. Additionally, when I am testing for the prevalence of each capital structure theory, Pecking Order Theory seems to be more prevalent.

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1. Introduction

Ever since, one of the most puzzling questions that firms have to answer about is which financing decisions do they have to follow in order to result on an optimal and beneficial capital structure. Capital structure in general is the amount of debt or equity that a firm has to employ in order to fund its operations and its investment decisions. Such operations could potentially be capital expenditures, mergers and acquisitions and other investments. In other words, firms have to answer the question of how much of the capital shall be debt and how much shall be equity so that they can run their business. Through the years, a lot of empirical research has been developed in order to address the question of what exactly determines firms' financing decisions. These studies are trying to demonstrate which firm specific features can affect the capital structure of the firms and should be considered as important. Notably, some of the most important papers that try to address this puzzling problem are presented by Frank and Goyal (2009), Myers (1984), Titman and Wessels (1988) and Rajan and Zingales (1995). What they find is that firm specific features such as tangibility of the assets, profitability, liquidity, the size of the firm and growth opportunities do matter for its corporate structure.

Initially, Modigliani and Miller (1958) tried to demonstrate with their paper that firm's total market value is irrelevant of its capital structure under some rigorous assumptions. Nevertheless, these assumptions are doubted due to the fact that markets nowadays they do have frictions. So, there was a need in the meanwhile for other theoretical frameworks to be developed in order to deal with such failures existing in the market and hence to help predicting which could be the optimal capital structure of the firms. Beginning with, Trade-Off Theory is a capital structure theory which argues that there is a tradeoff between tax shields and the cost of financial distress that a firm should balance when decides for debt financing. Next, Pecking Order Theory is related to information asymmetry. This theory argues that there is indeed a financial hierarchy that many companies follow. Briefly, firms tend to finance their structure using internal funds when they are adequate. If not, then these companies prefer first debt financing and then as a last financing resource the equity financing. Lastly, Market Timing Theory is a capital structure theory that has a more market view

perspective. This theory tries to explain that managers often strive to time the market in order to make the right decisions to fund their corporate structure. In few words, the principal of this theory is that managers tend to issue equity when the stock price of their firm is relatively high and buy back equity when stock prices are relatively low.

However, apart from firm specific determinants, also there might be other determinants that can influence the decision making process regarding the capital structure. Behavioral Finance can be the right field that can add to the existing literature of Corporate Finance. One common assumption of existing literature is that economic agents (e.g managers, CEOs, CROs, CFOs) are assumed to be fully rational (Fama, 1965). Obviously this assumption can be treated with skepticism and might turn to be problematic since it is widely observed that many financial distortions, either on a firm or country level, have been caused by irrational behavior choices. A lot of academic research has been focused on exploring why such managerial behavioral irrationality exists. Interestingly, many studies (Malmendier and Tate, 2005; Campbell et. al, 2011; Hirshleifer et.al, 2012) attribute this irrationality to the managerial behavioral bias of overconfidence. CEOs' overconfidence is predicted to cause many investment distortions within the firm and this has an impact on its structure (Heaton,2002). Thus, it is interesting in this point to see how CEO overconfidence affects the capital structure decisions of the firm under the three capital structure theories stated above.

This master thesis aims to add on existing literature by exploring and investigate the impact of being a CEO overconfident over the firm's capital structure decisions. Hence, I will examine how capital structure decisions can be affected if I incorporate the behavioral bias of overconfidence under the three capital structure theories argued briefly above. The working title of this thesis paper is ***"Overconfident CEOs and Capital Structure"*** and the main research question that I am trying to answer by conducting this empirical analysis is: ***"How does CEOs' overconfidence and other firm specific characteristics influence the decisions regarding the capital structure?"***. The reason that explains why I am motivated to select and conduct this research topic is because I find it really nice and challenging to derive and examine new findings by employing and combining insights from Corporate Finance literature, Behavioral Finance and Psychology. Since Behavioral Finance is a relatively new field of Economics, I would like to implement some aspects of this field onto

conventional capital structure theories and observe how potentially irrational decisions can be explained. Additionally, I formulate a set of sub-hypotheses referred to each capital theory. In this way, I am trying to give a more in-detail analysis by testing which capital structure theory is more persistent if I bear in mind the effect of overconfidence proxies over book leverage.

My sample consists of 1.757 public listed US firms and 2.217 non identical CEOs who are all operating in the US market. In the entire dataset, Financial-Insurance-Real Estate firms are not included based on Frank and Goyal (2009) and Baker and Wurgler (2002) papers. The sample period starts from 1992 till 2015. In order to obtain the data, I use the WRDS Compustat-IQ Capital database to get all the information that is needed for the capital structure of the firms and also the Compustat-Execucomp database from which I download all the necessary features regarding the construction of the option-holding based measures of CEO's overconfidence . Panel regression analysis has been used in order to conduct the analysis of this paper.

The results of my empirical analysis predict that when I am running the main regression model using the first option-based measure of overconfidence, there is a positive relation between book leverage ratio and overconfidence despite the fact that the effect is not statistically significant. This relation is in line with existing literature and can be elaborated as that overconfident CEOs usually tend to underestimate the cost of financial distress, assuming that the firms they manage have less possibilities to bankrupt (Hackbarth,2009). This notion leads them to prefer more debt financing, seeking on the tax benefits they could gain with higher leverage ratios. By contrast, when I am applying the second measure of overconfidence, the results predict an inverse relation between book leverage ratio and overconfidence. The effect of this relation is statistically significant and can be explained considering some empirical behavioral findings as well. The negative relation can be attributed to the calculative nature of the second overconfidence proxy which is time-variant. Thus, it is more able to capture any changes on the behavioral traits through the years. A macroeconomic shock, like the World Financial Crisis of 2007-2009, could have had an impact on the behavior and the decisions of the CEOs. It is predicted that individuals that experience such financial crises, usually tend to be reluctant into participating on the markets. This change on the CEO's behavior, can lead to debt conservatism and self-sufficiency, avoiding debt financing.

Additionally, testing for each capital structure sub-hypotheses, the results reveal that Pecking Order Theory seems to be a more prevalent capital structure theory, since the sensitivity of the core variables with the book leverage ratio, when firms are managed by overconfident CEOs, lead to the predicted empirical relations.

The reminder of this paper is organized as follows: Section 2 demonstrate the current state of existing literature, Section 3 covers the methodological procedure I follow in this paper as well as the main research question, hypotheses and sub-hypotheses, Section 4 illustrates the sample description and descriptive statistics, Section 5 present the results of the empirical analysis and lastly in Section 6 the concluding remarks are presented.

2. Literature Review

In this section, I am citing the most relevant theories referred to the capital structure as well as the recent empirical work of overconfidence. I will point out the most crucial key points of each theory and their main empirical predictions.

One reasonable question that someone can ask is which exactly theory is more suitable and which one is more relevant with capital structure. Obviously, this is something that is debatable. Across the years many capital structure theories have been proposed, however only few of them have been supported thoroughly in academia.

2.1 Modigliani & Miller Theory

Modigliani and Miller (1958) firstly introduced a theory regarding the capital structure in the late 1950s with their paper "The Cost of Capital, Corporation Finance and the Theory of Investment". This pioneering theorem can also be expressed as the "capital structure irrelevancy". They actually prove that capital structure of a firm is irrelevant of its value in an efficient market. Also the value of the firm is not influenced by the fraction of debt or equity that it holds in its books. In this paper they demonstrated 2 main propositions. The first one argues that *"The value of the asset does not change, regardless of how the net operating cash flows generated by the asset are distributed among different classes of investors"* (Modigliani &

Miller,1958). In simple terms they argue that either you have the cash flows to pay the equity or the debt holders, in sense the cash flows generated in the firm do not change. The second proposition they state is that *" The cost of equity of a levered firm is equal to the cost of equity of unlevered firm plus a financial risk premium, which depends on the degree of financial leverage".*

All those propositions are made under some certain assumptions. In detail, Modigliani and Miller assume that i) Individuals borrow at the same rate as corporations do. ii) There is a perfect capital market. This means briefly that there is no information asymmetry and there are no transaction costs. iii) Additionally, they assume there are no any taxes implemented. iv) There is no cost of financial distress and lastly v) there is a fixed investment policy followed by each firm. These assumptions lead to the finding that the cash flows generated by the firm remain the same. Focusing on those assumptions made in their paper, it is instantly understood the reason why there are many critics about this theory. Almost all of them do not hold anymore and hence perfect capital market conditions, in which this theory is based, turn to be unrealistic. For example, it is widely accepted that nowadays information asymmetry between economic agents and transaction costs indeed exist. So, there is no perfect capital market as the Modigliani and Miller propose. Taxes have been imposed not only for individuals, but also for corporations. Lastly, one other inconsistency that derives from this theory is that it is not explicitly argued about the conflict that might appear between the agents and the shareholders. Usually, an agent acts on behalf of somebody else within the firm. They act on behalf of the shareholders of the firm. Agents (or managers) have as a target the maximization of the benefits of the shareholders where, in this particular case, those benefits come from the maximization of the cash flows generated by the firm. Shareholders, from their point of view, they want to make sure that managers that work on their firm have aligned incentives. Managers might have the tendency to invest more than what is optimal from the shareholder's perspective, and hence a conflict can exist.

Modigliani and Miller in a later research paper, they indeed understand the need of reconsidering some strict and unrealistic assumptions, such as those represented above, and they argue in their paper that some world problems must be taken into account (Modigliani and Miller, 1963). In the meanwhile, later research also tried to deal with such market efficiency failures and tried to answer this puzzling question of the firm's optimal capital structure, incorporating other theories, which

some of them will be explicitly presented right below. Optimal capital structure theories usually aim to find out which is the firm's optimal leverage over its assets that should hold so that it can take some benefits from that.

2.2 Trade-Off Theory

After the Modigliani and Miller theorem, Trade-Off theory is concerned as the first solid capital structure theory. Myers (1984) in his paper assigns for the first time the name *"Static Trade Off Theory"*. One key difference with the Modigliani & Miller Theorem, however, is that the Trade Off Theory takes into account the fact that the there is a bankruptcy cost for each firm that might influence its capital structure decisions and their decisions of financing their investments and thus it tackles the Modigliani and Miller 1st proposition. The core idea of this theory is that there is a tradeoff between tax-shields and the cost of financial distress so that the firm has to balance out and hence to have an optimal capital structure. In simple terms, this can be elaborated as the firm always selects its optimal capital structure considering that it can borrow up to the level that the interest tax shields and cost of financial distress are equal at the margin (Myers, 2003). The only reason that a firm might deviate from the optimal capital structure is the adjustment costs.

Empirical evidences of the Trade-Off Theory shows that it can be tested cross-sectionally using proxies for tax status and costs of financial distress (Myers, 2003). The question here is which proxies can be incorporated in the trade off theory. Fortunately, existing literature gives a comprehensive guideline regarding which proxies to select. Myers (2003), demonstrate in his handbook that proxies, such as business risk, non-debt tax shields and tangibility of the assets work reasonably well in cross sectional test of tradeoff theory.

Taking a closer look on each of the proxies individually, we can see that using the business risk as a proxy of trade off theory is also been supported by De Jong et al. (2007) by stating in their paper that the business risk can count as a valuable feature that can affect the leverage of the firm. Usually, business risk can be attributed to the volatility of the earnings that a firm can generate. Non-debt tax shields, on the other hand, is the next proxy of trade of theory and its existence has also been supported in a recent work of Fama and French (2002). De Angelo and Masulis

(1980), in their paper also show that the non-debt tax shields indeed affect the capital structure of a firm. Additionally, they state that non-debt tax shields can be used in order one firm to gain tax benefits by debt financing. Hence, they can be used as a good guide that helps into the financial investment decisions of the firm. Ultimately the last proxy that is incorporated into the Trade-Off Theory is the tangibility of the assets. Usually, tangible assets are used as collaterals for many companies in order to issue debt. Tangibility of the assets is also been used by Rajan and Zingales (1995) as one of the core variables of capital structure.

What typically all these studies find about Trade-Off theory? In this point here, there is a need to bring out some of the most meaningful takeaways regarding the relation of each of the proxies of Trade-Off theory mentioned above with the leverage. Starting with, considering the business risk, we can understand that the more volatile are the earnings of the firm, the more risky the firm can be (it is also reasonable if we look this from the industry perspective). Thus, the business risk of the firm increases. However, if the business risk increases then the firm's cost of financial distress might increase as well. Titman and Wessels (1988), in their paper argue that the more volatile the earnings of the firm become, the less debt financing the firm chooses. In addition, according to Castanias (1983), the likelihood of a firm's bankruptcy might increase as far as the there is a (upwards) trigger of the earnings distribution (variance). Thus, he argues in his paper that there is an inverse cross sectional relationship between probability of bankruptcy and leverage (Castanias,1983). It make sense here to say that the firms, according to the empirical predictions mentioned above, should be reluctant into debt financing of their firm and thus they should keep the debt levels in a moderate proportion over its equity, otherwise it will be very difficult to fulfill all the obligations they have over their lenders. Hence, based on those empirical predictions I would expect as well a negative relation between business risk and leverage. However, another concern that I should take into account is that other studies like Ferri and Jones (1979), Titman and Wessel (1988),even though they initially expected the same negative correlation of business risk with the percentage of debt in a firm's financial structure, they found out that there is no significant relationship between them. Moreover, Scott (1976) in his paper finds that the correlation between leverage and earnings volatility can be sometimes ambiguous due to the different methods of calculation.

