UNIVERSIDADE CATÓLICA PORTUGUESA

Capital Structure.

Importance of Cash Management In Financing Decisions

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Abstract

The present work aggregates some theoretical knowledge concerning capital structure aiming to provide a holistic view over the topic, with the objective of reinforce the idea and importance of liquidity as part of the Capital Structure definition.

The study was made over data representative of the European and American firms (patent in STOXX600 and S&P500 indexes respectively) over the period of 2001 to 2016.

The paper follows a methodology similar to the one found in Frank & Goyal (2009), using the several regressions and creating models by selecting the factors that are found to consistently being part of the minimum bayesian information criterion and appear with coefficients statistically significant. The selection of "the most important variables" were made for measures of leverage, liquidity and net leverage. It is also studied the approach of the theoretical models and how thy explain the results by matching expectations created in the first with the coefficients signals found. The theoretical models approached, as in literature review is described are the "trade-off", "pecking order", "agency" or "free cash flow theory", "managerial optimism" and "market timing".

The principal conclusions are that for leverage the "most reliable" variables are growth (with a negative relation (-)), dividends (-), size (+), industry median leverage (+), cash holding's average (-), free cash flow (-) and working capital (-). Mainly the significance of industry median leverage and cash holding's average (define two targets leverage and liquidity) are the most important evidence of the tradeoff theory expectations. For liquidity the best variables found were the nature of assets (-), industry median cash holdings (+), cash holdings average (+), working capital (-), stock issuances (+), spread rate (+). In the two models is reflected predominance of the tradeoff theory for explanation of the relations, (even though there are some variables that it is not observable). The model of net leverage appears to be explained better by industry median leverage (+), cash holding's average (-), free cash flow (-) and working capital (-), stock repurchases (+), overinvestment (-) and risk (-). From those it was

found that the model incorporates the common variables of liquidity and leverage (cash holdings average and working capital). It was found consistently that leverage and debt have negative relation, not only for the coefficients found in incorporating liquidity as independent variable, but also comparing the coefficients behavior of the same factors when explaining at the same time leverage, liquidity and net leverage.

This paper presents a theoretical suggestion that the pecking order and tradeoff theory are not independent theories, but they complement each other, and the results provided, even insufficient, are consistent with that, as it is indicated, the targets for optimal decisions explained by the tradeoff and some significant variables which the relations with the dependent variables are better explained by the pecking order.

Keywords: Leverage, Cash Holdings, Capital Structure

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Chapter 1: Introduction

What is the capital structure? What influences the financing decisions? And how? The present study aims to contribute for the recognition of the concept of capital structure and the inclusion of the most basic source of financing: "Cash".

A lot of literature concerning this subject defines the capital structure as the portion of debt on the value of the firm. Without wanting to lead to an erroneous conclusion that this is wrong, the concept defined as that is just too simple for the complexity of the subject. This paper infers a relation between the definition of liquidity and the "classical approach definition" of the capital structure that is aimed to understand as significant in the conclusion.

To my knowledge, a study connecting leverage and cash holdings was never approached in this way despite the lot of literature existing on the matter, so this study aims to contribute in that way for the recognition of the importance of approach the capital structure theory as a very dynamic and complex topic and avoid narrowing it as just a debt to firm value ratio.

The empirical study is made on data concerning the most representative and diversified benchmarks of firms from America and Europe in order to also get a diversified sample that form firms in different contexts. The studied period approached aims to include both after and before subprime and sovereign debt crisis and starting in the post "dot com" crisis.

The objectives of the study are the matching of some theoretical theories with the observed reality, the definition of the best factors that influence this topic and obtain patterns that show the importance of the relation between liquidity and leverage. The structure of the work will follow the description and order of the following paragraphs.

In the "Literature Review" are approached the most relevant and theories concerning to this study that serve as a guideline for the interpretation of the

results. The approached theories are the “trade-off”, “pecking order”, “agency” or “free cash flow theory”, “managerial optimism” and “market timing”. All of them provide groundings to infer causes and consequences of financing decisions. By looking at the relations observed in the results from all variables it will be possible to attest the application of those theories contexts and/or predominance. There is space for the argumentation of the paper where it is suggested a complementarity of theories.

The “ Data and Methodology” describes the procedures used, that by following Frank & Goyal (2009), are based on the usage of the minimum bayesian criterion to infer the best models for each dependent variable. As the procedure involves a lot of tests (ordinary least square regressions) the results obtained by observing reported consistent signals of coefficients will provide the ground to infer the appliance of the theoretical models to the empirical work. After getting the "best variables" it is made a comparison between models for leverage, cash holdings, leverage with cash holdings as independent variable and finally net leverage. This in order to find patterns that indicate, as already stated, relations of liquidity and leverage as well getting most robust interpretation of the relations between factors and dependent variables connecting to the theoretical predictions.

The “Results” will describe the outcomes of the procedures described in methodology, starting by an overview of the descriptive statistics, followed by results of the correlations and univariate tests. Then the factor selection model (the appliance of the methodology similar to the found in Frank & Goyal (2009) results are described first in an analysis of the results found in all the contexts that the methodology were applied, followed by the signals consistency results show in the process (ground for concluding the relations between dependent and independent variables). After that, are described the factors that were chosen by the criterions applied (related with the observations of significant coefficients and inclusion on minimum bayesian criterion models). Finally, there are described the resulted models and the relations results and compared the models and variables achieved and introducing liquidity as independent variables.

In “Conclusions” are interpreted the results obtained and matched with the theoretical predictions and the suggestion made. There is also described some limitations and eventual future research suggestions.

Chapter 2:
Literature Review

2.1. Introduction

Capital structure is a topic profoundly studied over the last years all over the world. Despite of all attempts of explaining all, or at least the best determinants concerns the financing decisions of the organizations, this topic is still a puzzle with three pieces of financing sources with no absolutive rationale to fit them. Hence during the years, many investigators have developed some theories and approaches in order to solve the problem: "How do firms choose their capital structures?" (Myers, 1984). Since the companies are managed in order to maximize its own best interest, the capital sources have an implied cost that should be managed in order benefit the value of the company (Durand, 1952).

This last article presents a thought on the importance of measuring the costs incurred in financing decisions, being one of the most important departing points of the capital structure theory considering its importance in explaining the value of a company. The debate relating the leverage proportions influencers provides discussion based on a more behavioristic logic and/or more mathematical models.

The theories approached in general define the capital structure as the proportion of leverage (debt) on a company's value, reflecting the relation between the different financing sources: internal equity, debt and external equity. In this paper the focus will be more on the enlightening of the importance of the internal equity articulating with the remaining sources of financing.

2.2. The Evolution of Capital Structure Theory

2.2.1. The Classical Approach

The classical approach gives the perspective that the maximization of the value of the company is achieved when the cost of capital is minimized. This rationale is very well explained in the already mentioned article of Durand (1952). This is not as simple to implement as it looks like. This article alerts for the importance of the methods of measure value at the time, and as mentioned, alerts for the opportunity costs of using the profits in form of cash or retained earnings which constitute an implicit cost and are sources of agency problems between stakeholders as it will be seen forward[1]. So, to the puzzle of the equity and debt, and liquidity of the company carries a cost that should be managed in order to get the minimization of those opportunity costs.

In what concerns the subject of "cash management", Durand clearly identifies the implicit cost of the use of retained earnings as the opportunity cost when financing new investments to the detriment of paying dividends and vice-versa. The money earned by company in its operations must be used in paying its dues that are legally obliged and its management must be made in order to avoid the higher opportunity costs in transactions.

2.2.2. Modelling for Perfect Markets

Modigliani & Miller (1958) theorized some of the most important foundations on the capital structure theory with a model that values the combined costs of capital of debt and equity in a world determined by strict set of market conditions to be considered as a perfect market[2]. They showed mathematically that under those conditions "(…) the market value of any firm is independent of its capital structure (…)", suggesting that the value creation of the firms is provided by the

[1] See agency theory

[2] The assumptions made that founded this theory are the absence of tax, no bankruptcy nor transaction costs, allowance only for the firms to issue risk free debt and stock, the risk is. equivalent for all firms, no asymmetry of information concerning outside investors and the managers have the goal to maximize shareholder's wealth.

revenues and the cost of capital. This was a controversial argument since it showed an irrelevance of financing decisions in order to obtain gains though them and consequently a pursue of increasing the value of the firm.

This theory served for the purpose of provide a simplification for a better understanding of the capital structure problem. The irrelevance of the capital structure motivated a lot of research in order to prove the relevance of the capital structure and the failure of Modigliani-Miller theorem by relaxing some conditions and proposing new determinants to become more realistic.

2.2.3. Tradeoff Model

The "tax effect" was reviewed by Modigliani & Miller in 1963 and captures one of the fundamental determinants of the financing theory. This determinant captures the great advantage of financing by issuing debt through the tax deductions of interest payments also known as "tax shields" (which lower the cost of debt capital). This predicted that the best option of capital structure was 100% weight of debt since it didn't present an offset of the advantage of debt. This was concerned in the foundation of the "tradeoff model" that contrasts the advantages of debt with the disadvantages of bankruptcy costs. Hirshleifer (1966) suggested the importance of corporate and personal taxes as well as bankruptcy costs. Of the last, Baxter (1967) presented some empirical evidence on its existence both directly or indirectly. Kraus & Litzenberger (1973) created a model that demonstrates that "the market value of a levered firm is shown to equal the unlevered market value, plus the corporate tax rate times the market value of the firm's debt, less the complement of the corporate tax rate times the present value of bankruptcy costs". So, the "tradeoff theory" consists on the decision of capital structure based on an equilibrium between the advantage of tax-shields and the disadvantages of bankruptcy costs provided by excessive leverage. In a "static" point of view, a firm should optimize its value throughout this equilibrium. The discussion on the tax policy is not restricted to the corporate tax shields as investors face personal taxes from capital gains and that should be considered since it may offset the tax-shields advantage. This may influence in the dividend policy affecting the capital structure by stimulating the retained earnings (Miller, 1977).

Myers (1984) enlighten another point of view of the "tradeoff theory" that considers a "target" debt-equity ratio that firms attempt to follow. The argument is that due to adjusting costs there are some "lags" from events that change the distance from the optimum leverage ratio and delay the adjustment of the company to that target. This leads to a necessity of analysis of the behavior of the leverage through the time leading to the "dynamic models" in order to find if firms adjust gradually to the target. Fischer, Heinkel, & Zechner (1989) introduced a key point to the dynamic trade-off model that relates to the topic discussed in this paper, that are the transaction costs. They showed also that volatility is negatively related with leverage.

2.2.4. Pecking Order Theory

Other main theory that aims to explain the reasons behind the financing decisions is the "pecking order theory" well defined by Myers (1984) that consist in a financing decision made by order of preference. An observation of Donaldson (1961) quotes that firms prefer using the generating funds. Internal equity is by this theory the first option (which comprehends the management of the existing retained earnings in form of cash or equivalents). By this theory, the excess cash[3] is managed in order to allow the firm to meet the investment needs in cases where the operational cash is insufficient. For that reason, and following (Opler, Pinkowitz, Stulz, & Williamson, 1999) when the current operational cash flows are insufficient, the firm uses the excess cash in form of cash holdings, while otherwise they tend to accumulate and/or distribute them as dividends. When exhausted the business and excess cash of the firm, the firms, by this theory consider the external financing as a hypothesis with the issuance of new debt and then new external equity (in cases where the firm reached the full debt financing capacity).

This observed behavior is suggested to be caused by asymmetry of information between the managers, debtholders and stockholders. The asymmetries of information are sources of what are considered to be behavioral approaches that are the fundamentals of this theory. This means that the

[3] Excess cash is typically defined as cash and marketable securities above that used in the normal course of the business (Lins, Servaes, & Tufano, 2010)

understanding the pecking order is intrinsically connected to the interpretation of the adverse selection problem.

The "adverse selection" point of view exploit the dynamics of perception of value between the firm (manager) and the investor. The famous "Market for Lemons" work (Akerlof, 1979) addresses this question and presents the problem of the different sides in a negotiation have different knowledge about the object (more precisely, the seller knows more about the value of the object than the possible buyer). For corporate financial structure purpose, in this case "the seller is not offering a single good, but a partial claim on two, the asset-in-place and the new project" (Myers & Majluf, 1984). This supports some pertinent reasonings about the investor's reactions to the financing decisions.

It is assumed that all the players tend to make decisions in their own benefit. Myers & Majluf (1984) address this question for the assumption of perfect markets, starting by making an analysis of three stages of values information[4]. With that is shown that the manager always has the real value of an investment before the market, implying that the market in the stage of asymmetric information only have access to estimates based on the distribution of asset's possible values (for the firm and project), thus perception of investors about managers activity and information released to the market will play an important role in financing activities. The mentioned paper shows that rationally managers may drop investment opportunities with "positive net present values" if, by the need of raising capital, the realized values of the scenarios available plunge the value of the old shareholders. And as the real values information reaches the manager firstly, the decision of issuing may induce the perception of real scenario to the market as it may be confronted which scenario is more beneficial and to whom.

Other perspective of this, is that investors perceive the "news conveyed by an issue [as] bad or at least less good" interfering the issue invest decision and ultimately the realization of a project, since the price paid by investors may be insufficient for that. This is due to the investor's awareness of their ignorance, setting the valuation on an average basis of the future prospects benefiting bad projects and punishing the good ones.

[4] The first stage is where the manager and the market share the same information, the second is when the manager obtains information (concerning values of the firm and investment opportunities) and create an asymmetry with the market, and the last one is the release of the information on the market.

For the same assumptions, the existence of financial slack[5] to cover an investment opportunity allows the hypotheses that the return would be all distributed to old shareholders increasing the payoff of the scenario where the issue of new stocks would jeopardize their interest. The discussion of the importance of cash & equivalents is brought by this matter, since when it exists there it mitigates the probability of having to pass up a good investment opportunity. The conflicts between new and old shareholders are diminished, assuming that the old shareholders are passive and do not rebalance their personal portfolio. Other benefit of financial slack is the unrevealing to competitor about the true value of assets since the market can't infer the information that managers have when they issue new stock, because they won't drop the investment in any state.

On the other side, the market fluctuates from over to undervaluing in which the advantage taking by managers may be compromised in the existence of the financial slack. In its existence, the issuing of new external new external equity is perceived by the market as an exploitation of over market value if it's also perceived that the firm doesn't have to issue because it has its own funds, constituting an adverse selection problem.

For the debt issue, as it is riskless than equity and thus also costless, the required rate of return of the investment opportunity may be lower in order to be approved, preventing the problem of the dropped value creations at least partially. This possibility of financing by debt issue, as discussed by Myers & Majluf (1984), will be preferred in order to reduce the share of returns of new projects with new shareholders maximizing the investing benefits to old shareholders. This concludes that by an issue of new external equity to be perceived as a bad opportunity since it has less gains to new shareholders, showing that in the equilibrium, an issue of new external equity only is plausible for the company if the gains are negative, which repels the investors. The conclusion of this is the main theory of pecking order that the company will issue new external equity if there is no more capacity to get debt financing. This theory applies if the risk plays no role in financing decisions. Even though, they also infer that by the asymmetry of information, is also possible to explain a new external equity issue if the market overvalues the future variance rate.

[5] Financial slack is defined in this paper to be the "sum of cash on hand and marketable securities" considering ahead the unused borrowing power.

The dominance of debt due to asymmetric information is questioned by this argument and explored by some researchers as Halov & Heider (2011) showing empirically "that firms avoid issuing debt when the outside market is likely to know little about their risk". The risk is a crucial variable in order to understand the dynamics of the financing in this context since it may be perceived by the market as a possibility to obtain higher gains, but for the knowledge of the manager, it infers a higher probability of default either. This argument leads to the mispricing of debt which may lead to higher costs due to lack of information of potential debtholders. "It is likely that creditors and suppliers for these firms will be 'on alert' and will threaten to withhold future supplies, or only provide them at a very high cost, if there is any indication that the firm cannot meet its fixed obligations" (Graham, 1996). This means that the most probable a default is perceived, the higher will be the interest demanded by debtholders which constitutes a form of bankruptcy cost. Halov & Heider (2011) also show that the rating of firms diminishes this gap of information between management and market since rated firms tent to have less reluctance to search for debt financing than those who don't. As the assessment of assets value, now we also consider the risk as source of adverse selection problems.

It is important to mention that this theory, and the existence of information asymmetries has a direct impact on agency conflicts, as the asymmetries referred are described to be between the manager and the asset claimants (shareholders and debtholders). The awareness that the manager has primordially information about the firm than the investors may induce the manager in order to take advantage of those asymmetries for his benefit instead of the principal. This means that the information asymmetries between manager and principal are the foundation of the agency conflicts.

2.2.5. Agency Theory

From the definition given by Jensen & Meckling (1976) of an agency relation relies on a separation of ownership and control where the owner (principal) delegates the manager (agent) the power to make decisions about the organizational activities. Considering that they are both "utility maximizers", the agency problem comes from conflicts of interests that motivate the agent to act on his behalf and neglect the principal's interests. Corporate governance policies

arise to be needed in order to avoid the costs resulted by this problem. Jensen & Meckling (1976) consider the agency costs as a function of monitoring costs plus bonding costs plus the residual costs. The monitoring costs became from expenditures made by the principal in order to be aware of the managers activities. The bonding costs rely on the effort of the manager to show or guarantee the principal that acts on his behalf. The residual loss is the cost incurred when the actions of the manager diverge from the principal. The quoted paper analyzes the agency costs of equity and debt. The first one is analyzed by a comparison of a status of manager totally owner to a stage of declining ownership, and they argue that a decreasing in the equity and thus claim fractions on the firm's outcomes will tempt the manager to "appropriate perquisites out of the firm's resources for his own consumption" in order to offset some personal wealth costs (pecuniary or not). They suggest that there is a more important effect on the lowering of ownership fraction that is the lowering of effort on management activities "such as searching out new profitable ventures" because of personal costs leading to opportunity costs with consequence on the value of the firm. They also show (under a set of conditions) that the consumption of the resources of the firm perceived by the market will tend to lower the price that a new investor is willing to pay for a fraction of ownership. The monitoring and bonding activities have the objective to prevent this consumption, but they also carry a cost that will be reflected in the share price, concluding in permanent reduction (with or without these activities) of the value comparing to what it could be if the decisions were made always in the best interest of the organization. The magnitude of these costs is dependent, as suggested, to costs related with measurement the management performance, executive compensation and enforcement of "behavioral rules and policies".

The same paper illustrates the agency costs related to debt financing starting by arguing that creditors wouldn't lend excessively since it would incentivize the manager-owner to enter in projects with higher possible gains but lower probability of success. The logic is that if the manager-owner has a small portion of claims on the assets (assuming that he is the only owner), he is tempted on taking that risky project because the costs would be higher in case of investment failure for the creditors than for him, of the returns in case of success. When facing the option between two investment opportunities, where the difference is the variance of the project, the manager-owner will choose a higher variance

since the equity value tends to increase. By using the Black-Scholes model (Black & Scholes, 1973), the decision on taking the risky project will have, relating to the assets value, a smaller portion of debt claims than if the safer one was token. The bond investors perceiving the existence of the risky project, will only buy the bonds issued at the price valued as if the manager would take that project. Facing the two scenarios, the difference of debt value for each project would be the amount that the manager-owner would get by misleading the bondholders about the risk of the investment opportunity. The agency cost would be observable in the difference between the value of the firm after taking the safer project against after deciding in favor of the riskier one (assuming that the distribution of the cash flows has a higher expected value in the project with less risk). At this point was described the agency costs related with the impact of debt in investment decisions, but they also show that debt is related with two other sources of agency costs: monitoring/bonding costs and bankruptcy costs. The first pair relates to the enforcement of legal procedures in contract in order to monitor the agent performance that will create a cost (example: the cost of.an audit), knowing that the cost will be bared mostly by de manager, if he finds a way to provide the information less costly, he will do it in order to maximize the wealth value of the manager (bonding costs). The last source of agency conflicts, the bankruptcy costs, defined by the lack of possibility to satisfy all the debt claims (and none equity claims at that stage). Those are costs that are not only observed directly when it occurs (when the process consumes part of the claims), but also indirectly when there is a high probability of bankruptcy that will be reflected before in operating costs, manager's demand for compensation or the costs of external financing for example.

The agency theory on debt provides the conclusion that the higher amount of debt has consequence on decreasing the managerial discretion for the increasing control that the debtholders requires to fund an investment. This motives behaviors of managerial entrenchment defined by the failure of managers in be disciplined with the governance and control mechanisms such as board monitoring, compensation policies as defined by Berger, Ofek, & Yermack (1997). This paper finds evidence consistent with the entrenchment motive to lower leverage ratios, as the it tends to be lower in cases where the manager has more ownership on the firm, weaker compensation policy or weaker monitoring faced.

Some evidence may support the view that leverage as an instrument to avoid takeovers.

1.2.5.1. Free Cash Flow Theory

In what comes to internal financing, Jensen (1986) illustrates that the agency problems rely on the power that cash confer to the manager that may end in losing value for other shareholders. As it was already shown here, the manager behavior aims to maximize his benefits. This concerns a lot to the company's supply of cash and its capacity to generate positive free cash flows because the higher these variables are, the probability for the manager to incur in losing value activities will also increase. And as said before, the manager may end in wasting resources in organization inefficiencies, investment below the cost of the capital[6] or personal consumptions. Therefore, in the presence of excess cash, the outside investors prefer to have it distributed as dividends or debt issue instead of wasting in the quoted activities. The normal course of firm activities, product competition, factor market, and compensation policies attached to firm performance are incentives for the manager to reach higher growth and/or higher positive free cash flows. It must be enlightened that the positive free cash flow is crucial for the value of the firm, even so, the higher its proportions are, the more careful with the agency conflicts the parties should be aware of. In cases of high free cash flow, the manager can pay (or increase) dividends or repurchase stock. The last one has two benefits for the manager: the distribution of the excess cash and the increasing control of future cash flows. There the promise of the dividends pay will matter in the value of the firm as in the quoted paper state that in previous works of the author it was recognized that surprising increments in dividends increase the value, but negative growth in dividends has a larger punishment. This is due to the lack of guarantees of the shareholders have that they will receive the payment promised, as in fact, the manager may promise that in the first time and discontinue the dividend payment in the next decision. Consequently, the debt issuance has conferred the possibility of replacing dividend payment as this confers to the outside investors the right of receiving part of cash flows in form of rent the plus of being legally bonded which forbids the manager to have contradictory decisions about the payments.

[6] The overinvestment was empirically found to be related with agency conflicts as in Richardson (2006)

2.2.6. Managerial Optimism

In the sequence of the adverse selection and the agency theory we can extract for different assumptions some pros and cons of the existence of free cash flow in the managers hands. Heaton (2002) brings a model with a behavioral approach that aims to explain the two opposite main conclusions. The premise is based on the human tendency of being optimist in contexts of large control and/or high commitment to the objectives. The definition of an optimistic manager is given as the context where the manager "systematically overestimate the probability of good firm performance and underestimate the probability of bad firm performance". The rationale behind this theory is based on a tradeoff of underinvestment-overinvestment, or simplifying, the benefit of free cash flow concluded by the asymmetric information and the harm concluded by the agency costs, even though by different reasons.

For the benefit of free cash flow, the theory predicts that an optimistic manager may assume that the market undervalues the firm's risky security. The consequence is that when depending on external sources of financing, value creating projects may be declined by excessive financing costs making the internal sources of financing valuable for the manager as it allows a low-cost investment in a profitable project.

On the other side, the optimism leads to the manager overvalue in such way that a negative net present value is perceived as positive. In these cases, the dependence from outside funding would block the investment, but in the presence of sufficient hoards of funds at his dispose, the manager may pursue that kind of investments. For that reason, the free cash flow could be value destroyer, which by being due to estimating errors, this may occur even when managers think they are acting in shareholders favor.

The tradeoff is quoted in the paper to be seen in the connection of two variables: the optimism level and the opportunities available. The theory predicts that the more optimistic the manager is, more difficult is the external financing for the projects. In the presence of good projects, the underinvestment due to those barriers leads the shareholders to face high costs of opportunity. So, in these cases, the shareholder would prefer the retention of the cash flow and its risk management. In the presence of poor opportunities, the external financing dependence is beneficial to block the over investment. The shareholder would

rather prefer to see the cash flows distributed than see an accumulation in cash holdings.

2.2.7. Market Timing

At this point it was shown some of the prominent theories of capital structure as are the "tradeoff theory", "pecking order" and "agency theory". Through them we are able to understand some dynamics and the characteristics of each financing source and how they affect financing decisions. Other perspective became recently significant in explaining the decision making of the capital structure more pointed to the valuation of the market perception of the firm. This theory is called "market timing", and consists on the "practice of issuing shares at high prices and repurchasing at low prices" with "the intention (…) to exploit temporary fluctuations in the cost of equity relative to other forms of capital" (Baker & Wurgler, 2002). Basically, the firms intend to obtain gains through the financial markets by taking advantage of situations where the market under and overvalues the firm. Many authors refer to Lucas & Mcdonald (1990) as one of the most influential papers in the development of this theory. They created a model that articulated with some adverse selection reached some pertinent conclusion over the timing of issuances of new external equity. They argue that the issuance is made when firms equity market price is a stage of overvaluing, in order to avoid depreciation of prices that may end in the loss of the project. In case of undervalued firms, they wait until the correction of market value until they become in the better stage to issue. The adverse selection helps to explain that issuance announcement is proceeded by a drop on stock prices, since the investors know the conditions described for a decision of issuing. The model evolved in Korajczyk, Lucas, & McDonald (1992) allowing the existence adverse selection in a continuous mode. This allowed to understand that the adverse selection problem increases between information disclosures given that the price after announcement effect drops until a new information release. Even though the model doesn´t account for financial slack, they argue that in case of its existence, undervalued firms may use it in order to accelerate the project financing avoiding the wait of correction in stock prices. They point also that the issuing new external equity for holding slack is inefficient since the cost of capital will represent a loss since there will be stationary money or even marketable

securities that may have tax disadvantages. Baker & Wurgler (2002) tested the theory founding evidence that the managers behave like they can time the market, suggesting the definition of capital structure as the cumulative outcome of past attempts to time the equity market. This means that there is success in the attempt of the managers to time the market since the suggestion of Graham & Harvey (2003) in their surveys showing the managers willing on doing that. It was found that in the existence of high cash holdings, the timing is for different reasons than expected. Following Bolton, Chen, & Wang (2013), when the stock market improves, it was unexpectable that the firm would tend to enter in repurchases of stock instead of issuing, but for these firms, the increasing value of stock is a positive signal that allows for dismiss amounts of cash held in order to mitigate risks.

Even though the market timing theory was described to be done with equity securities and their market price movements to obtain financial gains, the same happens with debt securities. Faulkender (2005) found evidence that firms behavior changes due to market conditions of debt. The yield spread and curve was found to be major determinants when the managers consider an issue of debt with a floating or fixed rate. This means that the managers may intend to manage the interest rate exposure in order to get advantage from market conditions for obtaining a reduction on external capital financing at the lowest cost. The paper distinguishes two sources of interest rate risk: the assets sensitivity and debt securities. In a perspective of risk management, the objective of the firm would be a matching of both in what concerns the interest rate movements exposure, and so the debt issuance would follow the criterion of floating rates in case of a positive correlation between cash flow and interest rates and a fixed rate otherwise. A different behavior than that suggest a management for other purposes than hedging such as obtaining gains from the market conditions. The empirical study reveals that the yield spread is a key determinant as the yield curve provide the market expectations about future economic performances (even expected crisis) being a reliable source for managers to make decisions based on timing the evolution of interest rates.

2.3. Internal Equity

As stated before, Lewellen & Lewellen (2006) identify the existence of three sources of financing arguing the incompleteness of trade-off theory for undistinguishing the internal from the external equity. They both differ on the claims on assets being previous and post stock issuance respectively. So, the internal equity is constituted by the asset claims already in actual shareholders possession relying the retained earnings previously to a new external equity constitution.

The relevance of company's internal equity is broadly suggested (more or less directly), even though the capital structure definition doesn't distinguish internal from external equity[7]. The importance of funds generated in the firm's activities suggests a significant relation with the capital structure. As it will be showed forward, the contexts of its existence and evolution are sources of factors that may drive the proportion of leverages allowing for some discussion and theories.

Dechow (1994) reflected on the matter of earnings defining them as "the summary measure of firm performance produced under the accrual basis of accounting". In a footnote, this article states the earnings to be the "aggregate of cash flows and accruals". The advantages stated are to mitigate the problems related to revenue recognition and matching principles that cash statements have difficulties in accomplish. The accruals allow for the firms to report a revenue when the majority of the service have been performed and the cash receipt is reasonably certain (revenue recognition principle) and allows also that the cash receipt may be recognized in a period different than when the revenue was recognized (matching principle). The quoted paper showed that the earnings are a better proxy to reflect the expected cash flows than the realized cash flows can provide.

Even though, the earnings concept has disadvantages as the paper assumes problems relying on the possibility of manipulation. Fernandez (2017) considers that in the accounting criterion rely some possibility for the managing of net

[7] The definition of leverage is broadly considered to be the proportion of debt in the total assets value (as in the general literature as is example Frank & Goyal (2009)), where the remaining percentage can be viewed as the equity claim proportion (undistinguishing the internal from external influence)

income. The paper presents some points where among them lie the use of accruals and the revenue recognition for earnings management purpose, but also the capitalizing expenses in assets value, extraordinary profits from sales of what where until then undervalued assets, and the consolidation form of companies' acquisitions. Hence, when we value the income statements, we must consider the private information of managers allows them to manipulate the accounting reports in order to present a "more suitable information". The evidence of occurring phenomenon as earnings smoothing (Das, Hong, & Kim, 2012) and manipulation (Dechow, Sloan, & Sweeney, 1996)[8] suggest the existence of information asymmetries and consequently agency conflicts related to this matter.

So, the internal equity is built by results of the activities of the company (as defined for empirical purposes in Park & Pincus (2001)) that correspond in part on the cash flows provided by the economic activities and financial activities[9]. The earnings manipulation may confer results provided from other sources that doesn't relate with cash (as changes in measurements criterion). In what is considered the internal equity to be used for investment purposes, in the "economic side" of the balance sheet the liquidity plays the role of major importance that has consequence on the incentive the hoardings of liquidity or building financial slack.

2.3.1. Liquidity

The "financial slack" as discussed in Myers & Majluf (1984) considers the cash holdings, liquid assets and unused borrowing power. The "Liquidity Preference Theory" of Keynes (1936) considered demand for liquidity to be influenced by three motives: the "transactions-motive", the "precautionary-motive" and the "speculative-motive". The transactions-motive explains the business demand of liquidity for facing the inherent transactions (whether for facing the expenditures of normal course of firm's activities or for be able to invest in new projects). The precautionary-motive regard the holding of liquidity to safeguard against

[8] Both earnings smoothing and earnings manipulation refer to management practices of realizing information about firm performance that manipulate the results in order to avoid volatility or negative returns near zero respectively.

[9] Market timing theory suggests the pursue of gains through financing operations.

unexpected future needs. The last one alludes to the need of liquidity holdings in order to pursue gains with speculation on financial markets.

Of course, the benefits of holding liquidity are not only available for the sake of the firm's progress, but origins also a conflicting relation between manager and the outside investors. As already reviewed, asymmetric information and agency theory, presents different views on the benefits of holding liquidity for the manager, as also behavioral theories such as the presented managerial optimism. This means that the manager's characteristics tend to influence the management activity, voluntarily (shareholders aim to maximize its benefits, power and consumption) or involuntarily (biasness of performance estimations), which will be reverberated on the evolution of liquidity and consequently in the capital structure.

2.3.1.1. Cash Holdings

Cash holdings[10] correspond to the amount of cash held by the companies in the most liquid way, usually as deposits, but it is also the least profitable asset. It is hold in order to face the company's dues, having also the benefits and risks yet described. To solve the problem of idle money (returns under the rate of risk-free assets) the firms may invest in some securities that are considered as equivalents for the easiness of converting into cash in the market (marketable securities).

Opler et al. (1999) found evidence that supports the static tradeoff model of cash holdings. The tradeoff cited consist on the benefits and costs of holding cash. For the main benefits considered were the savings in transaction costs on fund raisings (avoiding asset liquidation) and the availability when external finance is not available. For the downside considers the low (or none) rate of return and possible tax disadvantages. The theory behind the tradeoff consist on finding the optimal amount of cash in which the marginal cost of holding cash corresponds to its marginal benefit. Being that explained, it may be inferred that there are two possible tradeoffs in what concerns the cash flow management: one approach concerning costs and other more behavioral.

Being in a shortage position in liquid assets[11], the firm may build more reserves by raising funds in financial markets, asset liquidation, reducing dividends and

[10] Cash holdings are usually defined as cash and marketable securities, or cash and cash equivalents (Opler et al., 1999)

[11] "We define a firm to be short of liquid assets if it has to cut back investment, cut back dividends, or raise funds by selling securities or assets" (Opler et al., 1999)

investment and/or by some renegotiation of existing contracts, as quoted in the paper.

It is important to mention the importance of cash flows as they are the actual builder of the cash holdings. The cash flow reflects the cash movements of the firm that the cash flow statement considers to be from operating, investing or financing activities. It "is an objective measure, a single figure that is not subject to any personal criterion" as Fernandez (2017) emphases when comparing to the use of net income. The paper differentiates four different types of cash flow: The "free cash flow" that represents the cash flow generated by the company without taking into account the dues of outside claims (debts and shareholders); the "equity cash flow" that represents the cash flow due to the equity holders after consider the debt claims of the period and tax shields; the "debt cash flow" considers the exchanges between firm and debtholders without the tax shields; Finally the "capital cash flow" is the cash flow balance of the money exchanges between firm and providers of funds (equity and debt).

Jensen (1986) defined free cash flow as the "cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital". His theory, as already approached, suggests that the excess of cash made from operational cash flows that were not offset by capital expenditures builds the financial slack, which is the source of agency conflicts and that puts in jeopardy the firm performance. This excess is argued to be related to the unavailability of good investment opportunities (which may lead to investments in less profitable projects) as Brush, Bromiley, & Hendrikx (2000) and evidenced. They concluded that firms with low amounts of free cash flow achieve a better performance alerting for the problems of very high amounts of free cash flow, and the importance of governance factors to mitigate those problems. However, the free cash flow theory testing induces the perception that the capital expenses must be made in the exercise period of the statements in order to get low amounts of free cash flow offsetting the most basic function of the free cash flow that is the building the financial slack for the next periods.

2.3.1.2. Unused Borrowing Power

The last form of liquidity, that is claimed is the unused borrowing power. In defining the liquidity, the credit lines appeared to be an important part as suggested in Emery (1982) and Emery & Cogger (1982), proving its importance

as the inclusion of this variable provided more reliable information companies' solvency and classification of failed/non-failed. A credit line is considered a debt claim from the bank, whereas the unused borrowing power is what is considered as liquidity (unused part of the credit line). Sufi (2009) approaches this instrument that is given to firms in form of credit lines finding that it is an instrument that is related with profitability (that makes the firms reliable on future payments promises) and comes also with more covenants attached for bank monitoring. As quoted in the paper, "lines of credit provide flexibility, but that flexibility is closely managed". So, the definition provided is the follow: "loan commitment or revolving credit facility, provides a firm with a nominal amount of debt capacity against which the firm draws funds". The upside is that the bank provides to the firm an instrument that allows the bank an easy source of funding within limits. The downside of this instrument, besides the inherent cost, is that by the covenants, a firm may be denied the usage of the remaining borrowing power in case of bad performance, and that is where the agency conflicts may arise more severely. The lines of credit don't constitute all the borrowing power that a firm can get but allows an easy understanding on the dynamics of the borrowing power of the firm, since the bad returns increase the risk premium and therefore compromise the access to other forms of external funding namely debt financing.

The debt and cash stated as negative debt. The first premise presented by Acharya, Almeida, & Campello (2007) is the fact some valuation models find net debt (debt less cash) as the variable to determine leverage. The seniority of debt claims gives the enforce the argument that the most liquid (less risky) assets are managed side by side with debt[12]. Also related to debt, cash holding decrease the likelihood of financial distress (Ferreira & Vilela, 2004). So, Acharya et al., 2007 enforces the differentially between cash and debt, firstly by enlightening the functions across time. As stated, the firms try to match the available funds to the investment opportunities over time. For that purpose, the firms may control the issuing of debt and the amount of cash held. For an issuance of debt, by keeping the proceeds the firm transfers resources to the present, while the saving of borrowing power transfers the easiness of funding to the future. The model used assumes an indifference between debt and cash for unconstrained firms, relying

[12] "(…) creditors have priority over a fraction of cash balances, and [...] cash flows from new investment opportunities are pledgeable (…)"

the study relevance on constrained firms. There, they find that the correlation between cash flows and investment opportunities (hedging needs) influence the preference for holding cash, which tends to happen more in contexts of high hedging needs. In cases of low hedging needs they found that the tendency is to behave like unconstrained firms and aim to reduce outstanding debt with the excess cash flows.

2.4. Argument of The Paper

This view on the principal theories may end with a the simple conclusion offered by Myers (2001): "There is no universal theory of debt-equity choice, and no reason to expect one. There are several useful theories however". There are several studies that provide evidence that consists, contradicts, or does neither or both at the same time. This may mean that the theories may be applied as a function of the context, since financial decisions may be done for tactic or strategic objectives, among other reasons. The complementarity of theories is thereby needed for understanding the financing decisions.

Empirical tests matched theories in diverse contexts, some more robust than others, hence this paper aims to enlighten the existence of the several tradeoffs found in literature as already mentioned. Several tests found evidence supportive of the tradeoff (theory) between debt and equity[13], meanwhile some others found evidence supportive on the existence of a tradeoff between the portions of cash holdings and debt[14]. The existence of both tradeoffs may suggest an articulation between pecking order and the tradeoff theories. The argument for this suggestion relies on the observation that tradeoff theories focus on the existence of an optimal amount of use of financing sources chosen between a pair of the existent while the pecking order theory articulates three main financing sources establishing an order of preference for the choice of the financing sources to use. By looking at the tradeoffs provided in the referred literature, the dichotomies refer to both connections between preferences[15]. A possible theory

[13] As Frank & Goyal (2009), Bradley, Jarrell, & Kim (1984); Faulkender, Flannery, Hankins, & Smith (2012); Flannery & Rangan (2006)

[14] Opler et al., 1999 was one of the most important. Managerial Optimism enlightens a behavioristic tradeoff between the two matters with results similar of opposing conclusions of adverse selection and agency theory.

[15] Being the two tradeoffs the Internal equity/debt (corresponding to the connection between the first and second preferred choices in the pecking order Theory) and debt/equity (correspondent to the connection between the second and third preference in pecking order Theory).

may be that while the pecking order theory suggests the preference of the use of financing sources, the tradeoff theory predicts the boundaries of their usage.

Empirical studies made proved the dynamics of the capital structure adopted by firms by observing factors that are considered to be an influence for this matter and analyzing the match with the predictions interpreted from theories. Regarding the two tradeoffs referred, this paper aims to analyze the determinants of capital structure side by side with the determinants of the cash holdings. The comparison between the main determinants found on literature brought to light some similarities for which ones are most important. By analyzing the determinants in both contexts at the same time it may be seen the influence of each one in each tradeoff, enlightening the ones that are coincident and those that are specific to each tradeoff. The final goal is to understand how important the liquidity management is and how does this matter influence the capital structure of firms.

In order study the most important determinants of the capital structure, Frank & Goyal (2009) made an empirical study over some of the most used or enlightened in the literature. They found some of the more robust factors that influence the capital structure, pointing to six of them as the "core factors". On the other hand, studies relying on the cash holdings matters enlighten the determinants of the liquidity amounts, however there is no reference to my knowledge of a study made in the same line as the Frank & Goyal (2009) for the weight of cash holdings. Nevertheless, some papers[16] have been pointed to address this issue, providing the liquidity determinants that may be used in order to make the suggested comparison of this paper.

[16] Opler et al. (1999) may be the major reference to this issue, as long as Acharya et al. (2007) and Ferreira & Vilela (2004).

Chapter 3:
Data and Methodology

3.1. Data

To address the question of this paper, there is used a sample of firms that are present on the most representative indexes of the developed countries namely the S&P500 stock index (for the U.S.A.) and the STOXX600 (for the European firms). The sample was chosen for the similitudes (as diversified in number of firms and sectors of activity) between those two regions, and also for the fact that both economies faced identical crisis in similar periods. In order to incorporate the economic fluctuations, the date comprehend the interval between 2001 and 2016 starting with the "Dotcom bubble crisis" passing the period where occurred the subprime crisis and the sovereign debt crisis until the most recent available data.[17] In "Methodology" there will be explained with more detail the treatment of the sample.

3.2. Variables and Hypothesis

In order to understand the importance of the cash management on leverage choice, and as said in the "Literature Review", this paper will focus on the analysis and comparison of the perceived impact of the determinants found to explain two main variables: leverage and cash holdings. In "Methodology" will be explained the methods in order to address the "how to do the analysis" but before that, for a better understanding there must be presented the variables related with the determinants aimed to be analyzed. In the Table 1 (Appendix I) are represented the variables and the correspondent determinants (Factors) and their relation, and the computations are present in the Table 2 (Appendix II)

[17] As reviewed in the Acharya, Eisert, Eufinger, & Hirsch (2016), Ravier & Lewin (2012) and Junior & Franca (2012)

3.2.1. Dependent Variables

The two main variables that this paper aims to explain as already quoted are the proportion of leverage and cash holdings. Several approaches were made and tested for this matter and so this work aims to use not only the better approaches known but also articulate some rationales in order to get, if possible, more robust approaches.