The next proxy been used in the Trade-Off Theory are the non-debt tax shields. As it was stated again before, De Angelo and Masulis (1980) they argue that the firms in general can take the benefit of non-debt tax shields when they decide to finance their projects with debt. It is worth observing that many big size companies prefer to finance their investments or their finance structure with debt. This can be reasonably explained as they use debt financing since the interest they pay for the debt is tax deductable and so that they have tax benefits. The higher the interest payments, the higher the tax benefits the firms gain. Moreover, De Angelo and Masulis (1980) illustrate in their paper that apart from the tax benefits that one firm can gain from debt financing, non-debt tax shield can be used as an alternative way. Following the same pattern, if one firm has higher non-debt tax shields it is required then to pay lower taxes and apparently to have lower levels of debt. Therefore, I would expect a negative relation between the non-debt tax shields and leverage.

Ultimately, the last proxy of the Trade-Off theory is the tangibility of the assets. As it was stated before, tangible assets are used as warrants from many companies in order to issue debt. Frank and Goyal (2009) mention that the tangible assets are an easy way for the lenders (Banks or Investors) to value the company. The more the tangible assets the firm has, the lower the distress cost in case of a bankruptcy will be. This is plausible since the lenders are able to pawn more assets from the firm they have lent their funds if the tangibility of those assets is high, and hence they can have a backup plan in case of the borrower goes bankrupt. Reasonably, I can make an argument that the more tangible assets the firm has, the more able this firm is to pursue more debt and thus, I expect a positive relation between firm leverage and tangibility of the assets.

2.3 Pecking Order Theory

The next theory that tries to answer questions about how firms finance their investment decisions is the Pecking Order Theory. According to this theory, the firms in order to finance their projects and their investments, must choose between internal financing and external financing. Donaldson (1961) is assumed to be the inventor of the Pecking Order Theory and S. C. Meyers the one that started formatting this. This theory implies that firms, in order to finance their decisions must follow a specific

hierarchy of funds. Myers (2003) shows that in general, firms prefer for internal financing rather than external. It is documented that most of the firms indeed follow this hierarchy especially these ones that are examined in the US market. Nevertheless, Meyers (1984) he states in his paper that there are some exemptions. By saying exemptions he means that there were some companies that led to finance their decisions by issuing equity, while at the same time it was easier for them to issue debt on an investment grade interest rate. The hierarchy of this theory demonstrates that if the internal funds are not adequate and external funds are needed for capital investment, firms will first prefer to issue debt before equity. As the demand for external financing is increasing, then the firm will be aligned with this hierarchy and will go through the Pecking Order Theory issuing from the safest to the riskiest form of debt, and as a final resource of fund, the firm will issue equity as the last resort (especially when the firm is under the pressure of financial distress). In order to demonstrate this in a more clear way, I will use some insights from Donaldson (1961), who was also a pioneer of the initial form of Pecking Order Theory. According to his research, Donaldson (1961) had as a sample U.S firms. In detail, he was conducting a survey in which he was asking managers of each firm about their financing decisions. The results show that there is indeed a financing hierarchy. Briefly, this hierarchy can be illustrated in the following way as: Firms tend to finance their decisions using, *1) Internal funds, 2)Debt, 3) Hybrid Securities and 4) Equity Issues*. The reasons why such an hierarchy exists might be attributed to the transaction costs of raising capital and firm's debt capacity (Myers, 2003). This is contradictive to the Modigliani Miller Theorem that in the capital markets there are no any transaction costs. Moreover another consideration that Pecking Order Theory takes into account in contrast to Modigliani Miller Theorem is the fact that information asymmetry indeed exists and really matters for the capital structure. Additionally, Myers and Majluf (1984) made many assumptions in order to test for the Pecking Order Theory. Some of them are that i) managers have more information than outside investors, ii) transmitting information is costly, iii) management acts in interest of old shareholders iv) old shareholders are passive. Overall, the above arguments can be summarized by Shyam-Sunder and Myers (1999) finding that *" In its simplest form, the pecking order model of corporate financing says that when the internal funds of the firm are not enough to finance their decisions and its dividend commitments, then the firm should use debt*

financing, otherwise it can use equity finance in case only it issues junk bonds and the cost of financial distress at the moment is really high".

Hence, in order to measure the Pecking Order Theory, I will use as a proxy again the tangibility of the assets since it can be used as an indicator of how difficult or not a firm is able to get debt financing from outside investors. Tangible assets, as it was discussed earlier, is a way for outside investors to approximate the value of the firm, and can use those tangible assets as collaterals in case that the firm goes bankrupt. Moreover, I will use the liquidity of the firm as an indicator of how much of the assets that the firm holds, are liquid or not. As the Pecking Order Theory predicts, corporations in general prefer first to use internal funds to finance their operations and then, if the internal funds are not enough, they will seek for external financing. Liquidity ratios can give a sneak preview of how liquid the assets of the firm are and therefore derive some extra information regarding the adequacy of the assets so that any potential firm can use them for internal financing. The last proxy that I will use in order to measure the Pecking Order Theory is the profitability of the firm. By using the profitability of the firm as a proxy, it is a way to show how much internal financing each firm has. According to Myers (2003) the more profitable firms tend to use less external financing not because their target leverage ratio is relatively low, but because in general those firms that are assumed to be more profitable, they usually have more internal funds available for financing their operations. In addition, those firms that are more profitable they indeed tend to minimize the amount of external financing they get over time (Frank and Goyal, 2009). The use of tangibility and profitability as proxies, have been supported also by Baker and Wurgler (2002).

What the empirical studies of Pecking Order theory above predict about the relation of each of the three proxies with the leverage ratio of the firm? Starting with, the tangibility of the assets is used as an indicator that shows how much the firm can use its assets as collaterals when external finance is needed. The more tangible the assets are, the less the cost of debt issuance. However, due to information asymmetry, adverse selection exists and this leads firms to increase their debt capacity as far as the assets are more tangible. Hence I would expect in this case a positive relation between the tangibility of the assets and the leverage ratio of the firm. One remark here is that in Pecking Order Theory, the sign of tangibility might sometimes change to negative, due to the fact that firm with high tangibility may find equity issuance cheaper and thus substitute for equity rather than debt (Frank and Goyal, 2009). Next,

regarding the liquidity ratio, as it was stated above the liquidity of the assets of the firm do matter a lot especially in the Pecking Order Theory. Let's suppose that one firm has high liquidity ratio. That implies that this firm holds in its balance sheet highly liquid assets such as cash, stocks, marketable securities, U.S treasuries, bonds and mutual funds. Remarkably, those types of assets are been characterized as liquid assets in sense that they can be converted to cash in a relatively short period. If this company is able to convert them into cash in a short period, simultaneously is also able to finance its structure or any other decision using its internal funds rather than using external finance like issuing debt (if and only if internal funds are adequate). Thus, I would expect a negative relation between the liquidity and leverage ratio. Lastly, the profitability is the remaining proxy of the Pecking Order Theory. Based on the empirical evidences mentioned above, like those ones from Myers (2003) and Frank and Goyal(2009) in which they state briefly that the more profitable firms tend to use more internal financing rather than external due to the adequacy of the assets, I would expect again a negative relation between profitability and leverage ratio.

2.4 Market Timing Theory

Market timing theory, is a relatively simple theory of capital structure. Baker and Wurgler (2002) introduced with their paper the Market Timing Hypothesis and argued that this theory has many influences from other financial domains such as behavioral finance since it is a theory that predicts when it is exactly the right time for managers-companies to finance their firms' structure in the most beneficial (costless) way. In addition, they argue that the ability to time the market actually gives some incentives to the managers to do it as efficient as they can if their incentives are aligned with those of the shareholders of the firm. In little words , *"capital structure includes all the aggregate of past attempts to time the equity market"* (Baker and Wurgler, 2002). Most empirical evidence shows that market timing really matters into the corporate financial policy of the firm, while at the same time all the other theories such as Trade-off Theory and Pecking Order Theory are still useful. Apparently, it does not seem as a complete theory of capital structure but it helps as a conditional theory. In contrast, Baker and Wurgler (2002) summarize in the end of their paper that the market timing hypothesis is the one that is dominating all the other

theories. The main point of this theory is clear. Firms tend to issue equity when the stock price of their firm is relatively high and, vice versa, they repurchase equity when the stock price of their firm is relatively low. In detail, Baker and Wurgler (2002) state in their paper that it is observed that firms are more likely to issue equity when their market values are high, compared to book and previous market valuations, and they tend to repurchase equity when their market values are low. This can be expressed in another way as the firms tend to issue equity (stocks) when the cost of equity is low and repurchase (buy back stocks) when the cost of equity is high. Moreover they find that the effect of the market timing over the capital structure is very persistent across the years, and the current state of the firm's capital structure is strongly correlated to past historical market values. The main finding of their research is that those firms that have lower leverage ratio are actually these that issued equity when their market-to-book ratio was relatively high and, vice versa, highly levered firms are these that they got external financing when their market-to-book ratio was relatively low. As an additive supporting argument, Graham and Harvey (2001), in the survey which they were conducting, by asking 392 CFOs of companies in the US market, they find out that approximately 30% of the survey participants (CFOs) are taking seriously into account whether the stock of their firm is under/overvalued so that they can process into issue equity or not. Lastly, looking on the methodological procedure of Baker and Wurgler (2002) they notify that their regression model has as dependent variable the leverage ratio and as independent variable they use the market-to-book and a "new" variable market-to-book$_{efwa,}$ which stands for "External Finance Weighted Average Market to Book". Actually, this "new" market-to-book variable is nothing more than a weighted version of the current market-to-book with a difference that when they say "weighted", they indeed take into account the net equity issues of the firm and the net debt issues for each year for every firm. They state that the historical variations of the market-to-book can be summarized by market-to-book$_{efwa}$. They incorporate simultaneously both the current market-to-book and the market-to-book$_{efwa}$ (henceforth EFWAMB) because in this way they can observe the within-firm time series variation and thus they document in this way the cumulative effect of the history of the market-to-book ratios on capital structure.

What do empirical evidences predict for the market timing theory? According to the findings of Baker and Wurgler (2002), they show that those firms that raised the lowest external financing are those that have higher market-to-book ratio and vice

versa, these firms that they have raised more external financing are those that have lower market-to-book values. Hence, I expect in my analysis that both book-to-market and EFWAMB will have a negative relation with the leverage ratio of the firm.

2.5 Overconfidence

On the other hand, apart from the empirical Corporate Finance Theories such those presented explicitly above, it is really needed to take into account also some other aspects or theories that can have a meaningful influence into the decision making process specially when we look within a firm level. Thankfully, Behavioral Finance Theory is here to fill this gap. One assumption that is considered in the existing literature of Corporate Finance, is that agents (managers or investors) are assumed to be fully rational (Fama,1965). Obviously, this argument is not realistic and can be problematic. Behavioral Finance is a theoretical field that tries to explain anomalies in the financial markets and corporations based on psychology theorems. One well known anomaly (or bias) that is well presented and argued in the recent existing literature of Behavioral Finance is the *Overconfidence* bias.

In general, overconfidence is a behavioral bias that leads individuals to overestimate their general knowledge on a certain field. Overconfident people also tend to underestimate their exposure over a certain decision or event and hence they underestimate the risk that emanates from this event. Also, they are very confident about themselves regarding their ability to control and manage various situations. These people can eventually be managers or CEOs in corporations operating in different industrial sectors and it is quite straightforward that this behavioral bias can have an impact on the investment decisions that their firm has to take. It is generally predicted that CEOs that have to deal with difficult tasks, such as making forecasts that are characterized by low predictability or multitasking roles within the firm level, tend to be highly overconfident. Overconfidence can be seen through two main channels, through miscalibration or through the *"better-than-average-effect"*. Ben-David, Graham and Harvey (2013) argue in their paper that miscalibration is the systematic underestimation of the range of potential outcomes and some potential reasons that allows miscalibration to exist as an behavioral bias are i) Managers overestimate their ability to predict the future and also ii) they underestimate the

potential risk of an upcoming event which can be hidden. For example, miscalibrated investors underestimate the volatility of their firm future cash flows (Ben-David et al., 2013) The second channel that overconfidence can be observed is the "*better-than-average-effect*". According to this, people in general think that their abilities or skills in a certain domain (business or society) are over performing the skills of other people. "*When individuals assess their relative skills, they tend to overstate their acumen relative to the average"* (Malmendier and Tate (2005); Larwood and Whittaker (1977); Svenson (1981)). CEO overconfidence can be linked also with corporate policies and corporate investments. As it is described in the Pecking Order theory, the funds needed for financing the corporate investments can be extracted either from internal financing (e.g cash flows generated) or external financing (debt issues / equity issues). Where can we see the linkage between CEO overconfidence and corporate financial policies? At this point it is worth to mention that such a behavioral bias like overconfidence can result in corporate investment distortions. By saying distortions I mean that a CEO can either underinvest or overinvest into some projects or investment opportunities. Underinvestment usually means that a CEO can withdraw from a project which in reality can have really good potentials in the long term as long as a good NPV value. On the other hand overinvestment is the case in which the CEO potentially can accept bad performing projects in reality, but phenomenally they seem to be valuable at the moment. Another reason that explains why such distortions exist is the information asymmetry between firm managers and outsiders (investors). Another view is that sometimes managers tend to overinvest in order to gain as much as more benefits creating the so called "empire building". In this case, also due to info asymmetry, the targets of the shareholders with the targets of the managers are not aligned. One of the most meaningful relations that Ben-David et al.(2013) in their research survey find in the results, is that the more miscalibrated managers exist in the firm, the more debt financed is the firm they work on.