Firstly, to enumerate the best references for the explanatory variables (to my knowledge), it will be considered:

- Leverage – total book value of debt/market value of assets – as in Frank & Goyal (2009)
- Cash holdings – cash and marketable securities/net assets – as in Ferreira & Vilela (2004)
- Net Leverage – net debt/book value of assets – as in Acharya et al. (2007) (even though in there is used in a dynamic way) and it will be used in order to help the analysis of the influence of cash holdings on leverage.

The articulations proposed by this work treat subjects like the usage of the proxies for debt and assets, depending on the usage of net or total values or market or book values. Frank & Goyal (2009) approached the last pair of possibilities for the consideration on leverage, but for example Acharya et al. (2007) suggest the usage of net debt for a better understanding of the influence of the cash holdings on debt levels. Ferreira & Vilela (2004) and Opler et al. (1999) use the net assets for determining the cash holdings, which is different from the other two variables that use both the dichotomy book *versus* market value. For that matter and in order to get a better comparison, there will be kept the three numerators, but the denominators will be target for changes.

3.2.2. Independent Variables

The independent Variables aim to reproduce the most important determinants found in the literature. Since the paper departed from the view of mutual determinants (based on most relevant papers already mentioned) in the independent variables the explanation will start with those variables followed by

some specifics (also based on the same papers) and others (from remaining approached literature) that will be also tested as will be specified in the characterization of each variable. The determinants were chosen in order to aggregate the influences found in the literature about the most relevant theories. Following the papers of Frank & Goyal (2009) as the reference for the most important determinants of leverage and the of Ferreira & Vilela (2004), Acharya et al. (2007) and Opler et al. (1999) as references for the most important determinants of cash holdings, some similarities are found related to the following determinants (between parentheses is the factor name used in the empirical study) :

3.2.2.1. Size (size)

- Measured as the logarithms of assets where concerning the last four referenced papers, only Acharya et al. (2007) used a different measure, although the proxy used (log of sales) was also reliable. The remaining three used the Log Assets as a measure of firm size.
    - The predictions relying the leverage degrees explained by Frank & Goyal (2009) claims a positive relation with size as they face lower default risk, lowering the cost of capital related to debt as a tradeoff prediction.
    - Relating the cash holdings predictions Ferreira & Vilela (2004) argue that the trade-off theory predicts a negative relation between size and cash holdings. This is due to the economies of scale[18] relating the cash management, the incentive to retain cash as the costs of raising capital are higher for small firms and finally the probability of distress costs is reduced in larger firms. The pecking order theory predicts more availability for cash as larger firms are probably more successful and thus are available to retain more cash. Ferreira & Vilela (2004) also suggest the predictions relating agency theory arguing a positive relation due to managerial discretion enlightened by the shareholder dispersion tendency empowering the manager in investment and resources allocation ending in more reserves of cash. They

[18] See Miller & Orr (1966)

complement the empowering argument with the probability of the firms being targets of takeovers in larger firms is reduced comparing to smaller firms.

3.2.2.2. Growth (Tobin's Q)

- It is the Market-to-book value ratio that confers a proxy of investment opportunities also associated with growth[19]. The variable essential as seen that growth is the base for valuation purposes as seen in the "Gordon's Model"[20] and in other valuation models and traduces the expectations of future performance.
    - About leverage, Frank & Goyal (2009) argue a negative relation explained by the tradeoff theory, as growth opportunities rise the financial distress costs as the risk is increased, and increase value for the shareholders. The pecking order theory expect a positive relation as the debt is expected to be accumulated in response to the investment opportunities. The agency theory also predicts a negative relation as the growth opportunities solve free cash flow problems and rise debt agency conflicts.
    - Concerning cash holdings, Ferreira & Vilela (2004), the tradeoff theory predicts a higher probability of cash shortage when facing investment opportunities, inducing a higher need for cash and therefore a positive influence of growth in cash holdings. The pecking Order theory also predicts a positive relation due to the demand for cash to pursue investment opportunities is preferred to be financed internally to avoid external costs and therefore implies a pursuance of profitable investments. In what concerns the free cash flow theory predictions, it is quoted that in the firms with poor investment opportunities managers tend to ensure availability of funds to invest in growth projects even if they are negative projects destroying value. Therefore, the market-to-book value is expected to have a negative relation with cash holdings.

[19] Used in the papers used as reference for the empirical work among other literature.
[20] See (Gordon & Shapiro, 1956) and (Gordon, 1959)

3.2.2.3. Dividend Policy (Dividends)

- In Frank & Goyal (2009) the dividend policy was studied in order to address the influence on leverage, finding, by using a dummy variable, that dividend paying firms tend to have lower portions of debt inducing a negative and significant relation. Acharya et al. (2007) used this a s grounding to infer the financial constraints.
    - As explained in the agency theory, shareholders prefer the earnings distribution in forms of cash as prevention of managerial overinvestment. The fact that debt is described by the theory to be an instrument with monitoring power, the existence may be related with the "obligation" of manager to disburse some cash hoardings, which may be the foundation of the results founded by the quoted paper. On the other hand, leverage is predicted to rise after the dividend payment as the proportion of internal equity drops from the disbursement.
    - Concerning cash holdings, the disbursement of cash to pay dividends is expected to lower the proportion of cash on the firm's book value.

In Frank & Goyal (2009) the most important determinants besides the ones already quoted the following[21]:

3.2.2.4. Profitability (Profit)

- The tradeoff model predictions are suggested to be a positive relation with leverage due to the lowering of the probabilities of financial distress and consequent costs, which make the tax shields advantageous (as the profits increase). The Pecking order predicts a negative relation as the profitability allows the retaining of earnings that are used. Agency theory predicts the debt to be useful for discipline purposes in avoiding agency costs concluding in a positive relation.
- Concerning cash holdings, the pecking order predictions are ambiguous, as the retaining of earnings allow to increase the cash holdings, the usage of the same also increase. The trade-off predicts that

[21] The justification will be given accordingly to the Frank & Goyal (2009) paper.

the risk premium decreases in this case supported not by the existence of the liquidity in the moment but by the expectations (of future performance) that the firm can generate consistently more profits. Therefore, the relation between the two variables is expected to be negative.

3.2.2.5. Nature of Assets (Tangibility)

- The tangible assets are easier to value on the investors perspective which allow for less distress costs, making the tradeoff theory expect a positive relation as well as agency theory related to debt (tangibility inputs difficulty on the shareholder for risk shifting practices). For the pecking order the predictions are ambiguous as new external equity issuances are less costly with low asymmetry of information provided by the already referred easiness of valuing those assets (negative relation) and if the asymmetries of information are related to tangible assets this tends to increase debt.
- For the cash holdings prediction didn't found any theoretical reason to induce any prediction. Concerning the rationale of being the cash holdings suggested to be negative debt (Acharya et al., 2007), this variable is studied to see if follows the expectation to have the opposite relation with cash holdings than it has with leverage.

3.2.2.6. Expected inflation rate (Expected inflation)

- It is expected that inflation increases the real value of tax deductions making the tradeoff theory predict a positive relation for this variable with leverage. The market timing theory expects also a positive relation for debt issuances when inflation is relatively high.
- The value of money in hand is expected to decrease in when the inflation rate is positive constituting an opportunity cost, so the expectation is for cash holdings to decrease when this variable increase.

3.2.2.7. Industry Median Leverage (Industry median debt)

- The industry standards may capture similarities in the activities that traduce into correlations that may influence the leverage degrees. This measure is used in order to evaluate the closeness of firms to a target capital structure.
    - This Target capital structure is suggested to be proof of the tradeoff theory, that predicts a positive relation with leverage.
    - Assuming that the leverage proportion follow the target (industry median), it is expected that this variable, the rising of the amount of leverage proportion is expected to be connected to a low proportion of cash holdings (the cash holdings as negative debt rationale).

3.2.2.8. Industry Median Cash Holdings (Industry median cash holdings)

- For the same purposes the previous one, in this study it will be studied is the industry median can suggest a target cash holdings proportion. Opler et al. (1999) found evidence of a target adjustment of the cash holdings. The effects of this tradeoff are also a target of this study. The proving of existence of target proportions of leverage and cash holdings is expected to validate the hypothesis of tradeoff theory may be used in order to get the boundaries of capital structure.
    - By the tradeoff theory the relation of this variable is predicted to have a positive influence on cash holdings as it constitutes a target.
    - For leverage, the rising of the amount of cash holdings is expected to be connected to a low proportion of leverage (the cash holdings as negative debt rationale).

3.2.2.9. Cash Holdings Average (cash holdings average)

- Orlova (2017) presents a study relying on different measures of targets for cash holdings. The deviations from the variable presented before were also analyzed, but the deviations from this variable presented

more robust conclusions. The predictions about this variable are expected to be the same as the last determinant presented.

The cash holdings related papers the most common important determinants differing from the above imply the cash flows performance. The reference paper for the predictions of relation between cash holdings and the following variables are found in Ferreira & Vilela (2004):

3.2.2.10. Free Cash Flow (Free Cash Flow)

- Even though the related paper uses the cash flow as a proxy free cash flow, following definition provided by Drake (2008), the free cash flow is inferred by subtracting the capital expenditures to operating cash flows. It will be used in the same rationale as in the papers dividing by the book value of assets. As a variable that reflects the firm performance, this variable has the same predictions as Profitability.
    - The tradeoff theory predicts that, as cash flow is considered a cash substitute (ready source of liquidity), the relation between free cash flow and cash holdings is negative. The pecking order in this case predicts a positive relation as the higher free cash flow allows for more retained cash.

3.2.2.11. Cash Flow Uncertainty (Industry Sigma)

- The proxy for uncertainty of the cash flows are based on the evolution of the sectors among the most important literature followed on this paper.
    - The uncertainty is predicted to have a positive relation with cash Holdings as it increases the probability of cash shortage, which induce in a precautionary motive for holding more cash (tradeoff theory).
    - In what concerns leverage the predictions are for a negative relation tradeoff (the uncertainty rises risk premium, and the external sources of financing become more expensive) a positive relation expected by the pecking order theory as the volatility of cash flows induce the need to access external capital markets after using the liquid reserves.

In the same papers other interesting figures arise to influence the cash holdings, and as this paper aims to study, may induce the proportion of leverages as follows:

3.2.2.12. Working Capital (Net working capital)

- This measure is used in order to address the possible substitutes for liquid assets as securitization of receivables or factoring Opler et al. (1999), and was also used in Ferreira & Vilela (2004).
    - The predictions are for a negative relation with cash holdings as it turns to be a measure for a substitute of liquidity (tradeoff theory). The pecking order predicts that the variable lowers leverage it means a good performance of the short-term assets that help to generate cash that helps to build cash holdings.
    - Concerning leverage, the relation is expected to be positive for the argument of cash being negative debt. The net working capital measures the capacity of the firm meet its short-term obligations which means that the better the company's net working capital is, the leverage is expected to increase by the tradeoff as the firm may rise the short-term debt.

3.2.2.13. Hedging needs

Acharya et al. (2007) presented a study where the hedging dimension proved to influence both the proportions of leverage and cash holdings. The results showed the hedging needs may be managed with the cash holdings as well as using derivatives. The paper uses two measures of hedging needs based on correlations. In both, the increase in the coefficients is assumed to mean a decreasing in hedging needs.

- Correlation of cash flow or free cash flow with Industry Median Research and Development (Hedging research and development (cash flow) or Hedging research and development (free cash flow))
- Correlation of cash flow or free cash flow with Industry Median Sales Growth (Hedging sales growth (cash flow) or Hedging sales growth (free cash flow))

- The industry median Research and Development and the industry median sales growth are proxies found in the reference paper relating the investment opportunities. High positive correlations with cash flows indicate lower hedging needs, thus the firm don't tend to hoard cash flows, which predicts a negative relation with cash holdings.
- About the leverage, as lower hedging needs are predicted to incentive the disbursement of the cash, for the correlations being high the leverage proportions are expected to lower (as the cash flows may be used to reduce debt – pecking order). For high hedging needs (low correlation) the proportion leverages are likely to increase, as the expected optimal policy involves issuing debt, as it is expected that the hoardings of cash influence positively the capacity to issue debt (debt holders have priority over cash pledges).

The above variables were found in the referred reference literature to be more significant to explain leverage and cash holdings. Nevertheless, this study proposes other variables found in other related literature that were considered to be significant for this study purposes.

Literature find this behavior to be found on issuance/repurchase of stock and debt due to favorable market conditions. The variables meant to be studied the stock issuance and repurchase and the yield spread (interest rates). Market timing may explain the contexts that lead to the financing decisions made but the influences of the decisions on capital structures are observed by the direct influence as explained following

3.2.2.14. Stock Issuance (Stock issuance)

- The issuance of financial instruments that are aimed to be done for market timing purposes have an impact on the capital structure. The suggested predictions are:
  - In order to explain leverage, a stock issuance will raise the equity claims, which has a consequence on the lowering the proportion of debt and therefore assumed a negative relation.

- For the cash holdings, the issuance will capture funds from investor that may end in the cash reserves, so a positive relation may be predicted.

3.2.2.15. Stock Repurchase (Stock repurchase)

- The repurchase due to market timing, may be made in situations of market undervaluing, and this has a consequence for the subject of this paper as follows:
  - The leverage may be positively influenced by a repurchase since a portion of equity claimants may disappear (which raises the proportion of debt indirectly, and the repurchase may be funded by a debt commitment.
  - For the cash holdings, it is expected a negative relation as it is expected a disbursement in order to pay the dues.

3.2.2.16. Expected Interest Rates (Yield Spread)

- Subsequent to the subprime and sovereign debt crisis, the macroeconomic conditions around Europe and America were characterized by low and even negative yields. Quantitative easing policies on central banks were made and influenced the firm's investment opportunities by lowering the discount rates. The risk-free rate benchmark lowered and influenced also the debt obligations valuation[22]. Faulkender (2005) found evidence that the shape of the yield curve is significant in determining the issuance of firm's debt to be characterized as fixed term rate or floating, which may consider the problematic of market timing of debt and hedging purposes. This determinant is directly suggested to be related with the debt cost of capital. The lower the yield spread is the higher is the expectation on a possible future crisis.
  - The predictions are a negative relation concerning cash holdings (as the crisis leads increasing hedging needs) and therefore a positive relation with leverage.

[22] Shi (2018)

3.2.2.17. Adverse Selection (Earnings Per Share Surprise)

- The adverse selection theory reflects the importance of market perception on the firm performance. As this variable informs about market expectations on future performance, here will be used in order to capture the influences of the managers perception to make decisions. Following evidence on the importance of a consensus analyst forecast play on the capital markets, Brown, Hillegeist, & Lo (2009), this variable may be very reliable for valuation of information asymmetries that influence the market value of a firm and for that cause, the proportion of debt on it.
    - It is expected that high negative surprises conclude high information asymmetries. Following the arguments presented on the literature review, the usage of cash holdings has the benefit of providing the owner more power to decide, and less information released. This means that by the pecking order, the proportion of cash holdings is likely to be high in the presence of information's asymmetries, thus a negative relation between cash holdings and the variable defined.
    - For leverage purposes, and also stated in the literature review, the presence of the information asymmetries leads to a market uncertainty about the companies' value, which means that debt cost of financing will increase, leading to the prediction of a negative relation between the leverage and Information asymmetries, or a positive relation with the measure presented.

3.2.2.18. Over Investment (Over investment)

- Over investment is a problem approached on agency theory and managerial optimism theory. Concerning the last one, the optimism was suggested to be associated with higher proportions of debt suggested by Oliver (2005) where was relating the portions with the consumer confidence index (proxy for CEO confidence). The over confidence of managers as suggested by the theory is associated with overestimating the investment opportunities. This excessive investment and over confidence is evidenced by (Kim, 2017). This may

induce the importance of managerial optimism. In what concerns the free cash flow theory, the overinvestment is argued to be due from managerial behavior to maximize its utility by making excessive investments rather than distribute the reserves. The measure used is the correlation of investment and firm performance. Following Fu (2010), there is evidence supportive of the correlation of investment and firm performance as indicative for over investment (if negative) which may be reliable to be tested as a determinant for capital structure and cash holdings.

- For cash holdings it may be induced a negative relation, as the first source of funding according to the pecking order are the internal equity, meaning that excessive investments will tend to require the usage of the cash holdings. The free cash flow theory provides a lower correlation (overinvestment) in the presence of high cash holdings.
- For the leverage determining this is predicted to have a positive relation for the reasons already quoted and for the probability of destroying value of the company has a consequence of having the weight of the debt to be heavier. Agency theory considers debt as monitoring instrument, which leads to the prediction that in the presence of lower levels of debt the correlation will be lower which is also traduced in a positive relation.

3.2.2.19. Risk (Price Volatility)

Variable important in many valuation models (black Sholes, emery, real options,…)[23] (Black & Scholes, 1973)

- Stock price volatility – Measure of the volatility of the value perceived in the markets, the stock price volatility presents a measure of risk. Frank & Goyal (2009) made some predictions about this measure concerning the relation with leverage:
  - The tradeoff theory predicts a negative relation as the volatility increases the financial distress costs making the external capital expensive. The pecking order predicts the opposite as the

[23] Black & Scholes (1973); Emery (1982); Emery & Cogger (1982)

volatility presents a need for the firms to access the external market from time to time to avoid the risk of avoiding shortage of cash holdings after being used.

- The last argument serves to the predictions relating cash holdings, as the stock price volatility may be explained from the volatility in free cash flows and the pecking order theory predicts a search for debt may be would mean a negative relation, whereas the tradeoff predicts a positive relation as concluded from the cheapness of internal equity comparing to external financing.

The Table 3 (Appendix III) present more synthetically the predictions about the coefficients of the factors and the relation with the underlying variable.

3.3. Methodology

As already defined the empirical part of this paper aims to discover the importance of some variables in determining the relation between the financing decisions on the usage of internal equity, debt and equity financing. The founding of common determinants in studies about capital structure and proportion of liquidity were the major influence on this study[24].

3.3.1. Data Treatment

The data used will be from the DataStream database concerning annual data from 1996 to 2018 from the public firms presented in the indexes of STOXX 600 and S&P 500.[25] The monetary values were downloaded in euros using the DataStream option.

The data was treated using the group industry classification code provided from DataStream in order to erase data from financial firms (codes 4,5 and 6).

[24] Note that the dependent variables used in studies modeling leverage used in general a definition of capital structure as debt to the value of the firm (differing in using book or market values, net or gross, …). This definition provides the tradeoff of debt and equity financing usage of the firms giving an overview on the behavior of both financing sources at once. For the liquidity definitions is generally used the cash holdings to assets, providing the overview of the proportions of liquidity.

[25] For the study purpose, was used data from 1996 to 2018 but the process of variables creation led to the dropping of the data comprehended between years 1996 to 2000 and 2016 to 2018 with the exception of the dependent variables that exist in the year 2016, for the purpose of the model. Other missing values existed or created were dropped as explained forward.

Using the nation code also provided by DataStream were dropped those firms outside Europe (nation codes 643 (Russia) and 784 (United Arab Emirates)). The expected inflation and spread rates variables were constructed with data taken from OECD Database and the data were dropped in case of missing values.