Similarly, in the same notion also Malmendier and Tate (2005) with their outstanding paper find the same behavioral patterns. It is one of the first papers that examines and tries to understand in depth how CEO overconfidence can have a serious impact on corporate investment distortions. Heaton (2002) showed that common distortions in corporate investment decisions can be caused by managers who are overestimating the returns of their investments. Malmendier and Tate (2005) are doing so by testing their main hypothesis *(H1: "Investments of overconfident*

CEOs are more cash flow sensitive compared to those made by less overconfident CEOs") and using different proxies that can measure the overconfidence of the CEO. Most notable proxy is the Holder67 overconfidence measure and then in rank is the Longholder in which the CEOs are classified as overconfident only if they keep their option holdings until the last year of its duration and lastly the Net Buyer proxy which classifies a CEO as overconfident if he was net buyer of company equity during the first five years they appear in the sample. One remark here is that both Longholder and Net Buyer are more difficult to be calculated due to the availability of the data. Some basic results that derived from Malmendier and Tate (2005) research paper are that there is a positive relation between CEO overconfidence and investment-cash flow sensitivity. Also another one notable finding is that the investment-cash flow sensitivity is more demonstrated in firms that are more equity dependent.

On the other hand, overconfidence as a behavioral pattern has not only its cons but also some positive insights in terms of management. Hirshleifer et al. (2012) finds that overconfident CEOs are in general better innovators, since they can gain higher innovative performance for a given "amount" of R&D, and also they are able to translate growth opportunities into value creation for the firm, but with the restriction that these arguments hold true only if we talk about innovative industries that these CEO are incorporated in.

Looking at all the information stated above as well as the empirical evidence regarding the overconfidence as a behavioral bias, I would expect a positive relation between overconfidence and leverage ratio.

3. Methodology

3.1 Research Question, Hypothesis and Sub-Hypotheses

As it was stated before, the main research question which this analysis is seeking to answer is *"How does CEOs' overconfidence and other firm specific characteristics influence the decisions regarding the capital structure?"*. At this point

here, it is plausible to state the basic hypothesis, so that I can test my empirical results which will derive from the analysis in the following sections.

H1: *Firms that are managed by overconfident CEOs, will decide to finance their capital structure with more leverage compared to other corporations that are managed by less overconfident CEOs.*

However, based on the literature review presented in the previous section and the specific features induced from the theories referred to the capital structure, namely (*A) Trade-off Theory- (B) Pecking Order Theory, (C) Market Timing* I am also able to form some additional theory-specific sub-hypotheses. In this way I can check whether or not the empirical findings of the analysis are aligned with those hypotheses for each capital structure theory and their empirical predictions. Starting with, below they are presented some basic sub-hypothesis for the first theory of capital structure.

3.1.1 Trade-Off Theory Sub-Hypotheses

H2: *There is a negative relation between business risk and leverage ratio when firms are managed by more overconfident CEOs*

H3*: There is a negative relation between non-debt tax shields and leverage ratio when firms are managed by more overconfident CEOs*

H4*: There is a positive relation between tangible assets and leverage ratio when firms are managed by more overconfident CEOs*

To test for each sub-hypothesis mentioned above, I will apply the basic theoretical model based on the firm characteristics and overconfidence measurements over the entire data sample. One remark in this point here is that in order to test for them, I will apply the main regression model using each time interaction terms based on the overconfidence measures and the variable of interest for each capital structure theory. Hence, I will be able in this way to see in detail the sensitivity of those terms over the dependent variable. Those models will be explained in detail in Section (3.3).

In the same way I can form also some basic sub-hypothesis, regarding the Pecking Order Theory and its specific features.

3.1.2 Pecking Order Theory Sub-Hypotheses

H5: *There is a negative relation between the tangibility of the assets and the leverage ratio when firms are managed by more overconfident CEOs*

H6: *The profitability of the firms and their leverage ratio are negatively related when they are managed by more overconfident CEOs*

H7: *The liquidity of the firms and their leverage ratio are negative related when they are managed by more overconfident CEOs*

Lastly, I am forming the sub-hypotheses regarding the last theory of capital structure and its variable of interest that this theory incorporates.

3.1.3 Market Timing Theory Sub-Hypotheses

H8*: There is a negative relation between market-to-book and leverage ratio when firms are managed by more Overconfident CEOs.*

H9*: There is a negative relation between EFWAMB and leverage ratio when firms are managed by more Overconfident CEOs.*

3.2 Methodology

In order to test the main hypothesis of the research question of this study and the additional sub-hypotheses, regarding each capital structure theory, it is worth mentioning in this point the main theoretical model that I will apply into my dataset.

Considering the already existing literature in the Corporate Finance and Behavioral Finance field, I am able to select the core factors that I will incorporate in the main regression model. Such factors, regarding the capital structure, can be extracted from income statements and balance sheets of publicly listed firms in the US stock market. On the other hand, regarding the behavioral bias of overconfidence, I will construct an overconfident measure such as *Holder 67* described in Malmendier and Tate(2005), plus another measure of overconfidence which is similar to *Holder67* but with some different adjustments that have been applied.

Due to the fact that my data set has a panel form, I assume that Panel Regression Analysis, using firm Fixed Effects and Year Fixed effects, is suitable to conduct this empirical research. One advantage of using a panel data model is that I can observe different dynamics in economic behavior. Thus, the main panel data model is presented below:

$$\mathbf{LEV_{i,t}= \alpha_i+\alpha_t+\beta_1 Size_{i,t-1} +\beta_2 Bus\_Risk_{i,t-1} +\beta_3 ND\_TaxShield_{i,t-1} +\beta_4 Tang_{i,t-1} +\beta_5 Profit_{i,t-1} +\beta_6 Liq_{i,t-1} +\beta_7 Over_{i,t-1} + \beta_8 M/B_{i,t-1}+\beta_9 EFWAMB_{i,t-1} +\varepsilon} \quad \mathbf{(1)}$$

Looking on Eq.(1), we can instantly understand that all the independent variables have 1-period lag compared to the dependent variable which is the book leverage ratio **(LEV).** The reason why there is such a case is that I want to examine and test the effect of each independent variable valued in the previous period over the dependent variable next period. In simple terms, I actually want to investigate the effect of the capital structure decisions taken and the behavioral bias (overconfidence) of each CEO in the previous period, over the leverage of the firm measured in the next period.

Hence, it is crucial now to describe each variable of the main model, one by one, considering also which one refers to each of the 3 capital structure theories (Trade-Off theory, Pecking Order and Market Timing Theory). Starting with, the dependent variable is the leverage ratio, measured for the firm i and time t. Surprisingly, the leverage ratio is quite more puzzling than it seems to be. Thus, it is really important at this point to be defined. Frank and Goyal (2009) mention in their paper that there are several different ways that we can measure the leverage ratio. Specifically, they argue that differences between the leverage ratio measurements depend on whether the book or market values are taken into account. Moreover, they point out the differences between long-term debt and total debt.

The Eq. (1) illustrated above can have either a market-based leverage or book based leverage. In recent literature, it is argued that there is no a rule of thumb for which one to select in order to be sure about the robustness of the outcomes. Frank and Goyal (2009) support this view as well. They state that "*there is no unified model of leverage currently available that can directly account for the six reliable factors of their analysis"* (Frank and Goyal ,2009).

In their analysis, Frank and Goyal (2009) select the market-based leverage in order to conduct their analysis. They support this view because only in this case they find reliable empirical patterns and a significant level for a set of six factors, which all account for more than 27% of the variation in leverage. However, there are also some other opinions regarding which kind of leverage is more suitable to select, and are contrary to the market-based leverage. Meyers (1977) indicates that the majority of the managers are actually more focused on book values and specifically in book leverage just because it is argued that the debt in general is better supported by assets in place rather than its own growth opportunities. Moreover, another claim that supports the selection of the book based leverage is that it is generally assumed that the markets are not always following a stabilized trend and most of the times the values that derive from market values are under scepticism and not reliable. Thus, even the market leverage can be considered as unreliable as well.

Considering all the thoughts and concerns above regarding the leverage, for my analysis I will select the book based approach to measure the corporate leverage **(LEV)**. In order to measure this ratio, I will divide the total debt by the total assets of the firm. By saying total debt, I actually imply that it equals to the current liabilities of the firm plus its no current liabilities.

Focusing now on all the independent variables and coefficients, $\boldsymbol{\alpha_i}$ captures and controls for any unobservable effect, such as omitted firm characteristics or CEO characteristics that do not vary within a firm. Furthermore, $\boldsymbol{\alpha_t}$ captures the effect of aggregate "time trends" over the dependent variable. It actually controls for the effect of time-varying variables that are omitted from the model.

Size: The variable Size describes the size of the firm. Apparently, also in this case there are several ways that can be used in order to measure the firm size. However, in my analysis, I will follow the approach of Frank and Goyal (2009) , which measures the size of the firm as the natural logarithm of its total assets. This variable will be used as a control variable in the regression model. Under the Pecking Order Theory, size has an inverse relation with leverage according to Frank and Goyal (2009).

Bus_Risk: This variable stands for the business risk that each firm faces due to its operations. One major risk for instance is the volatility of the earnings. According to many available ratios that can measure the business risk, the Financial Leverage

Effect (FLE) is one of the most known and quantifies the effect of leverage that exists in any firm. The idea behind this, is that considering that the revenues of the firm might vary, inducing more debt in the firm at the same time might increases the returns of the shareholders as well. This can hide a potential risk. In order to construct this ratio, FLE is equal to the operating income (EBIT) of the firm divided by its net income.

Tang: The variable Tang refers to the tangibility of the assets. According to Frank and Goyal (2009), tangible assets such as plant, property and equipment are easier for outsiders to value. In this way they argue that it lowers the expected distress cost. In order to measure the tangibility of the assets, the variable Tang equals to the tangible fixed assets of the firm divided by its total assets.

TaxShields: This variable stands for the non-debt tax shields. As it was stated before in the literature review, the non-debt tax shields are actually one basic pillar of the trade of theory. With those tax shields, one firm can decide about its corporate leverage taking into account and balancing the benefits and costs of getting more corporate leverage. Deangelo and Masulis (1980) show that non-debt tax shields can be used in order one firm to gain tax benefits by debt financing. Frank and Goyal(2009) state that non-debt tax shields can be measured as a ratio of depreciation over the total assets of the firm. This thought is also been supported by Fama and French. They state in their paper that depreciation can also be used as a proxy of non-debt tax shields.(Fama and French, 2000).

Profit : Profitability is the next variable of Eq. (1). It can be derived from the income statement. In order to find the profitability of the firm I have to divide the net income of the firm by its total assets. One can find also profitability expressed as operating income before depreciation.

Liq: Another variable referred to the capital structure is the liquidity of the assets of the firm. Overall, the more liquid assets the firm has, the less the need for external financing. These liquid assets will be used instead of debt. According to De Jong et al (2008) liquidity is defined as total current assets divided by total current liabilities.

M/B: Market to book is an additive independent variable that is used as a proxy of market valuation of the firm. For instance, one firm that have high Market to Book ratio means that this firm is valued higher in the market compared to its book value of its assets, so it is assumed to be overvalued. Whereas, when it has low

Market to Book ratio, it is assumed to be undervalued. The advantage of this variable is that it can potentially be used as a control variable in the model. Apart from that it can also capture the growth opportunities since it is used to account for the influence of equity mispricing (Baker et al 2002). Under the Trade-Off theory, the Market to book it can also be used as a proxy to identify investment opportunities. According to Frank and Goyal (2009) Market to book is expressed as a ratio of the market value of the assets over the book total assets of a firm. Malmendier and Tate (2005) give a more detailed definition in which they state that the Market to Book is the market value of equity plus the short-term debt plus long-term debt plus preferred liquidation value of the stocks minus the deferred taxes divided all by the total assets.

EFWAMB: The last independent variable of capital structure is the *"External Finance Weighted Average Market to Book"*. This variable is introduced in Baker and Wurgler (2002) paper and refers to the Market Timing theory of capital structure. EFWAMB is a weighted average of a firm's past Market to Book ratios (Baker et al. 2002). This weighted ratio is increasing as far as the firms decide to issue debt or equity when they are overvalued (e.g they have high Market to Book ratio) and vice versa. In line with Baker and Wurgler approach, the calculation of the EFWAMB ratio can be derived by Eq. (2) below. For a given firm-year:

$$EFWAMB_{t-1} = \sum_{s=0}^{t-1} \frac{\mathrm{e_s} - \mathrm{d_s}}{\sum_{r=0}^{t-1} e_r - \mathrm{d_r}} * \left(\frac{M}{B}\right)_s \qquad (2)$$

Where r and s indicate the time periods, starting from the first year that the firm appears in the sample. In addition e and d refers to *Net Equity Issues* and *Net Debt Issues* respectively.

Change in Retained Earnings or Newly Retained Earnings (ΔRE): Is defined as the ratio of the change in retained earnings over the total assets of the firm. (Baker and Wurgler 2002)

$$\Delta RE = \frac{\Delta Retained\ Earnings}{Total\ Assets} \qquad (3)$$

Net Equity Issues (e) derives when you subtract the change in balance sheet retained earnings from the change in the book equity, and all this divided by the total assets. (Baker and Wurgler 2002)

$$e = \frac{\Delta Book\ Equity - \Delta Balance\ Sheet\ Retained\ Earnings}{Total\ Assets} \tag{4}$$

Net Debt Issues (d) is calculated by dividing the residual change in assets divided by total assets. Otherwise it can also be calculated shortly as the ratio in which in the nominator is the change in book debt and in the denominator are the total assets. (Baker and Wurgler 2002)

$$d = \frac{\Delta Book\ Debt}{Total\ Assets} \tag{5}$$

Using the EFWAMB as an additive independent variable in the main regression model has also one basic advantage. This ratio is better to be used as a proxy that reveals the historical variations in market valuations, instead of using always lagged market to book ratios. Why is this better? Because using the weighted average it can indicate for each firm in a precise way which lag is that it matters more (Baker and Wurgler 2002).

One other question that might arise is why do I use in the same time both the Market to Book and the EFWAMB as independent variables since the notion behind the construction of those variable are almost the same? This can be explained in a really convincing way by Baker and Wurgler (2002) again. They state that the use of the Market to Book and the EFWAMB variable incorporated within the same regression model at the same time controls for current cross-sectional variations in the Market to Book level. What is been left aside due to this control can be attributed to

the EFWAMB as the residual influence of the past variations of the Market to Book (always talking on a firm level).

. ***Over***: Ultimately, the remaining variables of the regression model, which are also variables of interest, are the overconfident measures. To measure if the CEOs are overconfident empirically shows some difficulties in the first hand due to the fact that it cannot be measured directly. Hence, this variable of interest has a special weight and attention for my analysis. It will be a dummy variable and will take the value 0 if the CEO is classified as less overconfident and the value of 1 if the CEO is classified as overconfident. Barros and da Silveira (2007) in their paper also aim to solve this puzzle of the effect of overconfidence over the capital structure decisions in the Brazilian market. Similarly, they construct a dummy variable which takes the value 1 if the CEO is the founder of the firm and 0 otherwise. However, in order to conduct my research, I will follow the methodological process that Malmendier and Tate (2005) illustrate in their paper regarding the stock option-based overconfident measurements. Specifically, I will construct and induce in my model one of the 3 overconfident measures presented in Malmendier's paper, namely *Holder67*. Indeed, as it is mentioned earlier in the literature review, there are also other measures of overconfidence, like the Net Buyer and Long Holder, however Holder67 measure is widely known and used in other papers. They define CEOs as overconfident if the CEOs hold stock options that are more than 67% in the money. In other words, they classify an CEOs as overconfident, if he/she fails to exercise when the stock price already exceeds the exercise price by more than 67% in the money. Another requirement of this measurement is that the authors also require the CEOs to follow this option holding behavioral pattern at least two times during the sample period. For comparability reasons, due to the fact that a lot of different option packages have different vesting periods, Malmendier and Tate try to normalize this by setting the fifth year as the end of the vesting period (the period that normally the CEOs are not able to exercise their option packages). From this year and on, each CEO, that has an option package in one firm, can exercise his/her stock options. In addition, Campbell et al. (2011) and Murphy (1999), mention in their paper that the American stock options in general have expiration periods of 10 years.

In more detail, in order to construct the overconfident measure Holder67, it is necessary to consider some personal information and extra details regarding the

CEOs. Such details will be retrieved from the Compustat ExecuComp database, as it is described explicitly in the data section.

In addition to the methodological process that is followed by Malmendier and Tate (2005) regarding the Holder67 proxy, I will also use some insights from Campbell et al (2011) paper, which describes more precisely the way that this proxy is being constructed. This paper shows that in order to create this proxy of overconfidence, they indeed try first to calculate the moneyness of the CEOs' portfolio of options each year. Despite the fact that this proxy has small differences with this mentioned in Malmendier and Tate (2005) paper, Campbell et al(2011) shows that this overconfident measure works well. This claim is also been supported by Malmendier et al (2011) by taking into consideration first some other past factors.

Thus, the steps that I have to follow in order to construct the overconfident measurement are being described as follows. First, since I will use the stock option-based measure of overconfidence there is a need to distinct the difference between those stock options that are exercisable and those that are exercised. Mainly, this overconfident measure is taking into account the unexercised exercisable stock options instead of the exercised. In simple words it is focusing on the unexercised stock options, and consecutively takes a look on which of them could have been exercised since they are already in the money and they have been not yet exercised. Hence it is crucial in this point to calculate the moneyness of the stock option packages that each CEO holds and has not exercised them during the years in the sample.

3.2.1 Moneyness (Unexercised stock options)

Campbell et al (2011) mention in their paper that in order to calculate the moneyness of the CEOs' stock option portfolio, it is needed first to estimate *the average exercise price* of the aggregated options. Hence, I will first calculate the *average realizable value per exercisable option* as the *total realizable value of the exercisable options* divided *by the number of exercisable options* (step1). Then, as it follows I have to calculate *the average exercise price of the stock option*. In order to do so, I subtract *the per exercisable option value* that I found in the previous step from the *fiscal year end stock price* (step2). The reason why is because there is no any available information in the database about the exercise prices of the stock options.

Thus, the result that derives, average exercise price, is actually an estimation of the exercise price. Lastly, since I have already calculated the two features above (average realizable value per exercisable option, exercise price) I am able now to calculate the average percent moneyness of the option portfolios which can be derived by dividing the per-option value of the exercisable stock options (calculated in step1) by the average exercise price (calculated in step2).

Since I have constructed a variable that measures the moneyness of each stock option package (unexercised), I am able now to classify an CEO as Overconfident or Less Overconfident. In order to do so, however I have to look on the cutoff point of the 67% in the money of the portfolio as also Hall and Murphy (2002) set this threshold in their analysis. Those CEOs that are below the 67% cutoff are classified as less overconfidence, while those that are above the critical value of 67% in the money are classified as overconfident. Also I have to take into account all the other requirements described in the *holder67* description part ,e.g twice appearance of the same CEO behavioral pattern in the sample and the 5^{th} year as the critical year before of which exercising the options is not allowed.

Over2 : In the same way, I also construct a second variable of overconfidence in order to use this basically for the robustness of the results and for comparability among the first measure. An alternative reason that explains the existence of this variable is the fact that Over2 can potentially capture variations (across the years) that the Over cannot. Probably, by checking the results using the second measure of overconfidence, can bring up some new information. The logic behind the construction of this variable is based on the previous one **(Over).** However, there are some small changes regarding to the restrictions as those required for the construction of the first one. Again here Over2 is a dummy variable which takes the value 1 if the CEO is assumed to be overconfident and 0 if he/she is not. It also holds that for comparability reasons among different option packages that have different time durations with each other, I set as the first year that can be exercisable the year 5 and hence I examine the moneyness of the portfolio packages right after the year five. However the difference between the second **(Over2)** and the first**(Over)** measure here is the fact that a CEO is not classified as overconfident for the whole year sample if he/she, at least two times, fails to exercise his/her options if they are already in the money after the fifth year. Hence, the requirement of twice appearance of this behavioral trait is eliminated. Failing at least once is sufficient. According to Over2, I

inspect year by year the change of his/her behavior. So, Over2 is time-varying dummy variable which actually implies that is more transitory rather than permanent behavioral pattern (as Over is).

To put this in a more simplified way, I will illustrate this by giving an example that can make it easier to understand how those two measures of overconfidence are calculated and what are the differences. Let's assume that we have one CEO whose name is G.K. and he works in company JD. He appears in the sample for 8 consecutive years. From the first year he appear in the sample till the fourth year we know for sure that he cannot exercise his options. From the year five and on I am looking on which years this CEO, failed to exercise his options even though they were already 67% in the money. From what I observe, I see that G.K. failed to exercise his options in year 6 and year 7. Hence, if I want to classify this CEO using the **Over** measure, since I observed that he already failed twice to exercise after the 5^{th} year, I classify him as overconfident (**Over=1**) for the whole years he appears in the sample (from year 1 to 8). Whereas, if I use the **Over2** measure**,** due to the nature of this variable described above, I am classifying him as overconfident (Over2=1) only for those years that he failed to exercise when the options were above the 67% moneyness threshold. For the rest of the years (years 5 and 8) **Over2** takes the value 0. Arguably, I can see in detail the change of the behavioral pattern using Over2 in the regression model instead of using the Over.

By calculating these overconfidence measures, and incorporating them in the main model, then I am able to run the regression and derive results.

3.3 Testing for each Capital Structure Theory

In this part I will describe the way that I will follow in order to explore and test for each of the three capital structure theories that were presented above, based on empirical predictions and formatted sub-hypotheses in Sections (2) & (3.1) respectively. As it was implicitly stated before, in order to do so, I will apply the basic regression model for each theory with one key difference. Here, apart from the main model, I incorporate also interaction terms between each theory's variables of interest with the overconfidence measures, namely **Over** and **Over2** each time**.** Thus, I am

able in this way to observe the sensitivity of those interaction variables with book leverage and bring up a more detailed analysis for each independent variable over the dependent one. For practical matters, I illustrate below briefly those regression models for each capital structure theory and for each overconfidence measure. The results, will be explained later on the regression analysis part.

3.3.1 Testing for Trade-Off Theory

Using the first measure of overconfidence, the regression including interaction terms is:

$$LEV_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Bus\_Risk \times Over_{i,t-1} + \beta_3 ND\_TaxShield \times Over_{i,t-1} + \beta_4 Tang \times Over_{i,t-1} + \beta_5 Profit_{i,t-1} + \beta_6 Liq_{i,t-1} + \beta_7 M/B_{i,t-1} + \beta_8 EFWAMB_{i,t-1} + \beta_9 Bus\_Risk_{i,t-1} + \beta_{10} ND\_TaxShield_{i,t-1} + \beta_{11} Tang_{i,t-1} + \varepsilon \quad (6)$$

Using the second measure of overconfidence, the regression including interaction terms is:

$$LEV_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Bus\_Risk \times Over2_{i,t-1} + \beta_3 ND\_TaxShield \times Over2_{i,t-1} + \beta_4 Tang \times Over2_{i,t-1} + \beta_5 Profit_{i,t-1} + \beta_6 Liq_{i,t-1} + \beta_7 M/B_{i,t-1} + \beta_8 EFWAMB_{i,t-1} + \beta_9 Bus\_Risk_{i,t-1} + \beta_{10} ND\_TaxShield_{i,t-1} + \beta_{11} Tang_{i,t-1} + \varepsilon \quad (7)$$

3.3.2 Testing for Pecking Order Theory

Using the first measure of overconfidence the regression including interaction terms is:

$$LEV_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Bus\_Risk_{i,t-1} + \beta_3 ND\_TaxShield_{i,t-1} + \beta_4 Tang \times Over_{i,t-1} + \beta_5 Profit \times Over_{i,t-1} + \beta_6 Liq \times Over_{i,t-1} + \beta_7 M/B_{i,t-1} + \beta_8 EFWAMB_{i,t-1} + \beta_9 Tang_{i,t-1} + \beta_{10} Profit_{i,t-1} + \beta_{11} Liq_{i,t-1} + \varepsilon \quad (8)$$

Using the second measure of overconfidence, the regression including interaction terms is:

$$LEV_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Bus\_Risk_{i,t-1} + \beta_3 ND\_TaxShield_{i,t-1} + \beta_4 Tang \times Over2_{i,t-1} + \beta_5 Profit \times Over2_{i,t-1} + \beta_6 Liq \times Over2_{i,t-1} + \beta_7 M/B_{i,t-1} + \beta_8 EFWAMB_{i,t-1} + + \beta_9 Tang_{i,t-1} + \beta_{10} Profit_{i,t-1} + \beta_{11} Liq_{i,t-1} + \varepsilon \quad (9)$$

3.3.3 Testing for Market Timing Theory

Using the first measure of overconfidence the regression including interaction terms is:

$$LEV_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Bus\_Risk_{i,t-1} + \beta_3 ND\_TaxShield_{i,t-1} + \beta_4 Tang_{i,t-1} + \beta_5 Profit_{i,t-1} + \beta_6 Liq_{i,t-1} + \beta_7 M/B \times Over_{i,t-1} + \beta_8 EFWAMB \times Over_{i,t-1} + \beta_9 M/B_{i,t-1} + \beta_{10} EFWAMB_{i,t-1} + \varepsilon \quad (10)$$

Using the second measure of overconfidence, the regression including interaction terms is:

$$LEV_{i,t} = \beta_0 + \beta_1 Size_{i,t-1} + \beta_2 Bus\_Risk_{i,t-1} + \beta_3 ND\_TaxShield_{i,t-1} + \beta_4 Tang_{i,t-1} + \beta_5 Profit_{i,t-1} + \beta_6 Liq_{i,t-1} + \beta_7 M/B \times Over2_{i,t-1} + \beta_8 EFWAMB \times Over2_{i,t-1} + \beta_9 M/B_{i,t-1} + \beta_{10} EFWAMB_{i,t-1} + \varepsilon \quad (11)$$

4. Data Sample

4.1 Sample

In this section, I am stating all the necessary information and limitations that are considered regarding the formation of the data set that will be used for my quantitative analysis. Such limitations and criterions are assumed to be valid and robust since they have already been implemented in recent published research papers that I am taking some insights from. In the majority of the cases, one basic reason that such limitations exist, when a research is conducted, is the fact that a dataset can be negatively influenced by some observations that their values are distant from the values of other observations within the same set. These kinds of observations are generally called outliers and can be existent even due to the variability of the measurement of their values by different institutions or accounting procedures or due to mistakes. Thus, it is highly recommended these types of outliers to be excluded from the dataset.