The variables were constructed as follow and the computation is also described on Table 2 (Appendix II):

1. Leverage is the ratio of the total debt to market value of assets of the next proximate year. The market value of assets is approached as the sum of total debt with market capitalization. Work with the last item requires a special attention with the measure as it is in millions opposed to the thousands used in the remaining variables that measures monetary values.
2. Cash holdings is addressed as the ratio of cash and equivalents *per* net assets of the next proximate year. The net assets are the book value of assets minus the cash and equivalents.
3. Net Leverage variable is the ratio of the net debt variable provided by DataStream divided by book value of assets.
4. Size is computed as the logarithm of book value of assets.
5. Tobin's Q is computed as the ratio of market value of assets divided by its book value.
6. Dividends is given by the ratio of dividends payed *per* book value of assets.
7. Profits is the ratio of operating income divided by book value of assets.
8. Tangibility is the ratio given by dividing net plant, property and equipment to book value of assets.
9. The expected inflation is given by the inflation forecast data provided by OECD database representative of the forecast of the annual growth of consumer price index.
10. Median industry debt is approached by computing the median the variable defined as leverage for each cluster of industry code and year. the industry code used is not the "group industry classification" as used to clean the data but instead it was used the industry group variable also provided by DataStream.
11. Median industry cash holdings are approached by the same rationale as the previous variable, but for the cash holdings ratio.
12. Cash holdings average is computed as the average cash holdings for the five previous years. For this is necessary that the data is sorted by firm and

year, and then create the variable by computing the formula of five years average as in the appendix

13. The free cash flow is computed as the ratio where the numerator is the operating cash flow minus capital expenditures and the denominator is the book value of assets
14. The industry sigma is the industry mean of the firm's standard deviation of cash flows. The cash flow is computed as net cash flow from operations minus net cash flow from investing plus cash flow from financing (data already in a negative form).
15. Net working capital is equal to the ratio of working capital minus cash and equivalents divided by book value of assets
16. Hedging research and development (cash flow) is measured as the firm correlation of the proper cash flows with the industry median research and development book value.
17. Hedging research and development (free cash flow) has the same computation but using the free cash flow proxy and is used in order to address the best method.
18. Hedging sales growth (cash flow) is computed as the firm's correlation of the proper cash flows with the industry median sales expected growth for the next three years. For the last variable it is computed first the firm's growth as the net sales from year n+3 minus the net sales from the year n and then calculating the consequent growth rate. Then for each industry and year it is computed the mean of the referred rates.
19. Hedging sales growth (free cash flow) has the same computation but using the free cash flow proxy and is used in order to address the best method.
20. Stock issuance is computed as the value of the DataStream variable "net proceeds from sale/issue of common & preferred" (stock) divided by the book value of assets.
21. Stock repurchase is the ratio of the DataStream variable "common & preferred redeemed, retired, converted, etc." divided by the book value of assets.
22. Yield spread is computed as the difference between the long-term interest rates and the short-term interest rates which are variables provided by the OECD database that refer to the government securities rates (namely bond).

It is used the German spread rate as the reference for firms from countries in the euro-zone.

23. Earnings per share surprise is the value given by the variable of the DataStream earnings per share surprise percentage difference already in percentage measure
24. Over investment is given by the firm's correlation of the net cash flow from investments with the change in operating return on assets. The net cash flow from investments in given by the DataStream which doesn't happen with the other part. The operating return on assets is proxied by the variable "earnings before interest and taxes" that is divided by the book value of assets and then computed the percentage growth from the value from year n-1 to year n.
25. Price volatility is the values given by the variable in DataStream "price volatility" that is already in percentage measure.
26. Unlagged cash holdings is the same as the Cash holdings but for the correspondent year of the data.

The data used came with missing values and the process of variables creation also created missing values. This matter needed some caution in order to avoid biased results. For this purpose, after the first data treatment already mentioned, some cuts were made during the process of variables creation. The second round of cuts was made after creating the variables numbered from 1 to 5, 7 to 8, 13, 15 and 25 (the first round concerned the variables token from OECD Database numbered as 9 and 22). As suggested in Frank & Goyal (2009), some variables may have missing values due to the firm's lack of report of some specific items that can bias the study for requiring the dropping of data unnecessary. The procedure used in the quoted article passes to replace the missing values to zero for several items from the financial statements. In this study the variables numbered as 6, 20 and 21 were processed this way in order to avoid dropping variables from missing data that is could be probably due to the inexistence of dividends payed, or market movements in what concerns the number of stocks outstanding. The earnings per share surprise (23) is replaced as well in order to avoid missing reliable data that could be erased from an inexistence of estimations. For the construction of variables were followed the same strategy for research and development.

The third step concerned the construction of the time dependent variables and those related with industry standards. The variables number 12, sales growth (concerning the variable 18 and 19) and change in ebit (concerning the variable 24) were computed at this stage as well as the number 10 and 11. After dropping the missing values created, for the variables sales growth and cash holdings average, erased the data from the period before 2000 (including) and post 2016 (including).

After the years dropped, the remaining sample were used to compute the sigma for the available period studied (14) and the correlation variables (16 to 19 and 24). And after that, the missing values generated were dropped.

The data, as following the procedure of the referenced paper, were winsorized at 0,50% level for all variables, which means that the extreme values from the data were replaced by the nearest value where the cut off were made.

The model, as explained in section 3.3.1. has a one-year lag between the explained and the explanatory variables. Therefore, there was created a variable to replace the independent variables with the values of those variables but on the subsequent year. This means that in data, as an example, the leverage in 2008 corresponds to the value of unlagged leverage in 2009.

3.3.2. Empirical study development

The empirical study will be developed following part of the procedure of Frank & Goyal (2009). As presented in results, the process will start with a statistical analysis of the variables used. The statistics analyzed for all the variables will be the number of observations, mean, standard deviation, minimum and maximum, the tenth and ninetieth percentile as well as the median that corresponds to the fiftieth percentile.

The second step will be an analysis of a table of correlations between each dependent variable with each the explanatory variable. This will be done for the overall period, and two partitions of periods that are divided in two groups, the first until 2008 and the second from 2009[26] aiming to represent the period previous and post crisis. There will be reported for all variables the correlation coefficient, the significances and one signal for each partition period (positive or negative if

[26] For the dependent variables the division is until 2009 and from 2010

the coefficient in the referent period is significant and respectively positive or negative, otherwise, the dot represents "not significant")

The third step is the regression univariate regressions where each dependent variable is regressed with one independent at the time. There will be reported the coefficient, the t-statistic, the significance and the r-squared. All the regressions done from this to the last step have the standard errors clustered robust at both firm and year level[27].

The fourth step aims to choose one variable between each pair of hedging needs representation. The decision is based. On the confrontation so results from second and third step. The first criterion is to observe the confrontation of results of the t-statistics (and significances) and the r-squared of the third step regressions. From each pair, the variable that has a t-statistic more distant from zero and the higher r-squared in the regressions of two or the three univariate regressions is chosen. In case of the first criterion gives ambiguous results, the second criterion is equal to the first but only rely on the regressions of net leverage[28]. If by looking at the t-stat and the r-squared the variables it is not possible to choose, the third criterion is to find the variable better correlated with the net leverage variable.

The fifth step aims to finally reproduce the goal of this dissertation. It is a reproduction of the table III of Frank & Goyal (2009) for each dependent variable, that allows the comparison of influences of variables and adequacy of models. This procedure is the basis of selection of the "core variables" that is similar to what is aimed to infer for the tree dependent variables. For each one, the process of this step starts with a regression with all independent variables already defined (minus the dropped in the fourth step). After that it is selected the variable with poor performance[29] observed to be dropped and then is made a regression with the remaining variables repeating the process until the last variable. In each regression is reported for the variable with the poorest performance the coefficient, the t-statistic, the significance and r-squared of that

[27] In order to use two-dimension clustered robust standard errors there was installed in Stata the ado file that was downloaded from the following site as suggested in Frank & Goyal (2009): http://www.kellogg.northwestern.edu/faculty/petersen/htm/papers/se/se_programming.htm. The suggestion of the reference paper that followed Petersen (2007) to implement this procedure.

[28] This dependent variable has its variation based not only in the proportion of debt, but also on the proportion of cash holdings subtracted. This means that it may englobe the effects of both of the other dependent variables.

[29] The criterions to choose poor performance are first the observed t-statistic closer to zero, then the higher significance and for last criterion the t-statistic closer to zero in the univariate tests.

regression and the Bayesian Information Criterion. The selection criterion of the core variables, in Frank & Goyal (2009), is inferred after doing the same process for random partitions of the sample (ten equal groups and *per* years) and calculate the percentage that each variable is included in the minimum BIC specification. Here, this study differentiates from the reference paper. The same described procedure will be repeated not only by grouping variables by year or randomly, but for different contexts. The first context was already defined explained uses all the variables. The second does the same process taking the industry related independent variables that can bias the results[30], or offset results from other variables misleading their importance. The hedging needs proxies were not used also as they are computed by correlations from firm specific characteristics and industry characteristics. The third context drops also the industry median standard deviation. The fourth context drops the five years average cash holdings as it is considered to capture a target for cash holdings and in the previous contexts were also dropped the variables of industry where are included proxies for targets of leverage and cash holdings. The fifth context uses fixed effects that Frank & Goyal (2009) consider to be important but don't use for the difficulty of interpretation. Here the objective is not to make an interpretation but see which variables after taking it into account appear to be robust. The same premise is used for the sixth and seventh contexts where are taking into account the year and industry sector effects.[31]

The sixth step is the confrontation of the results given. First it is analyzed the number of times the variable was included in the minimum bayesian information criterion for each of the three dependent variables. It is calculated a mean percentage for each independent variable across the three dependent variables and the mean percentage on cash holdings and leverage. This means will be calculated in each analysis of the sixth step. The second analysis concerns the number of times the independent variable achieved 99% significance, first in total regressions that the independent variables were used and second among the times the variables were included in the minimum bayesian information criterion. The third analysis concerns the signals of the coefficients. First is analyzed the percentage of times that each variable had a positive sign, then a

[30] Sectors with just one firm as an example

[31] Those regressions require the use of fixed effects (firm, year and sector) and the multi-dimension clustering standard errors (firm and year). For that the code "clustre2" is not able to do in Stata, so the code used were "reghdfe" that is able to deal with both conditions. The code was downloaded from the site: http://scorreia.com/software/reghdfe/install.html

negative sign, and at the end the percentage of times the higher frequent signal appeared. The fourth analysis and the fifth analysis are equal to the third but this time instead of computing the percentages of signal appearance with the number of times the variable was used in each context study, it was used respectively the times the variables appeared in the minimum bayesian information criterion and times the variable appeared with high significance. This is expected to help to get considerations about the matching of expectations concerning the coefficients of the independent variables by observing the relations with the dependent ones. each time they were dropped[32].

The seventh and last step is the analysis of the results given in the steps made so far, provide a possible choosing of the most relevant variables. So, this step is a presentation of the regressions and it's results by choosing the best variables. The first presentation is the one that for each dependent variable chooses the most relevant[33] explanatory variables. The second regresses the three dependent variables with the factors considered as common for all the three[34]. The third regresses the three dependent variables with the most relevant explanatory variables common between cash holdings and leverage. For fourth presentation it is regressed leverage, net leverage and cash holdings using the factors found better for leverage and then for net leverage, and a new model is created and regressed by adding the unlagged cash holdings to the leverage model and net leverage model. The purpose is to find patterns that indicate the influence of cash holdings in the capital structure. If the coefficients get closer to the net leverage ones from the first model of leverage to the new one it is expected the existence of an important influence.

3.3.3. The Models

The objective of this study concludes in creation of new models that will be presented in the "Results" chapter. The model used is the same as in Frank & Goyal (2009) where the linear regressions will study the importance of each factor when other important factors are also considered. The models are as follow:

[32] Every time a variable was dropped in the fifth step, the values of the dropped reports are concerned with the regressions made with all the variables that are more significant.

[33] Only those that appear in the minimum bayesian information criterion in all contexts at least 80% of the timed that the variables were used having been reported a coefficient's significance at 1% level over 50% of the times that appeared in the first criterion.

[34] The common variables are related with the factors that compose the model in the first presentation.

- $Leverage_{i,t} = \alpha + \beta F_{i,t-1} + \varepsilon_{i,t}$
- $Cash\ Holdings_{i,t} = \gamma + \delta F_{i,t-1} + \zeta_{i,t}$
- $Net\ Leverage_{i,t} = \rho + \varphi F_{i,t-1} + \rho_{i,t}$

Where $Leverage_{i,t}$ corresponds to the dependent variable leverage of the firm *i* and year *t*; $Cash\ Holdings_{i,t}$ denotes the dependent variable cash holdings of firm *i* and year *t*, used as cash hold; $Net\ Leverage_{i,t}$ denotes the dependent variable net leverage of firm *i* and year t; $F_{i,t-1}$ denotes the set of factors of firm *i* and year *t-1*. α, γ and ρ represent the constants for each model regressed; β, δ and φ represent the coefficients of the factors used in the models regressed; ε, ζ, and ρ represent the error terms of each regression made. The list of factors used are described in the appendix in Tables 1 and 2 (Appendix I and II) and the expectations concerning the factor are described in Table 3 (Appendix III).

Chapter 4: Results

4.1. Summary statistics

The summary statistics are shown for all variables. It is important to consider that the sample concerns 6455 observations correspondent to firms and 15 years (2001 to 2015 for independent variables and 2002 to 2016 for dependent variables). The Table 4 (Appendix IV) discloses the summary of descriptive statistics.

From the three dependent variables, the only one that may consider negative values is the net leverage as the minimum shows. The minimum of leverage is 0 meaning that there are firms with no debt, and from the cash holdings is positive meaning that in the sample all firms maintain hoard of cash. The net leverage as observed in the tenth percentile comprehends negative values which is due from firms that have more hoard of cash than debt. By comparing the maximums and minimums is shown, that size and tobin's Q vary only in positive values. The variables yield spread and expected Inflation vary in percentage in a range from negative to positive. The same range applies to percentage variables as earnings per share surprise earnings per share surprise) and price volatility. The variables dividends, stock repurchases and issuances, industry sigma and industry median leverage range from 0 to 1, while the remaining variables (ratios and correlations) vary in the range -1 to 1.

4.2. Correlations

The Table 5 (Appendix V) discloses the values of the correlations found between each independent variable with each dependent one. It is also reported the signal if the correlations are significant for each period described as before and after crisis. Note that for the independent variables with higher correlations (as following description) maintain its behavior (same signal and significant) in both periods.

From the correlations[35] table it is observable that the most positive and significant correlations coefficients with leverage are Size (0,3646), Tangibility (0,2763), but the higher is the Industry median Debt (0,6240). About the negative and significant variables, the most highlighted ones are the Tobin's Q (-0,4981), Free Cash Flow (-0,4136) and Profit (-0,3743). The cash holdings related variables also show high negative and significant correlation coefficients (unlagged cash holdings with -0.2427, Industry median Cash Holdings with -0.2877 and Cash holdings average with a correlation coefficient of -0.2069) as well as Industry Sigma (-0,3262). Other variables appear to have high[36] negative and significant correlations are Dividends, Net Working Capital, Stock Issuance, Stock Repurchase, Yield Spread and Over investment.

Related with the dependent cash holdings variable high positive correlations were found for Tobin's Q, Stock Issuance, Stock Repurchase, Over investment and Price Volatility. The highlights are Industry median Cash Holdings (0.5419) Cash holdings average (0.7244) and Industry Sigma (0.5119). The most negative correlations are from the variables Size (-0.2468), Tangibility (-0.2582), Industry median Debt (-0.2547), Net Working Capital (-0.1607) and Profit (-0.1223).

The net leverage is positively correlated with high levels with Size (0.2820), Tangibility (0.3127), Industry median Debt (0.4644). The higher negative correlations are from the variables unlagged cash holdings (-0.5567), Tobin's Q (-0.3840), Industry median Cash Holdings (-0.4775), Cash holdings average (-0.4326), Industry Sigma (-0.4491), Price Volatility (-0.3754). Other variables as Free Cash Flow, Stock Issuance, Stock Repurchase and Over investment also presented high negative correlations with the quoted dependent variable.

For the "correlation variables", as the ones that infer the hedging needs were found low and negative correlations with leverage for the factors computed as Hedging sales growth (free cash flow) and Hedging Research and Development (cash flow) where the other pair got low positive coefficients.

4.3. Univariate tests

On the Table 6 (Appendix VI) are present the values of the coefficients, t-statistics, significance and r-squared for all the variables in simple independent

[35] The significance levels here described are at 1% level

[36] High correlations are the ones considered to have a coefficient higher than 0,10 positive or negative.

regressions combining each independent with each dependent variable. The result given are similar to those given above. The signals of the coefficients are exactly the same as expected.

In the case of the leverage, all variables are significant at 1%level except for Price Volatility (significant at 5% level) Hedging Research and Development (free cash flow) (significant at 10% level), Expected Inflation, Hedging Sales growth (free cash flow), Hedging Research and Development (free cash flow), Earnings Per Share Surprise and Hedging Sales Growth (cash flow). The r-squared higher than 0,1 are the variables Industry median Debt, Tobin's Q Free Cash Flow, Size, Profit and Industry Sigma where the first three are the ones that have higher t-statistic (higher than 10 positive or negative)

For cash holdings the variables that didn't present significance in at least 10% are Free Cash Flow, Expected Inflation, Hedging Research and Development (free cash flow), Hedging Sales Growth (cash flow), Earnings Per Share Surprise, Hedging Sales growth (free cash flow), Profit. Both Dividends and Hedging Research and Development (free cash flow) presented significance at 5% level. The remaining variables presented significance at 1% level. The only variable that surpassed the barrier of 10 in the t test is the Cash holdings average and it is also highest r-squared. The r-squared that surpassed the 0,10 barrier as well are Industry median Cash Holdings, Industry Sigma, Price Volatility, Tobin's Q and finally Stock Issuance.

Concerning net leverage, the lower significance was found in Expected Inflation, Earnings Per Share Surprise, Dividends, Hedging Sales growth (free cash flow), Net Working Capital, Hedging Sales Growth (cash flow), Hedging Research and Development (free cash flow) 6 and Hedging Research and Development (free cash flow) coefficients. The Profit has significance at 10% level. The remaining variables found the significance at 1% level and from those Industry median Debt and Industry median Cash Holdings perform with the higher t-statistic. Considering the r-squared, in addition to the last variables, Industry Sigma, Cash holdings average, Tobin's Q and Price Volatility as well as unlagged cash holdings have an r-squared higher than 0,1.

4.4. Choosing hedging needs proxy

The choosing of hedging needs proxy is explained in "Methodology" and after following that procedure, the proxy were chosen as follows:

The process described made the hedging needs proxy based on sales expected growth be chosen by a correlation with cash flows instead of using free cash flow. The values used in the criterion by observing the Tables 5 and 6 (Appendix V and VI) showed that the relations found with net leverage were used to untie the decision. For the usage Hedging Sales Growth (cash flow) the information provided by the tables, revealed better values in relation with leverage and net leverage, opposed to Hedging Sales growth (free cash flow) that only fitted for the cash holdings model.

For correlation with research and development, the free cash flow was chosen by recurring to the last criterion. The free cash. flow was better. Correlated for cash holdings and the cash flow better for leverage. The net leverage revealed an ambiguous decision, in one side the cash flow correlation had better performance in significance but, the r-squared was favorable to the free cash flow. The untie was made by looking at the correlations between Hedging Research and Development (free cash flow) and Hedging Research and Development (free cash flow) with net leverage.

4.5. Factor choosing regressions

The results provided from the six different contexts studied (Tables 7 to 13 (Appendix VII to XIII)) are presented as the variables that construct the models found by using the minimum bayesian information criterion.[37] The significances described as follow are related with the significance tests of the coefficients referent to the variables referred.

The first context (Table 7 (Appendix VII)) included all variables and remained in the referred criterion for leverage Industry median Debt, Tobin's Q, Free Cash Flow, Size, Dividends, Net Working Capital and Cash holdings average with 1%

[37] The variables Hedging Research and Development (free cash flow) and Hedging Sales Growth (free cash flow) were not included in any context as were dropped in the process described in 4.4.

level of significance and Hedging Sales Growth (cash flow), Profit, Stock Repurchase, Stock Issuance, Yield Spread, Earnings Per Share Surprise and Price Volatility.

In the cash holdings regressions, the minimum Bayesian information criterion used contained the following factors: Cash holdings average, Industry median Cash Holdings, Stock Issuance, Tangibility, Price Volatility, Yield Spread, Net Working Capital, Tobin's Q, over investment and Size dropped with 1% level of significance and Hedging Sales Growth (cash flow), Dividends, Earnings Per Share Surprise, Stock Repurchase and Profit.

The net leverage model included Industry median Debt, Price Volatility, Free Cash Flow, Cash holdings average, over investment, Industry median Cash Holdings, Net Working Capital, Stock Issuance, Stock Repurchase, Tangibility, Hedging Sales Growth (cash flow), where Net Working Capital and Hedging Sales Growth (cash flow) were dropped without the having 1% of significance level.

The second context (Table 8 (Appendix VIII)) didn't include the variables related with industry standards Industry median Debt and Industry median Cash Holdings and hedging needs proxies. In leverage the model chosen used Tobin's Q, Free Cash Flow, Net Working Capital, Industry Sigma, Size, Profit, Tangibility, Cash holdings average, Dividends, Yield Spread and Over investment where the last two presented significance levels comprehended only at 10% level opposed to the remaining used that presented significance levels inside 1%.

The cash holdings model used Industry Sigma, Stock Issuance, Yield Spread, Price Volatility, Tangibility, Net Working Capital that were dropped under significance level of 1%, and above it the Tobin's Q, over investment, Dividends, Free Cash Flow, Profit and Stock Repurchase.