In order to conduct the data analysis of this thesis paper, I downloaded the necessary data from two basic databases. I used the Compustat-IQ Capital database in order to get all the information that is needed for the capital structure of the firms(income statement and balance sheet items) and also the Compustat-ExecuComp

database from which I downloaded all the necessary features regarding the construction of the option- holding based measures of CEO's Overconfidence . Compustat- ExecuComp is a unique database which includes several stock option compensation features referred to more than 12.500 executives who operate in public listed firms in the US market. Both databases can be reached via the Wharton Research Data Services (WRDS).

In detail, this research topic is mainly focused on public listed firms of the US market and the time period of the data sample starts from the year 1992 till 2015. The reason that explains why the time period starts from 1992 is simply because of the availability of the data required for measuring the CEO Overconfidence. Compustat-Execucomp manual guide indicates that the data is available from 1992 and onwards. Overall, for comparability and computating reasons, all the required data (eg capital structure variables, market timing variables and overconfidence variables) should start from 1992 and on. Additionally, all the values are expressed annually.

It is important here to mention that a hierarchy of steps should be followed in order to form a valid and complete dataset. Hence, I first start to create an initial main dataset which refers to the construction of the variables of Pecking Order Theory, Trade-Off Theory and Market Timing of the existing public listed firms. Then I construct the last sub-dataset of the overconfidence measures which highly linked on the firms that result from the previous main dataset of capital structure.

By analyzing the previous paragraph in more detail, I first downloaded all the necessary balance sheet items, for all the available corporations in the database, that are needed to create the variables stated in the methodology section, for each capital structure theory. Hence, I initially find information for 29.782 corporations in total. As we can clearly understand we have to apply some restrictions to this big dataset. Hence, I exclude from my dataset all the Financial, Insurance and Real Estate companies with SIC codes lying between 6000 and 6999. Another way to detect and exclude such companies is by observing their industrial format flag (FS) provided thankfully from Compustat. The exclusion of all the Financial-Insurance-Real Estate firms reduces the sample to 21.033 firms. The exclusion of this type of companies is also supported from other related research papers such as Frank and Goyal (2009) and Baker and Wurgler (2002).

Moreover, I exclude all those firm-year observations that have missing values in some main variables. For instance, I exclude from the sample all these observations

that have missing values in Total Assets and in the Closing Price-Annual of the shares. Total Assets and Closing price are variables that are really important for the calculation of many of the other variables that are used in the regression model and hence it is crucial to exclude cases that have missing values. Frank and Goyal(2009) and Baker and Wurgler (2002) also follow the same procedure since they exclude in both research papers all these firm-year observations that have missing values in the book value of the assets. Consecutively, I also drop any other firm-year observation that has missing value either in its total Current Assets or in its Deferred Taxes derived from its balance sheet. Last but not least, I exclude also those firm-year observations that have missing values on the Convertible Bonds they hold in their balance sheet. I am doing so, because Convertible Bonds are highly important for the calculation of the Book Equity variable and consecutively for the Book Leverage which is the depended variable of the main regression model. Taking into consideration all the above limitations and exclusions, I observe that the number of the firms reduced from 21.033 to 18.238 unique firms.

On the other hand, apart from the missing values that someone can inspect in a dataset, I also have to be concerned about any potential outliers. For example, Brown et. al (2007) in their paper state that academics and practitioners generally exclude from their analysis any negative Book Equity stock. The reason why can be explained either because negative Book Equity is difficult to be interpreted or because their omission should have an insignificant effect in any data application. Hence, following this guideline, I also exclude all those firm-year observations that have negative book values assuming that they are outliers. Additionally, according to Baker and Wurgler (2002), they exclude from their dataset all these firm-year observation that have Book Leverage above one. This is really important for the rest of the analysis since it is feasible in this way to exclude such outliers, which could bias the results, since Book Leverage is the dependent variable. In simple words, Book Leverage above one means that the public listed firm has more Book Debt than its Total Assets, something that is not sufficient for listed firms.

Moreover, I exclude firm-year observations that have market-to-book values above ten. Baker and Wurgler (2002) are doing so as well in their paper, assuming that these firms that have market-to-book above ten can be outliers. By considering all the above omissions from the sample regarding the outliers, I notice that the number of the firms drops by 1.232 firms.

Regarding the Market Timing Theory of Capital Structure, there are also some limitations that should be taken into account. First of all Baker and Wurgler (2002) argue in their paper that for purposes of computing the External Finance Weighted Average market-to-book (EFWAMB), they set as the minimum weight to zero. The reason why they are doing so is to ensure that they indeed are forming a weighted average variable. Otherwise the weights might decreasing in the total amount of external finance raised for each period. Furthermore, they exclude from their sample all those firm-year observations that have EFWAMB values above 10 as they did as well also for the un-weighted market-to-book variable. Hence, by excluding all those firm-year observations that have EFWAMB above ten and substituting zero in any case that I observe a negative weight, then the remaining US-listed companies in my data sample that have all the required information to construct the variables of interest of the three main theories of capital structure are 17.006.

Since I have created now a full dataset of all the non-financial firms in the US that fulfill all the requirements mentioned above, I am searching through the Compustat-Execucomp database in order to gain all the required data regarding the executive compensation for the firms they appear in the full dataset. Hence, i am able in this way to classify an CEO executive as overconfident or non-overconfident. However, before classifying a CEO, I have first to point out in this case also some restrictions and limitations that should be taken into account. Starting with, based on the number of the firms (17.006 unique firms) which are included in the whole dataset stated above, I find stock option compensation details only for 2.877 firms (among the 17.006 firms) and 38.539 firm executives in total. This number of different executives refers to CEOs, CROs, CFOs and other firm directors. Nevertheless, since the main research interest of this thesis topic is regarded to the influence of the CEOs decisions on the capital structure of a corporation, then I keep only these observations that deal with CEOs. This results to 6.277 different CEOs for 2.877 different firms. For computing and calculating reasons, I exclude from the sample all those firm-executive-year observations that have missing values in the annual shares closing price as I did previously again. The reason that I am doing so, is because the closing price is really important as a variable for the calculation of the estimate of the exercise price of the stock options. Otherwise, if I don't do so, then I will have CEOs that cannot be classified and hence I will lead to incorrect classifications.

Moreover, according to Malmendier and Tate(2005) and Campbell et al.(2011) I have to process into some other omissions regarding the moneyness of the CEOs portfolios. Thereby, I exclude from the sample all those CEOs that have no options at all during the years they are present in the sample period (Campbell, 2011). The results indicate that among the 6.277 different CEOs, only 775 CEOs have no options at all. So, I exclude them from the sample. Moreover, in order to be able to compare each option package with the vesting periods of different time periods, I set the first year which all the option packages can be exercisable as the year five (Malmendier and Tate,2005). Thus, I keep only those CEOs that appear in the sample at least five years. This omission reduces my sample to 2.577 unique CEOs.

Lastly, following the methodological procedure of other related research papers regarding the classification of a CEO , I exclude from the sample all those CEOs that have all of their options out of the money for all the years that they appear in the sample period of the dataset. By saying *"out of the money"* , means that the stock price in the fiscal year end do not exceeds the exercise price of the option. In addition, due to the restricted data availability, as it was described in the methodology section, I make an estimation of the exercise price of the stock options, based on the closing stock price (annual) and the realized value per unexercised option since exercise prices are not included in the database. Considering all the omissions mentioned above regarding the overconfident measure (*Holder 67*) dataset, it results to a sub-dataset of 2.574 different CEOs that operate in 1.938 different companies.

Overall, after the merging of the sub-dataset of overconfident measure and the main dataset of capital structure, a final dataset results that will be used for the regression analysis. This dataset includes 1.757 non-identical companies and 2.217 different CEOs.

4.2 Reliability

Due to the fact that I use a statistical program rather than a simple excel analysis, I consider that the results and the available data are valid. One basic advantage of this program is the fact that I can do the analysis through a "*black box*" that derives and works in the same time with the program. So, I can inspect and check

any time any step that I follow so that I can do any necessary corrections immediately. However, apart from the use of the well-used program by academics, I also try to ensure that the data that are included in the sample are valid and robust. Hence, I cross-check for several companies of the dataset, their balance sheet and income statement items through the website of US Securities and Exchange Commission (EDGAR: www.sec.gov). This website provides many details about all the US-listed companies and other entity types. So, I can see through its own database many details regarding the companies that I am interested in. By selecting a random sample of firms that are involved in my final dataset, I cross-check their accounting details through their published income statements and balance sheets. The result of this search is positive. All of the firms' balance sheet features that are shown in my dataset are matching precisely with the features stated in the published balance sheets. So, this cross-checking of the data features ensures that all the information that is available for analysis is reliable and valid.

4.3 Summary Statistics

Table 1: Descriptive Statistics of the sample.

VARIABLES	(1) N	(2) mean	(3) sd	(4) min	(5) max
Over	15,585	0.427	0.495	0	1
Over2	7,725	0.334	0.472	0	1
Book_Leverage	15,585	0.465	0.196	0.012	1.000
Total_Assets	15,585	7.369	1.594	1.575	12.91
Business_Risk	15,544	1.788	25.47	-1,773	1,710
TaxShields	15,466	0.049	0.036	0.001	1.450
Tangibility	15,580	0.327	0.238	0.000	0.979
Liquidity	15,585	2.309	2.129	0.090	57.61
Profit	15,585	0.036	0.160	-4.753	11
Market_to_Book	15,585	1.490	1.088	-0.078	9.941
EFWAMB	15,585	4.249	2.400	0	9.999

Table 1 provides summary statistics of all US public listed firms that are included in the final dataset. As we can clearly see from this table 1, regarding the dependent variable of the regression model, the firms have on average a Book Leverage ratio nearly to 46%. Moreover, we can indicate that the standard deviation

of this variable is nearly 20%, something that implies that in some cases the book leverage deviates ± 0.2 from the mean. On the other hand, looking on the other variable of interest, Over, the summary statistics of the above table illustrates that nearly 43% of the observations in the sample have a value of 1, something that implies in this case that they are assumed to be overconfident. In real terms, by looking through all the different CEOs in the sample, I observe that among the 2.217 non-identical CEOs, 782 of them are assumed to be overconfident, whereas 1.435 are not. Additionally, looking on the second measure of overconfidence, Over2, the results of the summary table indicate that almost 33% of the cases are overconfident. One remark here that I have to point out is the fact that we see the number of the total observations regarding the second measure of overconfidence are reduced by half. This is reasonable due to the methodological process that is followed in order to construct this variable. To clarify this, the basic reason that explains why there is such a reduce on the total observations of Over2, is the fact that only firm-year-CEO observations stated after the 5^{th} year are taken into account in order to classify an CEO as overconfident or not. Comparing this with the first measure of overconfidence, it allows to capture the behavioral pattern of the CEO in a year by year basis, whereas the first measure of overconfidence assumes that since the CEO is at least twice overconfident after the fifth year , then he is overconfident for all the years he/she appears in the sample. The reason why I create a second measure of overconfidence, as it was explained in the methodological process again, is the fact I am able in this way to compare the results between the two measures and make thus some robustness checks. With this overconfident measure I can detect the behavior of the CEOs, year by year, as a time-varying behavioral pattern (variable). Hence, in this way I expect to capture some extra information that the initial overconfident measure cannot.

For the rest of the variables that are incorporated into the three different capital structure theories, namely Pecking Order Theory, Trade-Off Theory and Market Timing, are all illustrated in the table above.

5. Empirical Results

In this section I am providing all the results accruing from the panel regressions. I am starting from testing my main research question and hypothesis applying Eq. (1) and then I proceed to test for the sub-hypotheses that refer to each of the three capital structure theories using the models stated in section 3.3.

5.1 Testing the main research question

Table 2:This table illustrates the results from the Panel regressions of the main regression model-Eq.(1). Leverage ratio has been used as the dependent and as independent variables are used all the variables of interest for each capital structure theory. Both overconfident measures are dummy variables. Models (1) & (3) are incorporating the 1st measure of overconfidence (Over) whereas Models (2) & (4) are incorporating the 2nd measure of overconfidence (Over2). Across all models firm fixed effects have been implemented. Models (3) & (4) also examines additionally for year fixed effects. The sample period starts from 1992 till 2015 and refers to the US market. The description of the independent variables of Eq. (1), are presented in methodology section (3.2).

	(1)	(2)	(3)	(4)
Total_Assets(-1)	-0.008***	-0.014***	-0.016***	-0.022***
	(3.87)	(3.60)	(6.86)	(5.31)
Business_Risk(-1)	-0.000	-0.000	-0.000	-0.000
	(1.59)	(0.62)	(1.56)	(0.32)
TaxShields(-1)	-0.008	0.313***	-0.056	0.222**
	(0.15)	(3.03)	(1.14)	(2.17)
Tangibility(-1)	0.019	-0.010	0.012	-0.030
	(1.29)	(0.41)	(0.79)	(1.23)
Liquidity(-1)	-0.011***	-0.010***	-0.011***	-0.009***
	(16.48)	(9.02)	(15.78)	(8.59)
Profit(-1)	-0.088***	-0.099***	-0.098***	-0.112***
	(9.56)	(5.62)	(10.64)	(6.44)
Market_to_Book(-1)	-0.013***	-0.014***	-0.016***	-0.019***
	(8.89)	(4.78)	(11.31)	(6.55)
EFWAMB(-1)	0.007***	0.011***	0.005***	0.009***
	(7.27)	(5.03)	(4.25)	(3.57)
Over(-1)	0.003		0.004	
	(0.85)		(1.25)	
Over2(-1)		-0.006*		-0.009***
		(1.78)		(2.64)
Constant	0.538***	0.559***	0.609***	0.653***
	(33.07)	(18.31)	(30.68)	(18.58)
Adjusted R^2	0.05	0.05	0.09	0.10
N	13,114	5,889	13,114	5,889
Firm Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	NO	NO	YES	YES

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Table 2 above provides the results of the estimates of the regressions needed in order to test for the main hypothesis and research question of this paper. To restate here, the null hypothesis *(H1)* of the main research question is that firms that are managed by overconfident CEOs, will decide to finance their capital structure with more debt compared to those CEOs who are not overconfident.

In order to test for this hypothesis I applied the main regression model which incorporates all the variables that are specified by existing literature for each of the three capital structure theories, namely Trade-Off Theory, Pecking Order Theory and Market Timing. Apart from testing the main hypothesis, I can also find in the same time which leverage determinants do matter through this analysis. Also for robustness reasons, I differentiate the models by including the second measure of overconfidence, apart from the first one, which is presented in models (2) & (4).

In the table above, I apply firm fixed effects in all the regression models (from model (1) through (4)). Firm fixed effects are able to reveal the true relationship between the dependent variable and all the variables of interest within an entity, where in this particular case is the firm. The reason why I decided to use firm fixed effects is that I can investigate and analyze the impact of the independent variables to the leverage ratio that vary over time. Probably, there might be something within the firm that affects the leverage ratio and it is needed to control for this. So the resulting coefficients of the firm fixed effects are assumed to be unbiased since the time invariant characteristics are omitted. Moreover, in models (3) & (4) I apply year fixed effects additionally in order to capture the influence of aggregate "time trends". My decision of applying year fixed effects is supported by the results of an F-test that I checked in which I reject the null hypothesis that the coefficients for all the years in the sample are jointly equal to zero and this indicates year fixed effects are needed.

In detail, from the results of table 2 we see initially that using the first measure of overconfidence (Over), in models (1) & (3), business risk has a negligible negative impact over the leverage ratio. This is in line with the empirical predictions of the Trade-Off Theory which predict a negative relation between the business risk and leverage ratio. One remark here is that this coefficient is statistically insignificant. Titman and Wessel (1988), in their paper, even though they are expecting the same negative relation between those two variables, indeed what they find is that business risk is statistical non significant as well.

Non Debt Tax Shields coefficient has a negative sign which is aligned with the predictions of existing literature regarding the Trade-Off Theory (De Angelo and Masulis,1980). When I apply year fixed effects I observe that the effect of the Non Debt Tax Shields becomes more negative.

The tangibility of the assets coefficient has a positive relation with the leverage ratio. In model (1) a one standard deviation shift in the tangibility of the assets is associated with a shift of almost 2% of one standard deviation of the leverage ratio of the firm, whereas in model (3) the shift is smaller (1%). The sign is positive as it was initially expected from the existing literature. The more tangible assets the firm has, the more able this firm is to pursue more debt since it use its assets as collaterals in order to get more debt by the lenders. Thus, even though that the coefficients are not significant, the signs of the coefficients are in line with the predictions of the Trade-Off Theory.

Next, regarding Pecking Order Theory, I describe liquidity, tangibility and profitability effect on leverage. I observe a negative relation of liquidity and profitability with the leverage ratio. Combining this with the positive sign of the tangibility of the assets, it is proven that these results are in line with the empirical predictions of the Pecking Order Theory. In addition, in both model (1) and model (3) the coefficients of liquidity and profitability are all highly statistically significant on a percentage level of 99%. A one standard deviation shift in liquidity is associated with a decline of 1% of one standard deviation of the leverage ratio in both models (1) & (3). In the same way, profitability can be analyzed. If the profitability of the firm increases then the leverage ratio decreases due to the fact that the more profitable the firm becomes, the more adequate internal funds it has in order to finance its corporate structure, and hence it will decrease the external financing.

Consecutively, going to the variables of the last capital structure theory, Market Timing, I observe that the coefficient of the current market-to-book has a negative relation as the Market Timing Theory predicts and is statistically significant on a percentage level of 95% for both models (1) & (3). However, the relation of the EFWAMB with the leverage ratio is positive. This is contrary to the Market-Timing Theory predictions which they find a negative relation. The positive relation of the EFWAMB with leverage ratio, eventually, can be explained through different ways. For instance, if we assume that the Pecking Order Theory is a more prevalent capital structure theory, as the results of table 2 reveals, then the companies may issue first

debt rather than equity if internal funds are not adequate, as the Pecking Order Theory implies. Moreover, the current market-to-book ratio is getting higher when there are good investment opportunities (Myers,1977). Taking these two into account, it is reasonable to say that a higher EFWAMB is caused by more debt issues rather than equity issues and hence the predictor of Baker and Wurgler (Eq.(2)) will wrongly predict for equity Market Timing. Additionally, another reason that explains this positive sign contrary to existing literature predictions is the fact that the influence of EFWAMB on leverage ratio might alternate in terms of significance or even the sign might switch over time. Pecking Order Theory may change over time for different firms, and this is subject to the relative cost of each type of funding (Huang and Ritter, 2004). For example, if the cost of issuing equity is relatively low, then firms will immediately turn to external financing rather than using their internal. Hence, under the Pecking Order Theory the positive sign of EFWAMB can be explained.

The coefficient of size of the firms, which is measured by the natural logarithm of their total assets, has a negative sign in both models (1) & (3). In other words, the bigger the firm is, the smaller leverage ratio it has and vice versa. One potential explanation for this negative relation can be that smaller firms can get more debt through banks for the reason that they need less capital for their operations. Banks then might not hesitate to provide them with a loan even though that in some certain cases this can be risky. Frank and Goyal (2009), also supports that if Pecking Order Theory is more prevalent, they find a negative relation of size-leverage as well.

Lastly, I am focusing on the main variable of interest which is the first measure of overconfidence. In detail, looking on the results of table 2, models (1) & (3) reveals that there is a positive relation between overconfidence and leverage ratio. Hence, I am able in this point here to answer the main research question of this study and accept the null hypothesis *(H1)* that firms that are managed by overconfident CEOs, decide to finance their capital structure with more debt, compared to other firms that are managed by not overconfident CEOs. Hackbarth (2009) is also supporting this result in his paper and argues that overconfident managers generally believe that the firm they manage is less likely to experience a financial distress. Thus, they are underestimating the cost of bankruptcy cost and they will proceed into debt financing in order to gain any tax benefit or any other benefit resulting from higher leverage.

On the other hand, looking on the results of the regression models (2)&(4), which refer to the second measure of overconfidence (Over2), I observe different results. Starting with, the coefficient of the business risk has still a negligible negative effect on book leverage and the coefficient is statistically insignificant. This implies again that probably there is no a significant effect of business risk on book leverage and this is in line with the findings of Titman and Wessels (1988).

In contrast, comparing the results with models (1)&(3), the coefficient of the non-debt tax shields have a significant impact on leverage on a 99% and 95% significance interval for models (2)&(4) respectively. However, the sign of this coefficient is not negative any more. From a behavioral perspective, firms that are managed by overconfident CEOs might lead to decisions that increase the debt capacity of the firm. Scott (1977) and Moore (1986) argue that the higher the non-debt tax shields the firm has, the higher debt levels can induced due to the fact that higher non-debt tax shields can operate as collaterals. This can be a possible explanation of why there is a positive effect of non-debt tax shields over the book leverage.

Similarly, also the coefficients of the tangibility of the assets switch their signs from positive to negative and they are statistically significant. This result is against the predictions of the Trade-Off Theory, however in the Pecking Order Theory this result can be elaborated. Probably, firms that are characterized by high tangibility of the assets may depend more on internal funds which derive from the cash flows of the firm. This thought is also been supported by Frank and Goyal (2009) where they state that under the Pecking Order Theory the sign of tangibility might turn to negative. Low information asymmetry incorporating with the tangibility of the assets might make the equity issue less costly and thus equity is preferred (Frank and Goyal, 2009).

Additionally, the coefficient of liquidity has still a negative sing in both models (2)&(4) and is statistically significant. The same hold true also for profitability. It has a negative effect over book leverage and it is statistically significant in both models on a 99% level. Again, here looking on the signs of tangibility, liquidity and profitability, I can conclude that using the second measure of overconfidence in the models, the Pecking Order Theory seems to be supported by these results.

Regarding the current market-to-book coefficient, the results show that it has a negative effect on book leverage and this is aligned with the empirical predictions discussed above. However, again the EFWAMB effect on book leverage still remains positive and statistically significant. This positive effect is against the predictions of Market Timing Theory. Probably this indicates that firms might prefer issuing more debt rather than equity.

Ultimately, regarding the main variable of interest, Over2, the results show that CEO overconfidence has a negative effect on book leverage and it is statistically significant on 90% and 99% level for models (2)&(4) respectively. This result initially is not in favour of the empirical predictions mentioned above about the relation of overconfidence and leverage. However, due to the nature of the calculation of this variable (time-varying overconfidence), this result might provide us with different information about CEOs that the first measure of overconfidence cannot capture. As a quick remainder the first measure of overconfidence classifies an CEO as overconfident for the whole period he/she exists in the sample if he presents a behavioral trait for at least two times in the sample period. On the other hand, the second measure of overconfidence (Over2) even though it is similar to the first one, however it captures differences on the behavioral traits of a CEO for each year. So this measure can be expressed as a time-varying overconfidence measure.

Graham (2000) shows conservative debt policies lead firms to leave money on the table. But how is this prediction related to the negative effect of overconfidence over the book leverage? In order to answer, I need first to restate some information.

Again, overconfident CEOs according to psychological evidence are assumed to be those one that overestimate their skills and predictions about future outcomes that will derive for the time period they manage their firm. Usually, they overestimate the investment returns of their investment decisions. Under the *(H1)* hypothesis, overconfident CEOs tend to finance the structure of the firm with more leverage rather than equity. However, empirical studies show that overconfidence is not only trying to predict which financial instruments are better for financing (debt vs equity), but also can predict if internal funding is better than external (Malmendier et al., 2011). Probably, the negative effect of the time-variant measure of overconfidence can be attributed to debt conservatism. Debt conservatism implies that overconfident CEOs are more reluctant into selecting debt for financing their plans. Malmendier et al (2011) in their paper are taking into account that there is indeed a variation on the

ways that each CEO decides to finance his/her firm structure due to the fact that there is a variation on behavioral traits caused by past experiences. Consecutively, those past experiences can affect the CEO's behavior either by changing his/her beliefs or by changing preferences Malmendier et al (2011).

Looking through the years of the data sample, starting from 1992 till 2015, it is widely understood that macroeconomic exogenous shocks occurred. For instance, one major one was the word financial crisis between 2007-2009. Undoubtedly, this state had a significant impact on the firms' financial policies as well as on the behavioral traits of the firms' CEOs and also influenced the following policies right after the depression period. Empirical evidences show that individuals in general, after the experience of a financial crisis, tend to avoid from participating into financial markets. Over2 variable is able to capture those variations on CEOs behavior through the years and also after the world financial crisis.