The net leverage in this context found the model to be composed by Price Volatility, Free Cash Flow, Industry Sigma, Cash holdings average, Tangibility, Net Working Capital, Stock Issuance, Over investment, Stock Repurchase and Tobin's Q, where the first ones were dropped with a 1% level of significance and the last for have a significance level between 1% and 10%.

The third context (Table 9 (Appendix IX)) didn't include the same variables as in the previous context and also Industry Sigma. The model found for leverage included Tobin's Q, Free Cash Flow, Size, Net Working Capital, Cash holdings

average, Tangibility, Profit, Dividends, Stock Issuance, Yield Spread, Over investment. From those only the last four weren't dropped with a significance level included in 1%.

In the cash holdings model was found to use Cash holdings average, Tangibility, Price Volatility, Stock Issuance, Yield Spread, Tobin's Q, Net Working Capital, Over investment, Free Cash Flow, Profit, Dividends, Stock Repurchase and Size, where all the variables were dropped achieving 1% significance levels except for the last six.

The net leverage factors included in the minimum bayesian information criterion were Price Volatility, Free Cash Flow, Cash holdings average, Tangibility, Net Working Capital, Tobin's Q, Over investment, Stock Issuance and Stock Repurchase, where from those only the last two weren't dropped with 1% significance level.

The fourth context (Table 10 (Appendix X)) didn't include also Cash holdings average, and the best model found for leverage included Tobin's Q, Free Cash Flow, Size, Net Working Capital, Tangibility, Dividends, Stock Issuance, Profit, Yield Spread, Over investment, where the dropped factors that didn't get a reported significance level lower than 1% were the last three ones.

For cash holdings, the model found included Tobin's Q, Price Volatility, Tangibility, Stock Issuance, Net Working Capital, Profit, Yield Spread, Dividends, Stock Repurchase and Size where the last four where not included in the group of dropped with 1% significance.

The net leverage factor model included in this context Price Volatility, Tobin's Q, Tangibility, Free Cash Flow, Stock Issuance, Profit, Over investment and Net Working Capital where only the last two didn't achieve 1% significance at the stage that were dropped.

The fifth (Table 11 (Appendix XI)) context used firm fixed effects for all available variables excluding the ones that were excluded for collinearity issues (Over investment, Industry Sigma, Hedging research and development (cash flow) and Hedging Sales Growth (cash flow)). Being all said the leverage factors that were chosen are Tobin's Q, Free Cash Flow, Industry median Debt, Size, Stock Repurchase, Profit, Dividends, Yield Spread, where only the first four are included dropped with 1% significance level.

The cash holdings factors selected are Tangibility, Size, Industry median Cash Holdings, Net Working Capital, Cash holdings average, Expected Inflation,

Industry median Debt, Yield Spread and Price Volatility, where only the first three were reported with a significance below 1%.

The selected factor to explain net leverage are Free Cash Flow, Price Volatility, Size, Stock Repurchase, Industry median Cash Holdings, Industry median Debt, Tangibility, Profit, Yield Spread where only the last three were dropped without reaching 1% of significance.

The year effects (Table 12 (Appendix XII)) present on the sixth context induce that all the factors were included in this study. By this in the leverage results the factors included are Industry median Debt, Tobin's Q, Free Cash Flow, Size, Dividends, Net Working Capital, Cash holdings average, Stock Issuance, Industry Sigma, Profit, Hedging Sales Growth (cash flow), Price Volatility. Here the factors dropped with at least 1 % significance are the first six.

The cash holdings factors included almost all available except for Industry Sigma, Industry median Debt and Hedging research and development (cash flow). The most significant ones (significance of 1%) are Cash holdings average, Stock Issuance, Industry median Cash Holdings, Tangibility, Price Volatility.

The net leverage factor only didn't include Profit, Size, Hedging research and development (cash flow), Earnings Per Share Surprise and Dividends, whereas the Industry median Debt, Price Volatility, Free Cash Flow, Cash holdings average and Over investment were reported being significant at 1 % level in the last regression that they were included.

The seventh and last context (Table 13 (Appendix XIII)) included industry sector effects and for that reason Industry Sigma was not included. Being that said, the leverage factors included in this study are Tobin's Q, Free Cash Flow, Size, Dividends, Industry median Debt, Cash holdings average, Net Working Capital, Price Volatility, Stock Repurchase, Stock Issuance, Profit and Yield Spread, where only the first four are reported with 1% level of significance.

The cash holdings factors include Cash holdings average, Stock Issuance, Tangibility, Yield Spread, Net Working Capital, Size, Over investment, Tobin's Q, Expected Inflation, Industry median Debt, Industry median Cash Holdings and Price Volatility, where the first five are reported as 1% significant.

Finally, for the net leverage the factors included are Price Volatility, Free Cash Flow, Cash holdings average, Stock Issuance, Stock Repurchase, Tobin's Q, Over investment, Tangibility, Industry median Debt and Net Working Capital. Here

the variables Price Volatility, Free Cash Flow, Cash holdings average and Stock Repurchase are reported with 1% level of significance.

4.6. Signal Consistency Results

The results concerning the patterns observed on the signals that the coefficients of the variables shown (Table 16 (Appendix XVI)) are following described firm by firm:

- Size maintained a positive signal in all the contexts studies for leverage regressions and the opposite for the cash holdings. Concerning net leverage, the pattern is observed by observing the signals reported when the variable was included in the minimum bayesian information criterion models, showing a positive signal 100% of the times. These results are equally observed by observing the correlations and the univariate regressions coefficients.
- Tobin's Q in leverage and net leverages were always reported with negative coefficients. For cash holdings, the pattern was observed when included in the minimum bayesian information criterion models, where the coefficients were positive all times. These results are equally observed by observing the correlations and the univariate regressions coefficients.
- Dividends got all the coefficients in all studies positive for cash holdings and negative for the remaining dependent variables. In the correlations and univariate tests, the results of the signals were negative for cash holdings and positive for net leverage maintaining the negative signal on the coefficient related with leverage.
- Profit coefficients in all the context studies appeared with a negative signal concerning leverage, and by looking to the percentage of time that the variable was included in the minimum bayesian information criterion, the cash holdings presented also negative signals. In what concerns the net leverage, the Profit' coefficient appears to positive the only time it was reported as significant at 1% level. The correlations and univariate regressions pointed negative signals in relation with all dependent variables.

- Tangibility appeared always with a positive signal related with net leverage and the opposite related with cash holdings. When included in the minimum bayesian information criterion models the coefficient of this variable was always reported as positive for leverage. The results are equally found in correlations and univariate regressions.
- Expected Inflation the coefficients of this variable were found positive for net leverage in all regressions, and negative when included in the minimum bayesian information criterion models for cash holdings. The variable has never appeared with significance as benchmarked. In correlations and univariate regressions this variable got positive signs but not significant at 10% level for all dependent variables.
- Industry median Debt found the signals positive for all dependent variables in all the contexts, as well as in correlations and univariate regressions for leverage and net leverage. The cash holdings related coefficients are negative in these two last tests.
- Industry median Cash Holdings coefficients are negative for leverage and net leverage and positive concerning cash holdings as reported in all context's studies and correlations and univariate regressions.
- Cash holdings average the signals results are found to be equal as in Industry median Cash Holdings, the only difference is that the leverage signal was only found 100% of the times that included in the minimum bayesian information criterion models.
- Free Cash Flow signals are found in all the contexts negative for leverage and net leverage, and positive for cash holdings by looking when included in the minimum bayesian information criterion models. The results are equally found in correlations and univariate regressions.
- Industry Sigma appeared related with cash holdings as positive in all the context studies. Only by observing the signals when the report was significant at 1% level is observable that the remaining variables have negative coefficients. These signals are also observable in correlations and univariate regressions.
- Net Working Capital presented in all criterions for all variables a negative coefficient.

- Hedging research and development (cash flow) presented positive coefficients for all context studies but this variable never appeared in the minimum bayesian information criterion models neither were reported as significant at 1%. The correlations and univariate regressions showed a negative coefficient related with cash holdings.
- Hedging Sales Growth (cash flow) presented negative coefficients in all the contexts of studying leverage and net leverage, and positive for cash holdings. The same results are observed in correlations and univariate regressions. Note that this variable was never reported as significant in any of the contexts.
- Stock Issuance presented coefficients negative for leverage and net leverage and positive for cash holdings in all the contexts, criterions, and correlations and univariate regressions.
- Stock Repurchase the signals are the opposite of the Stock Issuance, with the difference that only for net leverage the criterions were fulfilled (appearance in all contexts with the same signal and being reported as significant at 1% level as well)
- Yield Spread coefficient appeared for leverage to be negative and positive for cash holdings in all context studies as well as in correlations and univariate regressions. Concerning net leverage, this variable doesn't follow a robust trend (100% of appearances of the same signal in any the criterion). The correlations and univariate regressions indicate a negative sign and the reports in all the contexts that the variable was used the coefficient have a positive signal.
- Earnings Per Share Surprise appeared in all the contexts with a positive coefficient relating cash holdings. When included on the minimum bayesian information criterion models, the variable presented a positive coefficient related with leverage. About net leverage the results are ambiguous as the variable never fulfilled totally the first criterions (minimum bayesian information criterion models and significances signals). The correlations and univariate regressions have presented positive signals in the coefficients of this variable related with leverage and cash holdings and negative for the remaining dependent variable.

- Over investment, as in the correlations and univariate regressions, presented positive coefficients for cash holdings and negative for net leverage in all the context studies. For leverage, the signal appeared positive 100% of the times that the variable was included in the minimum bayesian information criterion models, something observable also in the correlations and univariate regressions.
- Price Volatility coefficient appeared in all the context studies reported with a negative signal for net leverage and positive for cash holdings. The correlations and univariate regressions also support the same observation except for leverage where was found negative coefficients opposed to the positive values found in all times that the variable was included in minimum bayesian information criterion models.

4.7. Factor Choosing Results

The comparing the results on the Tables 14 and 15 (Appendix XIV and XV) it is possible to observe which factors are used in the minimum bayesian information criterion models for the seven contexts presented, and the percentage of times its coefficient were significant at 1% level.

So, it is possible to observe that for leverage, the variables that were included in the minimum bayesian information criterion in all contexts are Size, Tobin's Q, Dividends, Profit, Industry median Debt and Free Cash Flow, where Size, Tobin's Q and Free Cash Flow have the coefficients statistically significant at 1% level in all reports.

The cash holdings most used factors in the minimum bayesian criterion models are Tangibility, Industry median Cash Holdings, Cash holdings average, Net Working Capital, Yield Spread and Price Volatility where from these, the only coefficient that were significant at 1% level was Tangibility (Industry Sigma and Stock Issuance were always significant in all the times that were included in the minimum bayesian information criterion).

Net leverage factors that appeared 100% of the times in the minimum bayesian information criterion are Tangibility, Industry median Debt, Free Cash Flow, Over investment and Price Volatility. In this case the significance criterion highlighted Free Cash Flow and Price Volatility (Size and Cash holdings average

were always significant in all the times that were included in the minimum bayesian information criterion).

The comparison of behavior of the coefficients signals of the variables when included in the minimum bayesian information criterion and when the coefficients are found significant at 1% level provided robust results about the behavior of the independent variables and the influence on the dependent ones. First, all of the variables maintained the signal in all the regressions where they were used before being dropped in the context study when their coefficients were significant at 1% level. The variables that didn't appear to be significant more than one time are for leverage the Industry Sigma and Stock Issuance, for cash holdings the Profit and Industry Sigma, and for net leverage Size, Profit, Industry Sigma and Stock Issuance. In the inclusion of the minimum bayesian information criterion all the variables maintained the same signal except Industry Sigma for leverage studies where were included two times in the criterion with different signals in each time. The same happened with net leverage in relation with also Industry Sigma as well as Profit and Yield Spread.

4.8. Resulting Models

The criterion for determination of the models is expressed in the methodology. The results observed and following that methodology provided the following models (Table 17 (Appendix XVII)) where all the variables have coefficients significant at 1% level excepting for the Net Working Capital and Stock Repurchase in the regression of net leverage. The signals of the coefficients appeared in the regression of the following models with the same trend as described in the 4.6. section.

- The Leverage factors fulfilled the criterion selections are Size, Tobin's Q, Dividends, Industry median Debt, Cash holdings average, Free Cash Flow, and Net Working Capital. In this case Industry median Debt assumed the highlighted performance in terms of t-statistic (14,83) more than the double of the absolute value of the second-best performance (Free Cash Flow with -7,29).
- For Cash Holdings the same criterion determined the factors chosen to be Tangibility, Industry median Cash Holdings, Cash holdings average, Net Working Capital Stock Issuance, Yield Spread and Price

Volatility. The highlight performance in terms of t-statistic for this variable is Cash holdings average (12,12) that is almost the triple of the second-best absolute values that are related with Stock Issuance and Industry median Cash Holdings (4,55).

- Net Leverage chosen model is composed by is Industry median Debt, Cash holdings average, Free Cash Flow, Net Working Capital, Stock Repurchase and Over investment and Price Volatility. The highest t-statistic is Industry median debt, but the value of the t stat is closer to the following variables (Free Cash Flow with -8,79 and Price Volatility with -7,87).

The methodology approached and criterions provide observation of variables that Cash holdings average and Net Working Capital to be the common presence of the three models above described (Table 18 (Appendix XVIII)). The signals were found equal as in the regressions above and the significance levels were found to be included in 1% level as well. In net leverage the Net Working Capital coefficient was negative as in the other regressions. In the regression of cash holdings this variable had lower t-stat and coefficient (absolute number) than in leverage but the net leverage values were in the middle of both closer to the values found in cash holdings regression. The Cash holdings average have higher positive coefficient than the negative coefficient found by using to regress cash holdings and the net leverage coefficient is in the middle and closer to the one found after regress leverage. The t-stat became similar between leverage and net leverage.

These last models are composed by the only factors that are observed to be common between leverage and cash holdings.

The following study results (Table 19 (Appendix XIX)) are from the considered as fourth presentation in "Methodology") relates the usage of Size, Tobin's Q, Dividends, Industry median Debt, Cash holdings average, Free Cash Flow, and Net Working Capital to regress the three dependent variables and a fourth regression where the unlagged cash holdings is added as described in "Methodology". The signals in the four regressions follow the same trend described in the section 3.6. for almost all variables. The different signals are found in the regression of net leverage for the coefficient of Dividends that is positive (following the correlations and univariate regressions tests) and the same applied to this variable when regressing cash holdings but with opposed

signs. The Industry median Debt show a different signal than expected in the referred section for the cash holdings regression, but followed the pattern showed in the correlations and univariate regressions tests. After including the unlagged cash holdings in leverage regressions, the coefficients t-statistics wasn't observed great changes (only Cash holdings average' coefficient dropped to about half the value of the t-test losing the status of 1% significant).

When using the factors chosen for net leverage to create the four models as described in methodology (Table 20 (Appendix XX)), the factors Industry median Debt, Cash holdings average, Free Cash Flow, Net Working Capital, Stock Repurchase, Over investment and Price Volatility are the chosen for this approach. The first four are common variables with the leverage factors, and the coefficients for those revealed the signals. According to the description in section 4.6., the Stock Repurchase only after including unlagged cash holdings appeared with a positive coefficient, and for cash holdings the same criterions failed as the coefficient appeared positive. The other two factors have the coefficients according to the results of the signals analysis. The t-statistics of the variables didn't change considerably.

The observation of patterns used the two approaches (the eight models and regressions) for an understanding of the influence of cash holdings on leverage proportion and net leverage. It was observed that when a positive (negative) sign in the coefficients of the cash holdings regression was observed to be related with an increase (decrease) the coefficient from the leverage regression before and after including the unlagged cash holdings (even though the differences observed were very small). Moreover, the two regressions where the unlagged cash holdings was included had a negative coefficient. The last pattern found was observed by connecting the t-statistic value of net leverage with either the value in leverage or in cash holdings by the near value. It was observed that when the value of the t-statistic in net leverage is closer to the one in leverage, is related with a lowering of the value the coefficient (from the leverage related to the net leverage related). On the opposite, when the value of the t-statistic in net leverage is closer to the one in cash holdings, is related with an increasing of the value the coefficient (from the leverage related to the net leverage related). The only value that wasn't according to this observation was in the variable of Over investment. (Acharya, Eisert, Eufinger, & Hirsch, 2016)(Ravier & Lewin, 2012)(Junior & Franca, 2012).

Chapter 5: Conclusions

The present study aimed to help to enlighten that capital structure is not a matter only related with a simple dichotomy of equity and debt. In the literature review was shown that the theme is more complex where concepts as internal equity, liquidity, new external financing, played an important role that must be considered in the managing of the financing decisions. This study aims to enforce the importance of liquidity being part of the considerations when thinking about capital structure theory. The theories presented shown different reasons that guide the decision making on this topic. The tradeoff theory is presented as a model of choice of optimal decisions or a search for equilibrium, the market timing as a model of choice by opportunities available, the pecking order as a model of choice by order sustained by a behavioristic argument as well as agency theory and managerial optimism. From all the theories some variables were suggested to be relevant to influence the capital structure of a company.

The empirical part of this study aggregated the same explanatory variables to three dependent ones. The Net leverage was introduced in order to understand the results provided from the models used to explain leverage and cash holdings (the proxy for liquidity) and connect them. From the empirical study, the main conclusions to achieve are at first the relation of the coefficient and which ones were predicted by which theory. The second are which independent variables proposed better define each explained variable, and third which patterns are found to relate cash holdings and leverage.

Attending the first, the signals found to be more consistent for explanation of the influences are those that are consistently found in the results of the analysis of the signals in section 4.6. and also consistent with the signs observed in the coefficients after regressing the most consistent factors. So, the greater conclusion is that there is a tendency shown for firms to adjust on targets both for debt and liquidity which is consistent with the trade-of theory. Note that a proxy for target cash holdings were selected to be part of the leverage model. The size measure's coefficient and Tobin's q are also consistent with the same theory, where the last may be significant on leverage regression. This may be due to the variable varies

with the capitalization happening the same with the denominator of the leverage measure as the criterions used in this paper didn't show great importance of this variable in the other two studied (which may be argument for future research). The agency theory supports the results found on the variables Tobin's q and dividends. The variables of free cash flow and net working capital are supported by the pecking order. This result confers the suggestion of a combination of cash holdings and pecking order more likely as the there are some patterns found for the existence of them both. The suggestion is that the trade-off theory may explain the boundaries between the different financing sources used, in this case the boundaries for the usage of internal equity, debt and new external equity by the order suggested in the pecking order theory. In a simplistic way of traducing this is that "the manager decides to use what pecking order suggests until what trade-off theory allows". The cash holdings "best" variables follow mostly the predictions of the trade-off model.

The study passes through an extensive battery of tests in order find the most reliable variables. The best variables found to explain leverage are size, growth opportunities, dividends, the industry median leverage, the five-year average cash holdings, the free cash flow (was expected to be more important in cash holdings) and the working capital. For cash holdings the most reliable found were tangibility, the industry target variables (industry median and five-year average cash holdings), stock issuances, spread rate and volatility. The net leverage model is composed by the industry median leverage, the cash holdings average, the free cash flow, the net working capital, the stock issuances, the overinvestment and price volatility. The model was expected to be composed by the variables found important for leverage and cash holdings, and the first four described are shared with leverage while, the cash holdings average, the working capital and volatility are shared with cash holdings. At the end, the variables that were found common in the three models were just the cash holdings average and the net working capital. There was a limitation of the study as the number of variables is too much low and just the cash holdings average proved to have performance relevant for one of the independent variables (it was expected that the common variables counted with more of the variables that outperformed).

When comparing the models to evaluate the influence of cash holdings the major evidence concludes with cash holdings being negative debt as suggested in Acharya et al. (2007). The conclusion is firstly reached by observing that when

integrating the unlagged cash holdings as independent variable in leverage regressions (using leverage and net leverage selected factors) the coefficient observed is always negative. Then the signals of the regression of unlagged cash holdings as independent variable always dictate if the dependent variables influence (coefficient) rises or drops in leverage regressions after retrieving the cash holdings effects (inserting the unlagged cash holdings). But the most interesting pattern found (except for one variable) is by observing the t-statistics and comparing the evolution of the coefficient from leverage to net leverage. When the net leverage t-statistic values are closer to the ones of leverage regressions, the coefficient of the independent variables drop from the regression of leverage to net leverage. On the opposite when the net leverage t-statistic values are closer to the ones of cash holdings regressions, the coefficient of the independent variables tend to increase from the regression of leverage to net leverage. This is another proof that cash holdings and leverage are negative related, as it seems that leverage and cash holdings tend to offset each other's influence on net leverage.