As it is argued above, overconfident CEOs tend to overestimate the future returns of their investment, and this is obvious most of the times since we observe overinvestment practices. However, overconfidence can also lead, apart from overestimation, to misperception of the cost of external financing (Malmendier et al, 2011). Combining those two anomalies caused by overconfidence, overconfident CEOs avoid external financing and invest only on limited riskless debt finance if the cost of external finance is higher than the future investment returns. Hence, this decision can lead to a sufficient lower levels of debt financing ignoring the potential available tax benefits (Malmendier et al, 2011).Moreover, they state in the paper that CEOs experienced early in life a shock like the great depression in 30s, they prefer more self-sufficiency which means that they prefer to finance their investment decisions using first internal funds. This is a way that debt conservatism from above can be explained, taking into account overconfidence, and consecutively can explain the negative relation between overconfidence and leverage ratio in models (2)&(4).

5.2 Testing for the sub-hypotheses of each capital structure theory

5.2.1 Testing for the Trade-Off Theory Sub-hypotheses

Table 3 below provides the coefficient estimates of the regression models incorporating interaction terms between the variables of interest of Trade-Off Theory

Table 3: This table provides the estimates of an Panel regression using the Leverage ratio as the dependent variable of Eq. (1). In this table interaction terms have been used in order to see the sensitivity of 3 main variables of interests of the Trade-Off Theory with the leverage when the CEO is overconfident. Models (1) & (3) incorporate the 1st measure of overconfidence (Over), while Models (2) & (4) incorporate the 2nd measure of overconfidence (Over2). Across all models firm fixed effects have been implemented. Models (3) & (4) examines additionally for year fixed effects. The variables of interest here are Business Risk, Non Debt Tax Shields and Tangibility. The description of the independent variables of Eq. (6) & (7), are presented in methodology section.

	(1)	(2)	(3)	(4)
Total_Assets(-1)	-0.008***	-0.014***	-0.015***	-0.023***
	(3.72)	(3.74)	(6.74)	(5.44)
Business_Risk(-1)	-0.000	-0.000	-0.000	-0.000
	(1.11)	(0.83)	(1.25)	(0.54)
TaxShields(-1)	-0.124**	0.283***	-0.163***	0.193*
	(2.22)	(2.58)	(2.95)	(1.79)
Tangibility(-1)	0.047***	0.009	0.038**	-0.012
	(3.01)	(0.36)	(2.39)	(0.47)
Liquidity(-1)	-0.011***	-0.010***	-0.011***	-0.009***
	(16.47)	(9.17)	(15.74)	(8.69)
Profit(-1)	-0.093***	-0.099***	-0.102***	-0.113***
	(10.00)	(5.66)	(11.04)	(6.52)
Market_to_Book(-1)	-0.013***	-0.015***	-0.016***	-0.019***
	(8.79)	(5.12)	(11.22)	(6.84)
EFWAMB(-1)	0.006***	0.011***	0.005***	0.009***
	(7.23)	(5.06)	(4.19)	(3.56)
Over(-1)	0.013**		0.013**	
	(2.03)		(2.03)	
(Over× Business_Risk) (-1)	-0.000		0.000	
	(0.07)		(0.18)	
(Over × TaxShields) (-1)	0.376***		0.353***	
	(4.34)		(4.12)	
(Over× Tangibility) (-1)	-0.080***		-0.073***	
	(5.65)		(5.18)	
Over2(-1)		0.015**		0.010
		(2.26)		(1.45)
(Over2 × Business_Risk) (-1)		0.000		0.000
		(0.08)		(0.08)
(Over2 × TaxShields) (-1)		0.048		0.062
		(0.38)		(0.50)
(Over2×Tangibility) (-1)		-0.069***		-0.063***
		(4.75)		(4.39)
Constant	0.531***	0.559***	0.602***	0.652***
	(32.47)	(18.33)	(30.21)	(18.55)
Adjusted R^2	0.06	0.06	0.09	0.10
N	13,114	5,889	13,114	5,889
Firm Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	NO	NO	YES	YES

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

and overconfidence. Having a quick view over the results, I can see that the sensitivities of the variables of interest are not all at the same time in favour of the empirical predictions for Trade-Off Theory. In detail, beginning with the first measure of overconfidence (Over) in models (1)&(3), I observe that still the coefficient of business risk is has still negligible negative effect on book leverage .The interaction term implies that firms that are managed by overconfident CEOs present a lower sensitivity of leverage to business risk. That means that if a CEO is indeed overconfident, the effect of business risk tends to be even more negative. This is in line with empirical predictions of Trade-Off Theory, even though the coefficient is insignificant. This finding is also been supported by Titman and Wessels (1988) where they find a negative relation between leverage ratio and business risk and the coefficient is insignificant.

In the same logic, regarding the second measure of overconfidence (Over2), I observe the same pattern. Still the coefficient of business risk has a negligible negative effect on book leverage however it is not statistically significant and incorporating the effect of the interaction term over the business risk coefficient the sign does not change and remains negative. Looking from the perspective of both overconfident measures, the results support the H2 sub-hypothesis.

Next, regarding the next variable of interest, non-debt tax shields, the results demonstrate that all the coefficients are statistically significant on a 99% confidence level apart from model (1) and model (4) which is significant on a 95% and 90% confidence level, respectively. Analytically, for the first measure of overconfidence I see that in both models (1)& (3), firms that are managed by overconfident CEOs, exhibit a higher sensitivity of leverage to non-debt tax shields. This higher sensitivity can lead on both regression models to a change of the sign from negative to positive. This actually means that if firms are managed by overconfident CEOs (model (1)), a one standard deviation shift on the interaction term between non debt tax shields and overconfidence, is associated with a shift of 25% of one standard deviation of the leverage ratio of the firm, whereas in model (3), the overall effect of non debt tax shields on leverage is barely 20%. This can be explained probably by the fact that overconfident CEOs might have a target of higher debt capacity and consecutively higher non-debt tax shields. In this case, Moore (1986) argues that higher non-debt tax shields can act as attractive collateral and hence it can induce higher debt levels.

In other terms, overconfident CEOs might think that by financing their corporate structure with more debt, this may offset the non-debt tax shields, under the Trade-Off Theory. Accordingly, also for the second measure of overconfidence (models (2)&(4)), I observe a higher sensitivity of leverage to non-debt tax shields for firms that are managed by overconfident CEOs. This interaction, even though it is statistically insignificant, leads to a positive relation between non-debt tax shields and leverage. Hence, I am rejecting the H3 especially for the case of the first measure of overconfidence, while for the second measure, the results do not provide a meaningful and statistically significant explanation.

Lastly, regarding the last variable of interest, tangibility, in models (1)&(3) I observe that taking into account the effect of the interaction term between tangibility of the assets and overconfidence, the overall effect of tangibility over leverage changes sign from significantly positive to negative. In model (1), if firms are managed by overconfident CEOs, a one standard deviation increase of the interaction term is regarded to a decrease of 3.3% of one standard deviation of the leverage ratio. In model (3), the overall effect of tangibility of the assets on leverage if the firms are managed by overconfident CEOs is -3.5%. The same change in signs from positive to negative holds true also for models (2)&(4). For example, in model 2, if it assumed that the firms are managed by overconfident CEOs, a one standard deviation increase of the interaction term is associated with a decline by almost 6% of one standard deviation of firm's leverage ratio. Remarkably, looking on the significance of the interaction terms of overconfidence with tangibility of the assets, for both measures of overconfidence, the results reveals that they are all statistically significant on a 99% level. This shows that this effect of the interaction terms is strong over the leverage ratio and robust no matter which overconfidence measure is being used. The negative relation between tangibility and leverage ratio contradicts the empirical expectations of Trade-Off Theory. Hence, in this way I reject the H4 hypothesis, indicating overall in this way that the Trade-Off Theory is not really persistent into answering and supporting the sub-hypotheses of this paper.

5.2.2 Testing for the Pecking-Order Theory Sub-hypotheses

Table 4 below presents the results of the derived regression coefficients when I am testing for the sub-hypotheses of Pecking Order Theory. Again models (1) & (3) incorporate the first measure of overconfidence (Over), while models (2) & (4) incorporate the second measure of overconfidence (Over2). Before describing the coefficients of the interaction terms, it is worth to mention that the coefficients of overconfidence, both Over & Over2, they do have a positive sign not only when I run a firm fixed effects model, but also when year fixed effects are included in the model. The significance level is high on a 99% confidence level regarding Over, and moderately significant on a 90% significance level for Over2. This positive unconditional effect between overconfident measures and leverage is supporting the view that Overconfidence results in general into more debt financing as existing empirical results predict.

Focusing now on the coefficients estimated for the interaction terms of the models, model (1) & (3) reveals that CEOs who demonstrate a higher level of overconfidence they present a lower sensitivity of firm leverage to tangibility of the assets. Indeed, if CEOs are overconfident then the coefficient of tangibility becomes negative. In detail, if firms are managed by overconfident CEOs, according to the first measure of overconfidence, a one standard deviation shift on the interaction term is associated with a decrease of 1.5% of one standard deviation of the leverage ratio in model (1) and a decrease of 2% in model (3).The coefficient estimates for both models are statistically significant on a 99% level and this result is in line with the empirical predictions of Pecking Order theory. Taking into account that overconfident CEOs try to mitigate the information asymmetry regarding the tangible assets, issuing equity might be less costly.

Therefore, firms' leverage ratio should be lower for those firms that have higher tangibility of the assets and are managed by overconfident CEOs. Same thing happens for Over2, looking on models (2)&(4), when CEOs are overconfident, there is a declined sensitivity of firm leverage to tangibility. In both models (2)&(4), tangibility becomes negative when firms are operated by overconfident CEOs. So, I accept the H5 sub-hypothesis.

Table 4: This table provides the estimates of the Panel regressions using the Leverage ratio as the dependent variable of Eq. (1). In this table interaction terms have been used in order to see the sensitivity of 3 main variables of interests of the Pecking Order Theory with the leverage when the CEO is overconfident. Models (1) & (3) incorporate the 1st measure of overconfidence (Over), while Models (2) & (4) incorporate the 2nd measure of overconfidence (Over2). Across all models firm fixed effects have been implemented. Models (3) & (4) examines additionally for year fixed effects. The variables of interest here are Liquidity, Profitability and Tangibility. The description of the independent variables of Eq. (8) & (9), are presented in methodology section.

	(1)	(2)	(3)	(4)
Total_Assets(-1)	-0.008***	-0.014***	-0.016***	-0.023***
	(3.79)	(3.78)	(6.84)	(5.53)
Business_Risk(-1)	-0.000	-0.000	-0.000	-0.000
	(1.48)	(0.87)	(1.48)	(0.54)
TaxShields(-1)	0.008	0.294***	-0.041	0.209**
	(0.17)	(2.85)	(0.82)	(2.05)
Tangibility(-1)	0.045***	0.007	0.036**	-0.015
	(2.83)	(0.26)	(2.26)	(0.61)
Liquidity(-1)	-0.012***	-0.011***	-0.011***	-0.011***
	(13.39)	(8.02)	(12.38)	(8.07)
Profit(-1)	-0.070***	-0.095***	-0.080***	-0.109***
	(6.53)	(5.19)	(7.56)	(6.04)
Market_to_Book(-1)	-0.012***	-0.015***	-0.016***	-0.020***
	(8.69)	(5.12)	(11.12)	(6.89)
EFWAMB(-1)	0.007***	0.011***	0.005***	0.009***
	(7.35)	(5.00)	(4.27)	(3.47)
Over(-1)	0.026***		0.027***	
	(3.61)		(3.87)	
(Over ×Tangibility) (-1)	-0.060***		-0.056***	
	(4.32)		(4.07)	
(Over × Liquidity) (-1)	0.001		0.000	
	(0.84)		(0.13)	
(Over × Profit) (-1)	-0.063***		-0.060***	
	(3.42)		(3.32)	
Over2 (-1)		0.013*		0.004
		(1.68)		(0.57)
(Over2×Tangibility) (-1)		-0.063***		-0.053***
		(4.55)		(3.91)
(Over2× Liquidity) (-1)		0.002		0.003*
		(1.20)		(1.89)
(Over2 × Profit) (-1)		-0.032		-0.026
		(0.80)		(0.66)
Constant	0.526***	0.563***	0.598***	0.660***
	(32.07)	(18.35)	(29.96)	(18.67)
Adjusted R^2	0.06	0.06	0.09	0.10
N	13,114	5,889	13,114	5,889
Firm Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	NO	NO	YES	YES

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

Next, looking on the profitability, in models (1)&(3) CEOs who are overconfident, they present a lower sensitivity of leverage to profitability. This is obvious by considering that when CEOs are overconfident, then the coefficient of profitability becomes even more negative and this is in line with the Pecking Order Theory predictions. A one standard deviation shift on the interaction term between Over and Profit, given that the CEOs are classified as overconfident, is followed by a decrease of approximately 13% of one standard deviation of firm's leverage ratio in model (1) and a decrease of 14% in model (3). Coefficients are statistically significant on a 99% and 95% level for models (1)&(3) respectively. The more profitable firms according to Pecking Order Theory are, the less leverage they have. Same pattern is observed for the second measure of overconfidence (Over2) as well. Models (2)&(4) reveals a lower profitability to leverage sensitivity, however I observe that the effect of the interaction terms in both models is not statistically significant compared to the results indicated for models (1)&(3). One possible reason that explains why the coefficients for the second measure of overconfidence to be not significant is the fact that the observations are almost the half (5.889 observations), compared to the observations used in the first measure (13.114 observation). This implies that the coefficients might turn to be insignificant due to the low power of the model caused by the smaller number of observations. Nevertheless, firms with CEOs, who are classified as overconfident according to Over2, have a more negative relation of profitability with leverage under the Pecking Order Theory. So, I accept the H6 sub-hypothesis.