The conclusions of all the work provided evidence that is suggested in the literature concerning cash holdings provided evidence supportive of tradeoff as concluded in Opler et al. (1999) and Ferreira & Vilela (2004). The referenced paper of Acharya et al. (2007) suggested the same conclusions retrieved for the negative relation between liquidity and debt. The paper that provided the idea for the methodology (Frank & Goyal, 2009) suggested results that were also found, namely for the variables of median industry leverage, size, market to book assets ratio (Tobin's Q) and dividends. Surprisingly profits and tangibility and expected inflation were not included in the best model for leverage in this study. The profits may be explained by the introduction of free cash flow, that captures the same predictions but may be more reliable as suggested in Fernandez (2017).

Some variables were not found to have the impact that were expected, mostly the hedging needs, spread rates, expected inflation, and even overinvestment. This may be result from approaches that may be done with different measures that may be more reliable that the used. Other limitations are found in this study to achieve the expected conclusions. First one is the difficulty in find data to proxy credit lines, as it was found in the literature to be important for measuring liquidity and the same for ownership structure. Another important limitation is the computing cash holdings wit net assets as denominator. The variability of

values in the sample that may have biased some results inducing in error some results. Therefore, the industry median cash holdings, the cash holdings average and the industry sigma were directly related with that limitation which could provide other results concerning the same variables.

Then for future studies, the inclusion of ownership structure variables and unused borrowing power may help to get more detailed information concerning the study of this matter. Better proxies for some variables may be also approached in order to infer more consistent results that were expected concerning the ones related in the last paragraph. The using of a measure of cash holdings as the ratio of cash and equivalents on the book value of assets is expected to provide different results that may be interesting.

Even with all the limitation, surprisingly, many conclusions collided with the expectations, which may induce that the proxy used for liquidity may be taking into account for future studies. This result found in this study, directed towards the conclusion that liquidity is an important part of the capital structure as well as the two parts of the structure of the right side of balance sheets.

Bibliography

Acharya, V. V., Almeida, H., & Campello, M. (2007). Is cash negative debt? A hedging perspective on corporate financial policies. *Journal of Financial Intermediation*, *16*(4), 515–554. https://doi.org/10.1016/j.jfi.2007.04.001

Acharya, V. V., Eisert, T., Eufinger, C., & Hirsch, C. (2016). *Real Effects of the Sovereign Debt Crisis in Europe : Evidence from Syndicated Loans*.

Akerlof, G. A. (1979). The Market for "Lemons": Quality Uncertainty and the Market Mechanism Author(s): *The Quarterly Journal of Economics*, *84*(3), 488–500.

Baker, M., & Wurgler, J. (2002). Market timing and capital structure. *Journal of Finance*, *57*(1), 1–32. https://doi.org/10.1111/1540-6261.00414

Baxter, N. D. (1967). Leverage, Risk of Ruin and the Cost of Capital. *The Journal of Finance*, *22*(3), 395–403.

Berger, P. G., Ofek, E., & Yermack, D. L. (1997). Managerial Entrenchment and Capital Structure Decisions. *The Journal of Finance*, *52*(4), 1411–1438. https://doi.org/10.1111/j.1740-1461.2010.01193.x

Black, F., & Scholes, M. (1973). The Pricing of Options and Corporate Liabilities. *Journal of Political Economy*, *81*(3), 637–654.

Bolton, P., Chen, H., & Wang, N. (2013). Market timing, investment, and risk management. *Journal of Financial Economics*, *109*(1), 40–62. https://doi.org/10.1016/j.jfineco.2013.02.006

Bradley, M., Jarrell, G. A., & Kim, E. H. (1984). On the Existence of an Optimal Capital Structure: Theory and Evidence. *The Journal of Finance*, *39*(3), 857–878. https://doi.org/10.1111/j.1540-6261.1984.tb03680.x

Brown, S., Hillegeist, S. A., & Lo, K. (2009). The effect of earnings surprises on information asymmetry. *Journal of Accounting and Economics*, *47*(3), 208–225. https://doi.org/10.1016/j.jacceco.2008.12.002

Brush, T. H., Bromiley, P., & Hendrikx, M. (2000). The Free Cash Flow Hypothesis for Sales Growth and Firm Performance. *Strategic Management Journal*, *21*(4), 455–472. https://doi.org/10.1002/smj.233

Das, S., Hong, K. P., & Kim, K. (2012). Earnings Smoothing, Cash Flow Volatility, and CEO Cash Bonus. *The Financial Review*, *48*, 123–150. https://doi.org/10.2139/ssrn.2020463

Dechow, P. M. (1994). Accounting & Economics The role of accounting accruals. *Journal of Accounting and Economics*, *18*, 3–42.

Dechow, P. M., Sloan, R. G., & Sweeney, A. P. (1996). Causes and Consequences of Earnings Manipulation: An Analysis of Firms Subject to Enforcement Actions by the SEC*. *Contemporary Accounting Research*, *13*(1), 1–36. https://doi.org/10.1111/j.1911-3846.1996.tb00489.x

Drake, P. P. (2008). What is free cash flow and how do I calculate it?

Durand, D. (1952). *Costs of Debt and Equity Funds for Business: Trends and Problems of Measurement*. (U.-N. Bureau, Ed.), *Conference on Research in Business Finance*. NBER. Retrieved from http://www.nber.org/chapters/c4790

Emery, G. W. (1982). Optimal Liquidity Policy: A Stochastic Process Approach. *The Journal of Financial Research*, *5*(3), 273–283.

Emery, G. W., & Cogger, K. O. (1982). The Measurement of Liquidity. *Journal of Accounting Research*, *20*(2), 290–303.

Faulkender, M. (2005). Hedging or Market Timing ? Selecting the Interest Rate Exposure of Corporate Debt. *The Journal of Finance*, *60*(2), 931–962.

Faulkender, M., Flannery, M. J., Hankins, K. W., & Smith, J. M. (2012). Cash flows and leverage adjustments. *Journal of Financial Economics*, *103*(3), 632–646. https://doi.org/10.1016/j.jfineco.2011.10.013

Fernandez, P. (2017). *Cash Flow Is a Fact: Net Income Is Just an Opinion*. https://doi.org/10.2139/ssrn.330540

Ferreira, M. A., & Vilela, A. S. (2004). Why Do Firms Hold Cash? Evidence from EMU Countries. *European Financial Management*, *10*(2), 295–319.

Fischer, E. O., Heinkel, R., & Zechner, J. (1989). Dynamic Capital Structure Choice : Theory and Tests. *The Journal of Finance*, *44*(1), 19–40.

Flannery, M. J., & Rangan, K. P. (2006). Partial adjustment toward target capital structures. *Journal of Financial Economics*, *79*(3), 469–506. https://doi.org/10.1016/j.jfineco.2005.03.004

Frank, M. Z., & Goyal, V. K. (2009). Capital Structure Decisions: Which Factors Are Reliably Important? *Financial Management • Spring*, 1–37.

Fu, F. (2010). Overinvestment and the Operating Performance of SEO Firms. *Journal of Financial Management*, 249–272.

Gordon, M. J. (1959). Dividends, Earnings and Stock Prices. *The Review of Economics and Statistics*, *41*(2), 99–105.

Gordon, M. J., & Shapiro, E. (1956). Capital Equipment Analysis: The Required Rate of Profit. *Management*

Science, *3*(1), 102–111.

Graham, J. R. (1996). Debt and the marginal tax rate. *Journal of Financial Economics 41*, *41*, 41–73. https://doi.org/10.1038/srep43126

Graham, J. R., & Harvey, C. R. (2003). Expectations of Equity Risk Premia, Volatility and Asymmetry from a Corporate Finance Perspective. https://doi.org/10.2139/ssrn.292623

Halov, N., & Heider, F. (2011). Capital Structure, Risk and Asymmetric Information. *Quarterly Journal of Finance*, *1*(4), 767–809. https://doi.org/10.2139/ssrn.566443

Heaton, J. B. (2002). Managerial Optimism and Corporate Finance. *Financial Management*, *31*(2), 33–45. https://doi.org/10.2307/3666221

Hirshleifer, J. (1966). Investment Decision under Uncertainty : Applications of the State-Preference Approach. *The Quarterly Journal of Economics*, *80*(2), 252–277.

Jensen, M. C. (1986). Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. *American Economic Review*, *76*(2), 323–329. https://doi.org/10.2139/ssrn.99580

Jensen, M. C., & Meckling, W. (1976). Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure. *Journal of Financial Economics*, *3*(4), 305–360. https://doi.org/http://dx.doi.org/10.1016/0304-405X(76)90026-X

Junior, L. S., & Franca, I. de P. (2012). Correlation of financial markets in times of crisis. *Physica A: Statistical Mechaniscs and Its Applications*, *391*(1–2), 187–208.

Keynes, J. M. (1936). *The General Theory of Employment, Interest, and Money*. London: Macmillan.

Kim, S. T. (2017). *Managements' Overconfident Tone and Corporate Policies*.

Korajczyk, R. A., Lucas, D. J., & McDonald, R. L. (1992). Equity Issues with Time-Varying Asymmetric Information. *The Journal of Financial and Quantitative Analysis*, *27*(3), 397–417.

Kraus, A., & Litzenberger, R. H. (1973). A State-Preference Model of Optimal Financial Leverage. *The Journal of Finance*, *28*(4), 911–922.

Lewellen, J., & Lewellen, K. (2006). *Internal Equity , Taxes , and Capital Structure*.

Lins, K. V., Servaes, H., & Tufano, P. (2010). What drives corporate liquidity ? An international survey of cash holdings and lines of credit $. *Journal of Financial Economics*, *98*(1), 160–176. https://doi.org/10.1016/j.jfineco.2010.04.006

Lucas, D. J., & Mcdonald, R. L. (1990). Equity Issues and Stock Price Dynamics. *The Journal of Finance*, *45*(4), 1019–1043.

Miller, M. H. (1977). Debt and Taxes. *The Journal of Finance*, *32*(2), 261–275. https://doi.org/10.1111/jofi.12318

Miller, M. H., & Orr, D. (1966). A Model of the Demand for Money by Firms. *The Quarterly Journal of*

Economics, *80*(3), 413–435.

Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, *48*(3), 261–297.

Modigliani, F., & Miller, M. H. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *The American Economic Review*, *53*(3), 433–443.

Myers, S. C. (1984). The Capital Structure Puzzle. *The Journal of Finance*, *39*(3), 575–592.

Myers, S. C. (2001). Capital Structure. *The Journal of Economic Perspectives*, *15*(2), 81–102. Retrieved from http://links.jstor.org/sici?sici=0895-3309%28200121%2915%3A2%3C81%3ACS%3E2.0.CO%3B2-D

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, *13*, 187–221. https://doi.org/10.1016/0304-405X(84)90023-0

Oliver, B. R. (2005). The Impact of Management Confidence on Capital Structure.

Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, *52*, 3–46. https://doi.org/10.1016/S0304-405X(99)00003-3

Orlova, S. V. (2017). Cash Holdings Speed of Adjustment Cash Holdings Speed of Adjustment.

Park, C. W., & Pincus, M. (2001). Internal versus External Equity Funding Sources and Earnings Response Coefficients. *Review of Quantitative Finance and Accounting*, *16*, 33–52.

Petersen, M. A. (2007). *Estimating Standard Errors in Finance Panel Data Sets : Comparing Approaches*.

Ravier, A., & Lewin, P. (2012). The Subprime Crisis. *Quarterly Journal of Austrian Economics*, *15*(1), 45–74.

Richardson, S. (2006). Over-investment of free cash flow. *Review of Accounting Studies*, *11*, 159–189. https://doi.org/10.1007/s11142-006-9012-1

Shi, H. (2018). Research progress of monetary policy and international capital flow in the post-financial crisis era 2 . Latest features of current international capital flows. *Financial Forum*, 1–9.

Sufi, A. (2009). Bank Lines of Credit in Corporate Finance : An Empirical Analysis. *Review of Financial Studies*, *22*(3), 1057–1088. https://doi.org/10.1093/revfin/hhm007

Appendixes

Appendix I

Variable		Factor	Abbreviation
Unlagged Leverage	+	Unlagged Leverage	Leverage t-1
Leverage	+	Leverage	Leverage
Unlagged Cash holdings	+	Unlagged Cash holdings	Cash Hold t-1
Liquidity	+	Cash holdings	Cash Hold
Net Leverage	+	Net leverage	Net Leverage
Size	+	size	Size
Growth Opportunites	+	Tobin's Q	Tobin's Q
Dividend Policy	+	Dividends	Dividends
Profitability	+	Profit	Profit
Nature of Assets	+	Tangibility	Tangibility
Expected inflation rate	+	Expected Inflation	Inflation
Industry median leverage	+	Industry median Debt	Ind. Debt
Industry median cash holdings	+	Industry median cash holdings	Ind. Cash
Cash holdings average	+	Cash holdings average	Cash avg.
Free cash flow	+	Free cash flow	FCF
Cash flow Uncertainty	+	Industry sigma	Ind. Sigma
Working capital	+	Net Working Capital	WC
Hedging needs	-	Hedging research and development (free cash flow)	R&D hedge (fcf)
Hedging needs	-	Hedging research and development (cash flow)	R&D hedge (cf)
Hedging needs	-	Hedging sales growth (cash flow)	Sal. Hedge (cf)
Hedging needs	-	Hedging sales growth (free cash flow)	Sal. Hedge (fcf)
Stock Issuance	+	Stock issuance	Issue
Stock Repurchase	+	Stock Repurchase	Repurchase
Expected Interest Rates	+	Yield Spread	Spread
Adverse selection	-	Earnings Per Share Surprise	EPS Sur.
Over investment	-	Over investment	Overinv.
Risk	+	Price volatility	Volatility

Table 1: Nomenclature of Variables and Factors

The table describes the names of the variables and the factors as well as abbreviation used related to the factor. The signals "+" ("-") mean that the variable is positively (negatively) related

Appendix II

Factor	Measure	Computation
Unlagged Leverage	Total debt to market value of assets	=total debt (WC3255) /(total debt (WC3255)+market value of assets (1))
Leverage	Total debt to market value of assets (t+1)	=Total debt to market value of assets of year t+1
Unlagged Cash holdings	Cash to net assets	=cash&equivalents (WC02005) /net assets (2)
Cash holdings	Cash to net assets (t+1)	=cash to net assets of year t+1
Net leverage	Net Debt	=net debt (WC18199) /book value of assets (WC02999)
Size	Logarithm of Assets	=log (book value of assets (WC02999))
Tobin's Q	Market to book value of assets	=market value of assets (1) /book value of assets (WC02999)
Dividends	Dividends	=cash dividends payed (WC04551) /book value of assets (WC02999)
Profit	Profitability	=operating income (WC01250) /book value of assets (WC02999)
Tangibility	Tangibility	=net plant, property and equipment (WC02501) /book value of assets (WC02999)
Expected Inflation	Expected Inflation Rate	=inflation forecast (OECD Database)
Industry median Debt	Industry Median Leverage	=median (Total debt to market value of assets) by indy
Industry median cash holdings	Industry Median Cash Holdings	=median (Cash to net assets) by indy
Cash holdings average	Five-year cash holdings average	=mean (Cash to net assets) by firmcode for years t-5 to t-1
Free cash flow	Free Cash Flow	=fcf (3) /book value of assets (WC02999)
Industry sigma	Industry sigma	=mean (cf std (5)) by industry
Net Working Capital	Net working capital	=nwc (6) /book value of assets (WC02999)
Hedging research and development (cash flow)	Correlation of Cash Flow with Research and Development Industy	=correlation (IndR&D (8) with (CF (4)) by firm
Hedging research and development (free cash flow)	Correlation of free cash flow with Research and development industy	=correlation (IndR&D (8) with (Free cash flow)) by firm
Hedging sales growth (cash flow)	Correlation of cash flow with sales growth industy median	=correlation (Indsalgr (8) with (CF (4)) by firm
Hedging sales growth (free cash flow)	Correlation of free cash flow with sales growth industy median	=correlation (Indsalgr (8) with (Free cash flow)) by firm
Stock issuance	stock issuance	=net proceeeds from issuance of shares (WC04251) /book value of assets (WC02999)
Stock Repurchase	stock repurchase	= shares purchased/retired (WC04751) /book value of assets (WC02999)
Yield Spread	spread rate	=long term interest rates forecast-short term interest rates forecast (OECD Database)
Earnings Per Share Surprise	earning per share surprise	=earnings per share percentage surprise diference (EPSSURPDF)
Overinvestment	Overinvestment	=correlation (invcf (11) and change in ebit (12)) by firm
Price volatility	Stock price volatility	=Price volatility(WC08806)

Table 2: Measurement of the factor's representative of the variables

The table describes the measures used and computation of the variable representative factors. Between Parenthesis are the codes of the items in Datastream.

Measure	Computation
(1) Market value of assets	=total debt (WC03255)+market capitalization (MV)*1000
(2) Net assets	=book value of assets (WC02999)-cash&equivalents (WC02005)
(3) fcf	=net cash flow from operating activities (WC04860)-cash&equivalents (WC02005)
(4) cf	=(cash flow from operating activities (WC04860)-cash flow from investing activities (WC04870)+cash flow from financing activities) /book value of assets(WC02999)
(5) cf std	=standard deviation (cf (4)) by firm
(6) nwc	=working capital (WC03151)-cash&equivalents (WC02005)
(7) R&D	=research and development (WC01201) /book value of assets (WC02999)
(8) IndR&D	=median (R&D(7)) by indy
(9) salesgrowth	=net sales (WC01001)t+3 - net sales (WC01001) /net sales (WC01001)
(10) Indsalgr	=median (salesgrowth (9)) by indy
(11) invcf	=cash flow from investing activities (WC04870) /book value of assets (WC02999)
(12) change in ebit	=earnings before interest and taxes (WC18191)-earnings before interest and taxes (WC18191)t-1 /earnings before interest and taxes (WC18191)t-1
firm	firm number
year	year observed
sector	industry sector code (INDG) if the firm
fy	group (firm and year)
indy	group (sector and year)

Table 3 (continuation): Measurement of the factor's representative of the variables

The table describes the measures used and computation of the variable representative factors.

Appendix III

	Independent variable								
	Leverage				Liquidity				
	Theory								
Factor	Trade	Pecking	Agency	other	Trade	Pecking	Agency	other	Underliyng Variable
size	+				-	+	+		
Tobin's Q	-	+	-		+	+	-		+
Dividends			-	+				+	+
Profit	+	-	+		-				+
Tangibility	+		+					-	+
Expected Inflation	+				-				+
Industry median Debt	+							-	+
Industry median cash holdings				-	+				+
Cash holdings average				-	+				+
Free cash flow	+	-	+		-			-	+
Industry sigma	-				+	-			+
Net Working Capital	+	-			-				+
Hedging research and development (cash flow)				+				-	-
Hedging research and development (free cash flow)				+				-	-
Hedging sales growth (cash flow)				+				-	-
Hedging sales growth (free cash flow)				+				-	-
Stock issuance				-				+	+
Stock Repurchase				+				-	+
Yield Spread				+				-	+
Earnings Per Share Surprise		+				-			-
Overinvestment			+	+	-	-			-
Price volatility	-	+			+	-			+

Table 3: Theoretical predictions

The table presents the theoretical predictions concerning each factor with the independent variable. A "+" ("-") means a positive (negative) expected relation from the subjacent theory of the factor.

Appendix IV

Variable	Obs. (N)	Mean	Sd	Min.	Max.	p10	Median (P50	p90
sector	6455			1	56			
firm	6455			1	494			
year	6455			2001	2015			
Leverage	6455	0.1999156	0.1700381	0	0.8515428	0.0128313	0.1613906	0.4338862
Cash Hold	6455	0.239370	0.412608	0.002559	3.547864	0.0278755	0.1124688	0.5160725
Net Leverage	6455	0.087740	0.233491	-0.669305	0.6157567	-0.238262	0.1157442	0.3597702
Size	6455	15.57126	1.59673	11.42157	19.34403	13.54844	15.51205	17.69794
Tobin's Q	6455	1.801899	1.382105	0.3676862	9.642111	0.6841516	1.39979	3.323817
Dividends	6455	0.0244915	0.0269251	0	0.1808932	0	0.018171	0.0545979
Profit	6455	0.1061359	0.0820658	-0.244566	0.4242116	0.0265462	0.1001216	0.2022811
Tangibility	6455	0.22904	0.1683684	0.0122126	0.8184766	0.0565113	0.1831267	0.4851528
Inflation	6455	1.854466	1.172648	-1.143901	4.463287	0.1209304	1.905289	3.315255
Ind. Debt	6455	0.1817604	0.1276013	0.0023936	0.7022422	0.0516837	0.1586184	0.3372942
Ind. Cash	6455	0.1668754	0.1661038	0.0122992	1.079862	0.0498489	0.1067754	0.4027176
Cash avg.	6455	0.2700813	0.6116054	0.0033526	6.1922	0.0309448	0.1105939	0.526624
FCF	6455	0.0707216	0.0729993	-0.241586	0.3417966	-0.002138	0.0665315	0.1565383
Ind. Sigma	6455	0.0517551	0.0225016	0.0183605	0.1307825	0.0294384	0.0471675	0.0774921
WC	6455	0.0213148	0.120473	-0.376583	0.3604428	-0.125638	0.0235443	0.1702061
R&D hedge (cf)	6455	0.0112312	0.2506469	-0.653014	0.6809576	-0.315587	-0.001099	0.3328301
R&D hedge (fcf)	6455	-0.015172	0.3769971	-0.887323	0.8080007	-0.516428	-0.018689	0.5125079
Sal. Hedge (cf)	6455	0.0711506	0.2440654	-0.576558	0.6398405	-0.23596	0.0778452	0.3921303
Sal. Hedge (fcf)	6455	0.1119306	0.3231868	-0.674057	0.8071174	-0.317559	0.1076567	0.534556
Issue	6455	0.0128713	0.0323368	0	0.3002599	0	0.0029279	0.0306037
Repurchase	6455	0.0279203	0.0550732	0	0.3852602	0	0.0017445	0.0870432
Spread	6455	1.370599	1.046221	-0.990932	2.924651	-0.347534	1.349333	2.710834
EPS Sur.	6455	2.483813	26.93375	-142.647	222.876	-7.435	0.733	12.117
Overinv.	6455	-0.170369	0.3119013	-0.893332	0.6973236	-0.572053	-0.174706	0.214133
Volatility	6455	26.72381	9.097709	11.75	59.06	16.89	24.77	39.81

Table 4: Summary Statistics

The table presents the variables descriptive statistics. The factors are computed as described in table 2. "Obs. (N)" represents the number of observations, "Sd" is the standard deviation, "Min." represents the minimum value observed, "Max." represents the maximum value observed. "p10", "p50" and "p90" represent respectively the tenth, fiftieth and ninetieth percentiles.

Appendix V

	Leverage	Cash Hold	Net Leverage
Cash Hold (t-1)	-0.2427*** 0.0000 --	0.8834*** 0.0000 ++	-0.5567*** 0.0000 --
Size	0.3646*** 0.0000 ++	-0.2468*** 0.0000 --	0.2820*** 0.0000 ++
Tobin's Q	-0.4981*** 0.0000 --	0.3665*** 0.0000 ++	-0.3840*** 0.0000 --
Dividends	-0.1914*** 0.0000 --	-0.0800*** 0.0000 -.	0.0230 0.0650 +.
Profit	-0.3743*** 0.0000 --	-0.1223*** 0.0000 -.	-0.0914*** 0.0000 --
Tangibility	0.2763*** 0.0000 ++	-0.2582*** 0.0000 --	0.3127*** 0.0000 ++
Inflation	0.0028 0.8228 -.	0.0123 0.3230 ..	0.0025 0.8421 ..
Ind. Debt	0.6240*** 0.0000 ++	-0.2547*** 0.0000 --	0.4644*** 0.0000 ++
Ind. Cash	-0.2877*** 0.0000 --	0.5419*** 0.0000 ++	-0.4775*** 0.0000 --
Cash avg.	-0.2069*** 0.0000 --	0.7244*** 0.0000 ++	-0.4326*** 0.0000 --
FCF	-0.4136*** 0.0000 --	0.0039 0.7542 -+	-0.2436*** 0.0000 --
Ind. Sigma	-0.3262*** 0.0000 --	0.5119*** 0.0000 ++	-0.4491*** 0.0000 --
WC	-0.1712*** 0.0000 --	-0.1607*** 0.0000 --	-0.0381*** 0.0022 ..
R&D hedge (cf)	-0.0776*** 0.0000 --	0.0250** 0.0445 ..	-0.0592*** 0.0000 --
R&D hedge (fcf)	0.0370*** 0.0030 .+	-0.0741*** 0.0000 --	0.0632*** 0.0000 .+
Sal. Hedge (cf)	0.0527*** 0.0000 +.	-0.0345*** 0.0056 .-	0.0579*** 0.0000 +.
Sal. Hedge (fcf)	-0.0107 0.3900 ..	-0.0522*** 0.0000 -.	0.0407*** 0.0011 +.
Issue	-0.1457*** 0.0000 --	0.3423*** 0.0000 ++	-0.2375*** 0.0000 --
Repurchase	-0.2236*** 0.0000 --	0.1344*** 0.0000 ++	-0.1250*** 0.0000 --
Spread	-0.1225*** 0.0000 --	0.0888*** 0.0000 ++	-0.0642*** 0.0000 -.
EPS Sur.	0.0171 0.1700 ..	0.0215 0.0838 ..	-0.0070 0.5745 ..
Overinv.	0.1310*** 0.0000 ++	0.1002*** 0.0000 ++	-0.1068*** 0.0000 --
Volatility	-0.0864*** 0.0000 -.	0.3692*** 0.0000 ++	-0.3754*** 0.0000 --

Table 5: Table of correlations
The table describes the correlation coefficients between the dependent variables and the factors. The factors computation is described in the table 2. For each coefficient is attributed "***", "**", "*" if the significance level of the coefficients is under 1%, 5% and 10% respectively. Under the coefficient is described the p-values of the coefficients. The sample was divided in two periods (2001 to 2008 and 2009 until 2015). The signals under the p-values concern for each respective period the signal found of the correlation coefficient if significant at 1%level. If it is not significant, it is reported as ".".

Appendix VI

	Leverage				Cash Hold				Net Leverage			
Independent Variable	Coef	t-stat	sign	R2	Coef	t-stat	sign	R2	Coef	t-stat	sign	R2
Cash Hold (t-1)	-0.0932	-5.50	0.000	0.0589	no	no	no	no	-0.2935	-7.28	0.000	0.3099
Size	0.0388	7.75	0.000	0.1329	-0.0638	-5.26	0.000	0.0609	0.0412	7.29	0.000	0.0795
Tobin's Q	-0.0605	-12.42	0.000	0.2419	0.1094	8.46	0.000	0.1343	-0.0649	-8.67	0.000	0.1474
Dividends	-1.2088	-6.99	0.000	0.0366	-1.2265	-2.09	0.037	0.0064	0.1992	0.56	0.572	0.0005
Profit	-0.7756	-8.57	0.000	0.1401	-0.6148	-1.55	0.120	0.0150	-0.2601	-1.90	0.057	0.0084
Tangibility	0.2790	8.15	0.000	0.0763	-0.6326	-7.24	0.000	0.0666	0.4336	9.05	0.000	0.0978
Inflation	0.0004	0.10	0.922	0.0000	0.0043	0.63	0.526	0.0002	0.0005	0.08	0.935	0.0000
Ind. Debt	0.8315	18.82	0.000	0.3893	-0.8236	-7.07	0.000	0.0649	0.8499	12.98	0.000	0.2157
Ind. Cash	-0.2945	-7.96	0.000	0.0828	1.3461	7.82	0.000	0.2937	-0.6713	-10.10	0.000	0.2280
Cash avg.	-0.0575	-4.88	0.000	0.0428	0.4887	15.05	0.000	0.5248	-0.1652	-5.73	0.000	0.1871
FCF	-0.9634	-10.37	0.000	0.1711	0.0220	0.05	0.958	0.0000	-0.7791	-5.24	0.000	0.0593
Ind. Sigma	-2.4654	-8.85	0.000	0.1064	9.3864	6.95	0.000	0.2620	-4.6603	-9.94	0.000	0.2017
WC	-0.2416	-4.88	0.000	0.0293	-0.5503	-3.60	0.000	0.0258	-0.0739	-1.03	0.301	0.0015
R&D hedge (cf)	-0.0527	-1.85	0.065	0.0060	0.0412	0.80	0.423	0.0006	-0.0551	-1.55	0.122	0.0035
R&D hedge (fcf)	0.0167	0.93	0.353	0.0014	-0.0811	-2.07	0.039	0.0055	0.0392	1.48	0.139	0.0040
Sal. Hedge (cf)	0.0367	1.38	0.166	0.0028	-0.0583	-1.00	0.317	0.0012	0.0554	1.48	0.140	0.0033
Sal. Hedge (fcf)	-0.0056	-0.25	0.806	0.0001	-0.0666	-1.21	0.226	0.0027	0.0294	1.00	0.318	0.0017
Issue	-0.7659	-7.59	0.000	0.0212	4.3670	7.65	0.000	0.1171	-1.7150	-9.74	0.000	0.0564
Repurchase	-0.6903	-8.33	0.000	0.0500	1.0071	2.91	0.004	0.0181	-0.5298	-3.46	0.001	0.0156
Spread	-0.0199	-2.63	0.009	0.0150	0.0350	3.47	0.001	0.0079	-0.0143	-2.59	0.010	0.0041
EPS Sur.	0.0001	1.00	0.320	0.0003	0.0003	1.04	0.300	0.0005	-0.0001	-0.41	0.679	0.0000
Overinv.	0.0714	3.47	0.001	0.0172	0.1326	2.95	0.003	0.0100	-0.0799	-2.70	0.007	0.0114
Volatility	-0.0016	-2.11	0.035	0.0075	0.0167	6.45	0.000	0.1363	-0.0096	-9.60	0.000	0.1409

Table 6: Independent or Univariate Regressions

The table reports the values provided from simple independent or univariate OLS Regressions. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". For each factor is reported the coefficient (Coef), the t-statistics (t-stat), the p-value (sign) and the r-squared (R2).

Appendix VII

Leverage						Cash Hold						Net Leverage					
Variable	coef.	t-stat	sign.	cum. R2	BIC	Variable	coef.	t-stat	sign.	cum. R2	BIC	Variable	coef.	t-stat	sign.	cum. R2	BIC
Ind. Debt	0.0831	18.82	0.000	0.3893	-7721.548	**Cash avg.**	0.4887	15.05	0.000	0.5248	2103.398	**Ind. Debt**	0.8499	12.98	0.000	0.2157	-2012.450
Tobin's Q	-0.0358	-9.72	0.000	0.4609	-8517.115	**Ind. Cash**	0.5646	5.70	0.000	0.5626	1577.634	**Volatility**	-0.0079	-9.77	0.000	0.3072	-2804.603
FCF	-0.4260	-6.84	0.000	0.4871	-8830.522	**Issue**	0.9372	5.21	0.000	0.5672	1517.671	**FCF**	-0.5774	-5.45	0.000	0.3367	-3076.173
Size	0.0159	4.90	0.000	0.5059	-9062.602	**Tangibility**	-0.1374	-4.45	0.000	0.5701	1483.880	**Cash avg.**	-0.1147	-5.10	0.000	0.4121	-3846.231
Dividends	-0.5495	-4.32	0.000	0.5124	-9138.790	**Volatility**	0.0030	3.84	0.000	0.5734	1442.633	**Overinv.**	-0.0617	-3.26	0.001	0.4181	-3904.377
WC	-0.1109	-3.70	0.000	0.5179	-9204.181	**Spread**	0.0180	3.27	0.001	0.5754	1420.209	**Ind. Cash**	-0.1703	-3.01	0.003	0.4263	-3986.722
Cash avg.	-0.0157	-2.59	0.010	0.5202	-9225.880	**WC**	-0.1844	-2.57	0.010	0.5782	1386.147	**WC**	-0.1395	-2.82	0.005	0.4311	-4032.898
Sal. Hedge (cf)	0.0229	1.76	0.079	0.5213	-9231.602	**Tobin's Q**	0.0203	2.46	0.014	0.5818	1339.612	**Issue**	-0.2173	-2.26	0.024	0.4319	-4032.808
Profit	-0.1274	-1.74	0.082	0.5225	-9238.879	**Overinv.**	0.0336	1.83	0.067	0.5824	1339.526	**Repurchase**	0.2586	2.62	0.009	0.4348	-4056.823
Repurchase	0.0651	1.35	0.178	0.5228	-9234.578	**Size**	-0.0101	-1.91	0.057	0.5834	1332.941	**Tangibility**	0.0622	1.76	0.078	0.4364	-4066.409
Issue	-0.0871	-1.53	0.127	0.5230	-9228.747	**Sal. Hedge (cf)**	-0.0469	-1.60	0.110	0.5842	1329.871	**Sal. Hedge (cf)**	0.0410	1.71	0.088	0.4382	-4078.629
Spread	-0.0127	-1.36	0.173	0.5289	-9299.931	**Dividends**	0.3944	1.64	0.101	0.5847	1321.812	**Tobin's Q**	-0.0062	-1.03	0.304	0.4390	-4078.275
EPS Sur.	0.0001	1.35	0.177	0.5291	-9294.126	**EPS Sur.**	0.0002	1.39	0.164	0.5849	1318.843	**Profit**	0.0909	0.77	0.440	0.4393	-4073.012
Volatility	0.0008	1.18	0.237	0.5302	-9300.839	**Repurchase**	0.2704	1.02	0.306	0.5860	1310.963	**Ind. Sigma**	0.4071	0.86	0.388	0.4398	-4070.101
Ind. Sigma	0.2418	0.91	0.362	0.5307	-9299.047	**Profit**	-0.2007	-1.12	0.264	0.5866	1282.755	**Inflation**	0.0028	0.60	0.551	0.4400	-4063.426
Ind. Cash	-0.0189	-0.60	0.548	0.5309	-9291.841	**FCF**	0.2089	1.21	0.228	0.5871	1283.785	**Dividends**	-0.1355	-0.52	0.600	0.4401	-4056.589
Inflation	-0.0018	-0.45	0.654	0.5310	-9284.990	**Ind. Debt**	0.0313	0.80	0.424	0.5872	1291.615	**Spread**	0.0032	0.44	0.658	0.4403	-4049.937
R&D hedge (fcf)	0.0039	0.45	0.649	0.5311	-9277.195	**Ind. Sigma**	0.7762	1.16	0.246	0.5878	1326.550	**R&D hedge (fcf)**	0.0034	0.21	0.837	0.4403	-4041.491
Tangibility	0.0014	0.06	0.954	0.5311	-9268.443	**Inflation**	-0.0046	-1.11	0.269	0.5879	1332.967	**Size**	-0.0008	-0.16	0.873	0.4404	-4032.928
Overinv.	-0.0006	-0.05	0.956	0.5311	-9259.686	**R&D hedge (fcf)**	0.0122	0.71	0.476	0.5880	1339.918	**EPS Sur.**	0.0000	0.07	0.942	0.4404	-4024.161

Table 7: Factor choosing - context with all variables

The table reports the values provided from the factor choosing methodology. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". The values attributed to each factor concern the regression made including just the factors reported above (meaning the regression before the variable is dropped). It is reported the coefficient (coef.), t-statistic (t-stat) and p-value (sign) of the factor and the cumulative r-squared (cum. R2) and the Bayesian information criterion (BIC) of the model regressed. The order of the variables list is from the bottom to the top, the order that the variable was dropped. The selection of the dropped variable (reported) concerns for each regression the "t-stat" closer to 0.

Leverage						Cash Hold						net_lev_3_lead					
Variable	coef.	t-stat	sign.	cum. R2	BIC	Variable	coef.	t-stat	sign.	cum. R2	BIC	Variable	coef.	t-stat	sign.	cum. R2	BIC
Tobin's Q	-0.0605	-12.42	0.000	0.2419	-6325.464	**Cash avg.**	0.4887	15.05	0.000	0.5248	2103.398	**Volatility**	-0.0096	-9.60	0.000	0.1409	-1424.297
FCF	-0.5593	-7.58	0.000	0.2877	-6719.117	**Ind. Sigma**	3.6503	5.46	0.000	0.5545	1695.629	**FCF**	-0.9135	-7.54	0.000	0.2216	-2052.118
WC	-0.2245	-5.81	0.000	0.3130	-6943.704	**Issue**	0.9356	4.80	0.000	0.5591	1637.702	**Ind. Sigma**	-3.3329	-7.47	0.000	0.3047	-2772.436
Ind. Sigma	-1.5344	-5.91	0.000	0.3465	-7258.218	**Spread**	0.0239	4.58	0.000	0.5628	1592.472	**Cash avg.**	-0.1092	-4.60	0.000	0.3634	-3332.487
Size	0.0165	3.60	0.000	0.3641	-7425.083	**Volatility**	0.0035	4.13	0.000	0.5674	1532.642	**Tangibility**	0.1398	3.58	0.000	0.3719	-3410.804
Profit	-0.2009	-2.66	0.008	0.3673	-7449.120	**Tangibility**	-0.1294	-4.19	0.000	0.5699	1504.356	**WC**	-0.1666	-3.19	0.001	0.3791	-3476.434
Tangibility	0.1069	3.32	0.001	0.3765	-7534.320	**WC**	-0.2203	-3.09	0.002	0.5739	1452.458	**Issue**	-0.2682	-2.34	0.019	0.3802	-3479.713
Cash avg.	-0.0210	-2.91	0.004	0.3799	-7561.810	**Tobin's Q**	0.0199	2.38	0.017	0.5773	1409.348	**Overinv.**	-0.0451	-2.32	0.021	0.3835	-3504.980
Dividends	-0.4247	-2.67	0.008	0.3834	-7588.656	**Overinv.**	0.0366	2.09	0.037	0.5780	1407.730	**Repurchase**	0.1902	1.81	0.070	0.3851	-3512.608
Spread	-0.0144	-1.95	0.051	0.3910	-7659.972	**Dividends**	0.3828	1.65	0.098	0.5785	1400.246	**Tobin's Q**	-0.0126	-2.03	0.042	0.3881	-3535.411
Overinv.	0.0253	1.79	0.074	0.3930	-7672.457	**FCF**	0.1208	0.70	0.486	0.5788	1404.731	**Inflation**	0.0041	1.22	0.222	0.3885	-3530.873
Issue	-0.1129	-1.65	0.099	0.3933	-7667.627	**Profit**	-0.2756	-1.31	0.192	0.5796	1400.153	**Size**	-0.0016	-0.29	0.769	0.3886	-3522.949
Volatility	0.0008	0.97	0.330	0.3943	-7669.534	**Repurchase**	0.3454	1.37	0.171	0.5812	1385.313	**Profit**	0.0320	0.29	0.775	0.3886	-3514.561
EPS Sur.	0.0001	0.97	0.334	0.3945	-7662.346	**EPS Sur.**	0.0002	1.22	0.222	0.5813	1391.785	**Dividends**	-0.0700	-0.26	0.794	0.3886	-3506.261
Repurchase	0.0383	0.79	0.430	0.3946	-7654.752	**Inflation**	-0.0041	-0.94	0.348	0.5814	1398.752	**Spread**	0.0007	0.14	0.889	0.3886	-3497.587
Inflation	0.0007	-0.24	0.813	0.3946	-7646.223	**Size**	-0.0047	-0.82	0.415	0.5816	1404.308	**EPS Sur.**	0.0000	0.09	0.931	0.3886	-3488.822

Table 8: Factor selection - context without industry median variables and hedging needs

The table reports the values provided from the factor choosing methodology. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". The values attributed to each factor concern the regression made including just the factors reported above (meaning the regression before the variable is dropped). It is reported the coefficient (coef.), t-statistic (t-stat) and p-value (sign) of the factor and the cumulative r-squared (cum. R2) and the Bayesian information criterion (BIC) of the model regressed. The order of the variables list is from the bottom to the top, the order that the variable was dropped. The selection of the dropped variable (reported) concerns for each regression the "t-stat" closer to 0. In this study the variables Industry median debt, industry median cash holdings and all related with "Hedging needs" were not included.