Lastly, testing for the last set of sub-hypotheses regarding the Pecking Order Theory I observe that there is a negligible higher liquidity to leverage sensitivity when firms are managed by overconfident CEOs. This is present through all models from (1)-(4). By adding the coefficient of the interaction term to the liquidity unconditional coefficient in each model, I observe that the effect of liquidity over the leverage ratio stays negative (for all models). This sign is in line again with the predictions of the Pecking Order Theory as it was discussed before and the unconditional effect of liquidity is statistically significant on a 99% level. Hence, it allows me to accept the H7 formulated in the sub-hypothesis section.

Overall, by accepting each sub-hypothesis (H5, H6, H7) under the Pecking Order Theory, I argue that incorporating the behavioral bias of overconfidence into this capital structure theory, I can observe that the results are in line with the Pecking Order Theory which supports its importance as a good capital structure theory.

5.2.3 Testing for the Market Timing Theory Sub-Hypothesis

In table 5, I am presenting the results of the regression models that test for the Market Timing sub-hypotheses. The variables of interest for this theory are the current market-to-book ratio and EFWAMB and are tested for both measures of overconfidence. Starting with the first measure of overconfidence in models (1)&(3) the coefficients of the interaction terms are insignificant. This evidence, reveals that whether or not the CEO is overconfident, classified based on the first measure of overconfidence, the current market to book effect on leverage is not influenced by this behavioral bias. The same holds true also for the EFWAMB. It seems that those coefficients in both models are not influenced by the fact that a CEO can be overconfident.

The significance of the unconditional coefficients of current market-to-book and EFWAMB in both models are highly significant on a 99% level. On the other hand, the sign of the market-to-book seems to have the expected negative sign as empirical evidence predicts in Market Timing Theory. However, still the coefficient of the EFWAMB is positive, and this is something that is not in line with empirical predictions.

Similarly, looking on the results presented for the second measure of overconfidence in models (2)&(4), I observe that regarding the current market-to-book, the interaction terms are statistically significant on a 95% significance level. This reveals, by looking on the effect of the interaction term on current market-to-book, that if the CEO is assumed to be overconfident based on the second measure of overconfidence, the market-to-book of the firm still has a negative effect on leverage and this is in line with the empirical prediction of Market Timing Theory.

Table 5: This table provides the estimates of the Panel regression using the Leverage ratio as the dependent variable of Eq. (1). In this table interaction terms have been used in order to see the sensitivity of 2 main variables of interests of the Market Timing Theory with the leverage when the CEO is overconfident. Models (1) & (3) incorporate the 1st measure of overconfidence (Over), while Models (2) & (4) incorporate the 2nd measure of overconfidence (Over2). Across all models firm fixed effects have been implemented. Models (3) & (4) examines additionally for year fixed effects. The variables of interest here are Market to Book and EFWAMB. The description of the independent variables of Eq. (10) & (11), are presented in methodology section.

	(1)	(2)	(3)	(4)
Total_Assets(-1)	-0.008***	-0.014***	-0.016***	-0.023***
	(3.87)	(3.75)	(6.89)	(5.47)
Business_Risk(-1)	-0.000	-0.000	-0.000	-0.000
	(1.58)	(0.65)	(1.57)	(0.35)
TaxShields(-1)	-0.007	0.309***	-0.056	0.220**
	(0.13)	(2.99)	(1.13)	(2.15)
Tangibility(-1)	0.018	-0.011	0.011	-0.031
	(1.25)	(0.45)	(0.76)	(1.25)
Liquidity(-1)	-0.011***	-0.010***	-0.011***	-0.009***
	(16.49)	(9.05)	(15.79)	(8.60)
Profit(-1)	-0.088***	-0.097***	-0.097***	-0.110***
	(9.48)	(5.52)	(10.60)	(6.34)
Market_to_Book(-1)	-0.014***	-0.019***	-0.017***	-0.025***
	(7.28)	(5.02)	(8.56)	(6.55)
EFWAMB(-1)	0.006***	0.011***	0.004***	0.009***
	(5.99)	(4.78)	(3.41)	(3.46)
Over(-1)	-0.003		0.000	
	(0.40)		(0.03)	
(Over×Market_to_Book)(-1)	0.003		0.000	
	(1.01)		(0.08)	
(Over × EFWAMB)(-1)	0.001		0.001	
	(0.45)		(0.79)	
Over2(-1)		-0.020**		-0.024***
		(2.50)		(2.97)
(Over2×Market to Book)(-1)		0.008**		0.009**
		(2.04)		(2.44)
(Over2 × EFWAMB) (-1)		0.001		0.000
		(0.47)		(0.26)
Constant	0.542***	0.571***	0.613***	0.667***
	(31.96)	(18.41)	(29.97)	(18.71)
R^2	0.05	0.05	0.09	0.10
N	13,114	5,889	13,114	5,889
Firm Fixed Effects	YES	YES	YES	YES
Year Fixed Effects	NO	NO	YES	YES

* $p<0.1$; ** $p<0.05$; *** $p<0.01$

A shift of one standard deviation on this interaction term in model (2), given that the CEO is classified as overconfident, is associated with a decline of 1% of a standard deviation of the leverage ratio. Similarly, in model (4), a shift of one standard deviation of the interaction term, leads overall on a decline of 1.6% of a standard deviation of the leverage ratio.

One remark here is that when I compare the interaction terms incorporating the current market-to-book for each of the overconfident measures, what I observe is that when I am using the first measure of overconfidence the interaction term is statistically not significant, whereas when I apply the second measure of overconfidence, the coefficients of the interaction terms suddenly become statistically significant, as it can be seen in models (2) & (4). One explanation of this pattern could be initially the fact that current market-to-book is capable of capturing any growth opportunities that might exist in the market over the years. Additionally, the second measure of overconfidence, due to its time-variant nature, might predict that CEOs that are classified as overconfident based on Over2, allows them to time the equity market and realize any investment opportunity more efficiently compared to the time-invariant measure of overconfidence (Over). Hence, the explanatory power of Over2 as well as the market-to-book increases and this is apparent in Table 5 since the significance of the interaction terms when Over2 is used in models (2)& (4) is high and also the overall negative effect of market-to-book on book leverage is in line with the empirical predictions of Market Timing Theory.

By contrast, when I am focusing on the coefficient of the interaction term of EFWAMB, I see that it is insignificant. In simple words this means that whether or not the CEO is overconfident, the effect of EFWAMB over the leverage will remain positive and again as before this is against on the predictions of the Market Timing Theory.

Summarizing the results again, I argue that regarding the market-to-book effect, I reject the hypothesis H8 for first overconfident measure, while I accept the H8 for the second measure of overconfidence. For the EFWAMB I am not able to reach to a certain conclusion since I am rejecting for both overconfident measures the H9 hypothesis under the Market Timing Theory. Hence, I believe that Market Timing Theory fails to interpret and support the sub-hypotheses of this paper. Overall, the results predict that when I am incorporating the behavioral bias of overconfidence through the Market Timing Theory, the effect of overconfidence through the

interaction terms turns to be insignificant and this is obvious when I observe the coefficients of the interaction terms incorporating the EFWAMB, for both measures of overconfidence. Market Timing Theory empirical predictions cannot be supported when I am incorporating the behavioral bias of overconfidence and this is obvious from the analysis right above.

6. Conclusion

This study paper aims to contribute on existing empirical findings of corporate finance and examines further which firm's determinants can have an impact into the decision making process, made by CEOs. The intellectual content of this research topic is to examine how firm's capital structure decisions can be influenced if it is taken into account additionally the managerial behavioral bias of CEO's overconfidence. The sample period considered for this study starts from 1992 till 2015. Given this period, the main research question that this paper strives to answer is:

"How does CEOs' overconfidence and other firm-specific characteristics influence the decisions regarding the capital structure?"

In order to answer so, I am embodying on the main regression model some firm-specific characteristics that are retrieved and supported from findings in existing literature regarding three dominant capital structure theories namely, Trade-Off Theory, Pecking Order Theory and Market Timing. On the same time, I am constructing two stock-option based measures of overconfidence which are based on the empirical research paper of Malmendier and Tate (2005) with the difference that the first measure (Over) is time-invariant behavioral trait, whereas the second measure is time-variant. Thus, I am able to answer the main research question by comparing the results that derive from using these two CEO overconfident measures each time in the main regression model.

Additionally, apart from answering the main research question, like the one stated above, I am also trying to give a more in-depth perspective in this analysis by

formulating sub-hypotheses that refers specifically for each capital structure theory. The reason why I am doing this is because I can check whether or not the empirical findings of this paper are aligned with the predictions of existing literature of capital structure when I am taking into account the overconfidence. In other words, I am trying to find in this way which capital structure theory is more prevalent when I am incorporating the behavioral bias of overconfidence.

Using Panel Regression Analysis, I am in position to provide the results that helps me to answer the main research question as well as to find which out of three capital structure theories is more prevalent. I am applying firm fixed effects and year fixed effects in order to control for firm parameters or time trends that might influence the dependent variable of the regression model.

The results presented in table 2 reveals two different interpretations regarding for each measure of CEO overconfidence. Concerning the first measure of overconfidence, the effect of the coefficient on leverage is positive but statistically insignificant. Even though there is no significance, the positive sign is in line with empirical findings, which predicts that CEOs who are classified as overconfident, they tend to decide to finance the capital structure of the firm they manage with more debt. One argument that can explain this result is that overconfident CEOs believe that the firm they manage has fewer possibilities to face financial distress and thus, they tend to underestimate the cost of bankruptcy. This behavioral trait can lead overconfident managers to finance their investment decisions using more debt.

On the contrary, concerning the second measure of overconfidence the results are different. The coefficient of the second measure of overconfidence has a negative effect on book leverage and is statistically significant. This finding has an opposite effect compared to the first measure of overconfidence. However, this negative effect can have a meaningful interpretation due to its calculative nature. Since this measure captures any time-varying changes on the behavioral traits of CEOs, in contrast to the first measure, it can predict that an exogenous shock may have an impact on the decisions taken from CEOs. Probably, the world financial crisis of 2007-2009 might be the reason for those changes. It is proven that individuals usually tend to avoid on participating in financial markets when they experience macroeconomic shocks early in their life or later. Hence, this can trigger the change of the behavior of many CEOs and can lead them into deciding for self-sufficiency. In other words, CEOs become more reluctant for debt financing (debt conservatism) and they prefer to maximize the

use of internal funds in order to finance their structure. Accordingly, this is in line with the predictions of Pecking Order Theory.

Looking on table 2 overall, either in case of the first overconfident measure or the second one, the results predict that Pecking Order Theory seems to be a more prevalent capital structure. The reason why, can be explained through the negative effect of liquidity and profitability, for both measures, which are aligned with the empirical predictions of Pecking Order Theory. Arguably, the effect of tangibility might vary through the years and can have either a positive or negative effect on leverage. Predicting that Pecking Order Theory is a more prevalent is also been supported by Frank and Goyal (2003) where they state that "pecking order behavior" describes better the capital structure decisions of large firms.

The prevalence of Pecking Order Theory can also been supported when I am testing for each capital structure theory incorporating the sensitivity of each theory core variables with overconfidence. The results in table 4 indicate that when I incorporate the behavioral bias of overconfidence, the sensitivities of the interaction terms lead the core variable effects to have the expected signs. Since I am not rejecting any of the null sub-hypotheses of Pecking Order Theory, I find that this capital structure theory predicts better the investment decisions of the firms considering the effect of the CEO being overconfident and is more prominent for the first measure of overconfidence. For the rest capital structure theories such as Trade-Off Theory and Market Timing, the results reveal that I am not in position to proceed to any robust inference due to the fact that the signs are alternating constantly and the significance level does not exist on many core variables.

As well as other empirical studies, also this study has limitations. The first one refers to the *External Finance Weighted Average Market to Book* (EFWAMB). In my study I have included this variable as a typical variable that represents the Market Timing Theory. Apart from this, one could incorporate independently in the model also the net equity issues as well as the net debt issues so that we can see the effect or any possible changes on leverage decisions when the CEO changes his behavioral trait. The second limitation of this paper is that I have tested for only three main capital structure theories. Agency Cost Theory can also be considered as an additional capital structure theory and can be tested for. Briefly, this theory is based on the costs that derive due to the conflicts that have emerged within the company between

shareholder and managers. Such conflicts between managers and shareholders within the firm usually occur because of the separation of ownership. Lastly, one other limitation that I am considering for this study and is recommended for further investigation is the measurements of the leverage ratio. As it was described on the methodological question, the decision to select an appropriate leverage ratio can be puzzling due to the variety of its definitions. Thus, someone in the future can select and induce also other definitions of leverage as well as different ways of calculating some of the independent variables for robustness reasons. Overall, these limitations presented above can be taken into account for further study in the future.

7. References

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