Appendix IX

Leverage						Cash Hold						Net Leverage					
variable	coef.	t-stat	sign.	cum. R2	BIC	variable	coef.	t-stat	sign.	cum. R2	BIC	variable	coef.	t-stat	sign.	cum. R2	BIC
Tobin's Q	-0.0605	-12.42	0.000	0.2419	-6325.464	**Cash avg.**	0.4887	15.05	0.000	0.5248	2103.398	**Volatility**	-0.0096	-9.60	0.000	0.1409	-1424.297
FCF	-0.5593	-7.58	0.000	0.2877	-6719.117	**Tangibility**	-0.2414	-7.30	0.000	0.5340	1985.949	**FCF**	-0.9135	-7.54	0.000	0.2216	-2052.118
Size	0.0251	5.72	0.000	0.3362	-7165.971	**Volatility**	0.0058	5.24	0.000	0.5481	1796.042	**Cash avg.**	-0.1395	-5.79	0.000	0.3387	-3095.643
WC	-0.1433	-4.01	0.000	0.3456	-7248.733	**Issue**	1.0176	4.55	0.000	0.5536	1726.603	**Tangibility**	0.1798	4.65	0.000	0.3534	-3231.779
Cash avg.	-0.0325	-4.27	0.000	0.3556	-7339.165	**Spread**	0.0227	4.27	0.000	0.5569	1687.522	**WC**	-0.1705	-3.22	0.001	0.3609	-3298.743
Tangibility	0.1046	3.15	0.002	0.3649	-7424.561	**Tobin's Q**	0.0260	3.36	0.001	0.5631	1605.344	**Tobin's Q**	-0.0168	-2.66	0.008	0.3670	-3351.873
Profit	-0.2300	-3.23	0.001	0.3690	-7457.641	**WC**	-0.2374	-3.32	0.001	0.5677	1545.199	**Overinv.**	-0.0511	-2.60	0.009	0.3711	-3385.368
Dividends	-0.3405	-2.22	0.026	0.3712	-7471.597	**Overinv.**	0.0397	2.24	0.025	0.5685	1542.030	**Issue**	-0.2867	-2.44	0.015	0.3724	-3389.830
Issue	-0.1437	-1.88	0.061	0.3718	-7469.028	**FCF**	0.1364	0.75	0.456	0.5689	1545.062	**Repurchase**	0.2051	1.99	0.047	0.3742	-3399.369
Spread	-0.0146	-1.95	0.051	0.3796	-7540.603	**Profit**	-0.3560	-1.68	0.093	0.5705	1512.757	**Inflation**	0.0051	1.53	0.126	0.3748	-3397.234
Overinv.	0.0201	1.41	0.159	0.3809	-7545.092	**Dividends**	0.3564	1.45	0.146	0.5709	1515.857	**Profit**	0.1239	1.14	0.255	0.3754	-3394.263
EPS Sur.	0.0001	1.14	0.256	0.3811	-7538.338	**Repurchase**	0.4029	1.65	0.100	0.5729	1484.339	**EPS Sur.**	0.0000	0.23	0.820	0.3754	-3385.545
Volatility	0.0003	0.31	0.753	0.3812	-7530.870	**Size**	-0.0086	-1.54	0.124	0.5737	1473.476	**Size**	0.0012	0.22	0.828	0.3754	-3377.240
Repurchase	0.0054	0.10	0.918	0.3812	-7522.121	**Inflation**	-0.0049	-1.14	0.253	0.5738	1488.405	**Spread**	0.0008	0.16	0.872	0.3755	-3368.602
Inflation	-0.0003	-0.10	0.922	0.3812	-7513.388	**EPS Sur.**	0.0002	1.06	0.291	0.5740	1477.806	**Dividends**	-0.0243	-0.09	0.929	0.3755	-3359.885

Table 9: Factor selection - context without industry median and sigma variables and hedging needs

The table reports the values provided from the factor choosing methodology. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". The values attributed to each factor concern the regression made including just the factors reported above (meaning the regression before the variable is dropped). It is reported the coefficient (coef.), t-statistic (t-stat) and p-value (sign) of the factor and the cumulative r-squared (cum. R2) and the Bayesian information criterion (BIC) of the model regressed. The order of the variables' list is from the bottom to the top, the order that the variable was dropped. The selection of the dropped variable (reported) concerns for each regression the "t-stat" closer to 0. In this study the variables Industry median debt, industry median cash holdings, Industry sigma and all related with "Hedging needs" were not included.

Leverage						Cash Hold						Net Leverage					
variable	coef.	t-stat	sign.	cum. R2	BIC	variable	coef.	t-stat	sign.	cum. R2	BIC	variable	coef.	t-stat	sign.	cum. R2	BIC
Tobin's Q	-0.0605	-12.42	0.000	0.2419	-6325.464	**Tobin's Q**	0.1094	8.46	0.000	0.1343	5975.138	**Volatility**	-0.0096	-9.60	0.000	0.1409	-1424.297
FCF	-0.0559	-7.58	0.000	0.2877	-6719.117	**Volatility**	0.0146	6.48	0.000	0.2361	5176.302	**Tobin's Q**	-0.0568	-8.40	0.000	0.2516	-2306.053
Size	0.0251	5.72	0.000	0.3362	-7165.971	**Tangibility**	-0.0350	-6.58	0.000	0.2552	5022.379	**Tangibility**	0.2727	6.65	0.000	0.2876	-2615.644
WC	-0.1433	-4.01	0.000	0.3456	-7248.733	**Issue**	2.3718	5.54	0.000	0.3489	4765.282	**FCF**	-0.4135	-3.59	0.000	0.3000	-2720.200
Tangibility	0.1214	3.75	0.000	0.3587	-7370.322	**WC**	-0.5186	-4.10	0.000	0.3080	4565.149	**Issue**	-0.5714	-4.11	0.000	0.3053	-2760.276
Dividends	-0.4158	-2.72	0.007	0.3623	-7397.992	**Profit**	-1.1678	-3.27	0.001	0.3413	4254.941	**Profit**	0.3506	2.78	0.005	0.3106	-2800.932
Issue	-0.1984	-2.75	0.006	0.3635	-7401.336	**Spread**	0.0195	2.53	0.012	0.3438	4240.024	**Overinv.**	-0.0426	-1.99	0.047	0.3135	-2819.136
Profit	-0.1163	-1.59	0.111	0.3645	-7402.753	**Dividends**	1.0758	2.27	0.023	0.3472	4214.522	**WC**	-0.1254	-2.06	0.039	0.3174	-2847.112
Spread	-0.0148	-1.97	0.049	0.3725	-7475.972	**Repurchase**	0.5817	1.94	0.052	0.3517	4179.118	**Repurchase**	0.1412	1.23	0.217	0.3182	-2846.060
Overinv.	0.0180	1.26	0.207	0.3735	-7477.723	**Size**	-0.0141	-1.69	0.091	0.3537	4168.090	**Dividends**	-0.2641	-0.86	0.387	0.3188	-2843.419
EPS Sur.	0.0001	1.17	0.244	0.3737	-7471.166	**Inflation**	0.0066	1.02	0.306	0.3540	4173.757	**Size**	0.0030	0.50	0.615	0.3191	-2837.247
Inflation	-0.0012	-0.34	0.731	0.3738	-7463.037	**Overinv.**	0.0344	0.98	0.327	0.3546	4176.769	**EPS Sur.**	0.0000	0.43	0.664	0.3191	-2828.708
Repurchase	-0.0058	-0.11	0.910	0.3738	-7454.291	**FCF**	-0.1269	-0.54	0.592	0.3547	4183.701	**Inflation**	0.0014	0.35	0.730	0.3192	-2810.363
Volatility	-0.0001	-0.06	0.951	0.3738	-7445.565	**EPS Sur.**	0.0001	0.36	0.719	0.3548	4192.144	**Spread**	-0.0008	-0.16	0.876	0.3192	-2811.712

Table 10: Factor selection - context without industry median and sigma variables, hedging needs and cash holdings average

The table reports the values provided from the factor choosing methodology. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". The values attributed to each factor concern the regression made including just the factors reported above (meaning the regression before the variable is dropped). It is reported the coefficient (coef.), t-statistic (t-stat) and p-value (sign) of the factor and the cumulative r-squared (cum. R2) and the Bayesian information criterion (BIC) of the model regressed. The order of the variables list is from the bottom to the top, the order that the variable was dropped. The selection of the dropped variable (reported) concerns for each regression the "t-stat" closer to 0. In this study the variables Industry median debt, industry median cash holdings, Industry sigma all related with "Hedging needs" and cash holdings average were not included.

Appendix XI

Leverage							Cash Hold							Net Leverage						
variable	coef.	t-stat	sign.	cum. R2	adj. R2	BIC	variable	coef.	t-stat	sign.	cum. R2	adj. R2	BIC	variable	coef.	t-stat	sign.	cum. R2	adj. R2	BIC
Tobin's Q	-0.0248	-10.75	0.000	0.7490	0.7283	-13452.550	**Tangibility**	-0.4310	-3.37	0.005	0.6860	0.6602	-569.036	**FCF**	-0.36613	-5.98	0.000	0.7901	0.7728	-10515.310
FCF	-0.2973	-4.51	0.000	0.7556	0.7354	-13616.340	**Size**	-0.1197	-4.34	0.001	0.7021	0.6775	-898.403	**Volatility**	-0.0053	-6.48	0.000	0.8012	0.7847	-10855.410
Ind. Debt	0.3334	3.02	0.009	0.7664	0.7471	-13899.890	**Ind. Cash**	0.7270	3.53	0.003	0.7157	0.6921	-1190.967	**Size**	0.0328	3.49	0.004	0.8046	0.7884	-10958.090
Size	0.0201	3.07	0.008	0.7693	0.7501	-13970.480	**WC**	-0.4453	-2.58	0.022	0.7199	0.6967	-1279.650	**Repurchase**	0.2725	3.60	0.003	0.8067	0.7907	-11020.310
Repurchase	0.1421	2.33	0.035	0.7704	0.7513	-13992.740	**Cash avg.**	0.1558	2.72	0.017	0.7337	0.7116	-1597.289	**Ind. Cash**	-0.1739	-3.17	0.007	0.8091	0.7932	-11091.490
Profit	-0.1343	-2.47	0.027	0.7712	0.7521	-14005.700	**Inflation**	-0.0136	-2.22	0.043	0.7349	0.7128	-1616.522	**Ind. Debt**	0.1876	2.67	0.018	0.8109	0.7952	-11145.820
Dividends	-0.1316	-1.25	0.231	0.7713	0.7522	-14000.540	**Ind. Debt**	0.1449	1.75	0.102	0.7353	0.7132	-1616.446	**Tangibility**	0.0965	1.71	0.109	0.8113	0.7956	-11149.450
Spread	-0.0105	-1.16	0.266	0.7747	0.7558	-14088.510	**Spread**	0.0106	1.36	0.194	0.7358	0.7137	-1620.585	**Profit**	-0.0840	-1.33	0.203	0.8115	0.7957	-11146.730
Inflation	0.0026	0.86	0.404	0.7749	0.7560	-14085.460	**Volatility**	0.0020	0.95	0.357	0.7362	0.7141	-1621.420	**Spread**	-0.0046	-1.04	0.316	0.8118	0.7961	-11149.650
Volatility	-0.0008	-0.92	0.371	0.7752	0.7563	-14086.130	**Dividends**	0.2821	0.83	0.421	0.7363	0.7141	-1615.111	**Issue**	-0.0529	-0.95	0.360	0.8119	0.7961	-11142.150
Cash avg.	0.0042	0.91	0.380	0.7753	0.7564	-14079.060	**EPS Sur.**	0.0001	0.82	0.425	0.7363	0.7141	-1607.421	**Inflation**	0.0022	0.83	0.419	0.8119	0.7961	-11135.960
Ind. Cash	-0.0186	-0.70	0.497	0.7753	0.7564	-14071.670	**Tobin's Q**	-0.0062	-0.43	0.670	0.7364	0.7142	-1601.821	**WC**	-0.0285	-0.53	0.603	0.8120	0.7961	-11128.990
WC	-0.0137	-0.39	0.702	0.7754	0.7564	-14063.560	**Issue**	0.0919	0.45	0.657	0.7365	0.7142	-1593.926	**Dividends**	-0.0837	-0.39	0.702	0.8120	0.7961	-11121.110
Issue	-0.0119	-0.28	0.786	0.7754	0.7563	-14054.890	**Repurchase**	-0.0452	-0.25	0.810	0.7365	0.7142	-1585.606	**Tobin's Q**	-0.0016	-0.35	0.729	0.8120	0.7961	-11113.060
EPS Sur.	0.0000	-0.22	0.832	0.7754	0.7563	-14046.300	**Profit**	0.0254	0.13	0.901	0.7365	0.7141	-1576.976	**EPS Sur.**	0.0000	-0.28	0.782	0.8120	0.7961	-11104.420
Tangibility	-0.0008	-0.01	0.989	0.7754	0.7562	-14037.520	**FCF**	0.0125	0.07	0.948	0.7365	0.7141	-1568.235	**Cash avg.**	-0.0030	-0.20	0.846	0.8121	0.7961	-11096.160

Table 11: Factors selection - context considering firm fixed effects

The table reports the values provided from the factor choosing methodology. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". The values attributed to each factor concern the regression made including just the factors reported above (meaning the regression before the variable is dropped). It is reported the coefficient (coef.), t-statistic (t-stat) and p-value (sign) of the factor and the cumulative r-squared (cum. R2) and the Bayesian information criterion (BIC) of the model regressed. The order of the variables list is from the bottom to the top, the order that the variable was dropped. The selection of the dropped variable (reported) concerns for each regression the "t-stat" closer to 0. In this study the variables Industry sigma, all related with "Hedging needs" and overinvestment were not included for collinearity problems by introducing firms fixed effects.

Leverage							Cash Hold							Net Leverage						
variable	coef.	t-stat	sign.	cum. R2	adj. R2	BIC	variable	coef.	t-stat	sign.	cum. R2	adj. R2	BIC	variable	coef.	t-stat	sign.	cum. R2	adj. R2	BIC
Ind. Debt	0.8615	18.29	0.000	0.4307	0.4293	-8173.942	Cash avg.	0.4893	14.88	0.000	0.5280	0.5269	2060.506	Ind. Debt	0.8925	12.74	0.000	0.2369	0.2351	-2188.984
Tobin's Q	-0.0373	-9.25	0.000	0.5070	0.5057	-9094.081	Issue	1.3775	5.96	0.000	0.5381	0.5370	1929.011	Volatility	-0.0076	-8.78	0.000	0.3169	0.3152	-2895.144
FCF	-0.4017	-7.30	0.000	0.5298	0.5285	-9391.260	Ind. Cash	0.5333	5.35	0.000	0.5703	0.5692	1471.071	FCF	-0.5646	-5.11	0.000	0.3447	0.3430	-3154.903
Size	0.0151	4.46	0.001	0.5460	0.5448	-9609.284	Tangibility	-0.1440	-4.43	0.001	0.5734	0.5722	1433.501	Cash avg.	-0.1147	-4.94	0.000	0.4198	0.4182	-3931.875
Dividends	-0.5448	-4.11	0.001	0.5522	0.5509	-9689.558	Volatility	0.0030	3.73	0.002	0.5765	0.5752	1395.483	Overinv.	-0.0658	-3.37	0.005	0.4267	0.4250	-3999.600
WC	-0.1106	-3.46	0.004	0.5578	0.5564	-9760.736	Spread	0.0224	2.67	0.018	0.5775	0.5762	1388.530	Ind. Cash	-0.1682	-2.85	0.013	0.4345	0.4327	-4079.653
Cash avg.	-0.0125	-2.11	0.053	0.5592	0.5577	-9772.768	Inflation	-0.0138	-2.72	0.017	0.5781	0.5767	1388.184	Issue	-0.2494	-2.56	0.022	0.4355	0.4336	-4082.291
Issue	-0.0918	-1.82	0.090	0.5594	0.5579	-9767.607	WC	-0.1921	-2.64	0.019	0.5811	0.5797	1350.492	Spread	0.0238	2.74	0.016	0.4391	0.4372	-4115.019
Ind. Sigma	0.5365	2.17	0.048	0.5621	0.5605	-9797.579	Tobin's Q	0.0207	2.39	0.032	0.5847	0.5833	1303.445	WC	-0.1395	-2.72	0.017	0.4439	0.4419	-4161.973
Profit	-0.1149	-1.76	0.099	0.5629	0.5613	-9801.765	Overinv.	0.0324	1.71	0.109	0.5853	0.5837	1304.033	Inflation	0.0147	2.37	0.033	0.4460	0.4440	-4177.820
Sal. Hedge (cf)	0.0238	1.79	0.095	0.5641	0.5624	-9810.073	Size	-0.0102	-1.82	0.090	0.5863	0.5847	1297.312	Repurchase	0.1878	2.09	0.055	0.4475	0.4453	-4185.672
Volatility	0.0009	1.45	0.168	0.5655	0.5637	-9821.589	Sal. Hedge (cf)	-0.0440	-1.45	0.170	0.5869	0.5853	1295.658	Tangibility	0.0593	1.61	0.129	0.4489	0.4467	-4193.581
EPS Sur.	0.0001	0.88	0.392	0.5655	0.5637	-9814.010	Dividends	0.3959	1.46	0.166	0.5874	0.5857	1296.474	Tobin's Q	-0.0101	-1.56	0.140	0.4507	0.4484	-4206.445
Repurchase	0.0299	0.73	0.477	0.5656	0.5637	-9806.213	EPS Sur.	0.0002	1.44	0.173	0.5876	0.5858	1302.161	Sal. Hedge (cf)	0.0358	1.47	0.165	0.4521	0.4497	-4213.989
Inflation	-0.0025	-0.74	0.471	0.5657	0.5638	-9799.145	FCF	0.1231	0.69	0.502	0.5879	0.5861	1306.512	Ind. Sigma	0.6124	1.28	0.222	0.4532	0.4508	-4218.432
Ind. Cash	-0.0185	-0.56	0.586	0.5658	0.5638	-9791.965	Profit	-0.2398	-1.07	0.304	0.5886	0.5866	1305.473	Profit	0.1451	1.23	0.238	0.4540	0.4514	-4218.197
R&D hedge (fcf)	0.0045	0.50	0.626	0.5659	0.5638	-9784.549	Repurchase	0.3211	1.22	0.241	0.5898	0.5878	1294.450	Size	-0.0024	-0.49	0.631	0.4541	0.4515	-4211.385
Spread	-0.0024	-0.40	0.696	0.5660	0.5638	-9776.723	Ind. Sigma	0.5873	0.86	0.403	0.5901	0.5881	1297.989	R&D hedge (fcf)	0.0064	0.37	0.719	0.4542	0.4515	-4203.781
Overinv.	-0.0036	-0.31	0.762	0.5660	0.5638	-9768.503	Ind. Debt	0.0303	0.75	0.464	0.5902	0.5881	1305.964	EPS Sur.	0.0000	-0.05	0.961	0.4542	0.4514	-4195.011
Tangibility	-0.0044	-0.17	0.869	0.5660	0.5637	-9759.936	R&D hedge (fcf)	0.0115	0.66	0.520	0.5903	0.5881	1313.116	Dividends	-0.0108	0.04	0.968	0.4542	0.4513	-4186.251

Table 12: Factor selection - context considering year effects

The table reports the values provided from the factor choosing methodology. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". The values attributed to each factor concern the regression made including just the factors reported above (meaning the regression before the variable is dropped). It is reported the coefficient (coef.), t-statistic (t-stat) and p-value (sign) of the factor and the cumulative r-squared (cum. R2) and the Bayesian information criterion (BIC) of the model regressed. The order of the variables list is from the bottom to the top, the order that the variable was dropped. The selection of the dropped variable (reported) concerns for each regression the "t-stat" closer to 0. In this study all the variables were considered without any conflict by introducing year fixed effects.

Appendix XIII

Leverage							Cash Hold							Net Leverage						
variable	coef.	t-stat	sign.	cum. R2	adj. R2	BIC	variable	coef.	t-stat	sign.	cum. R2	adj. R2	BIC	variable	coef.	t-stat	sign.	cum. R2	adj. R2	BIC
Tobin's Q	-0.0449	-12.76	0.000	0.4966	0.4922	-8969.160	**Cash avg.**	0.4179	12.05	0.000	0.5727	0.5690	1417.202	**Volatility**	-0.0051	-5.55	0.000	0.3956	0.3903	-3694.291
FCF	-0.4624	-6.74	0.000	0.5221	0.5178	-9295.030	**Issue**	0.8986	4.29	0.001	0.5769	0.5731	1362.840	**FCF**	-0.6408	-6.34	0.000	0.4271	0.4220	-4031.324
Size	0.0168	5.18	0.000	0.5374	0.5332	-9496.686	**Tangibility**	-0.2047	-3.74	0.002	0.5797	0.5759	1329.134	**Cash avg.**	-0.1121	-4.70	0.000	0.4822	0.4775	-4674.622
Dividends	-0.5043	-3.44	0.004	0.5418	0.5376	-9550.005	**Spread**	0.0210	3.54	0.003	0.5824	0.5786	1295.506	**Issue**	-0.3105	-2.78	0.015	0.4837	0.4789	-4684.894
Ind. Debt	0.2989	2.56	0.023	0.5510	0.5468	-9671.924	**WC**	-0.2658	-3.22	0.006	0.5866	0.5827	1239.206	**Repurchase**	0.3151	3.38	0.004	0.4878	0.4830	-4727.602
Cash avg.	-0.0124	-1.98	0.068	0.5522	0.5479	-9680.483	**Size**	-0.0215	-3.56	0.003	0.5906	0.5867	1185.154	**Tobin's Q**	-0.0147	-2.65	0.019	0.4916	0.4867	-4766.280
WC	-0.0960	-2.46	0.027	0.5552	0.5509	-9714.649	**Overinv.**	0.0350	1.91	0.077	0.5912	0.5872	1185.019	**Overinv.**	-0.0537	-2.81	0.014	0.4955	0.4906	-4808.357
Volatility	0.0011	1.54	0.147	0.5568	0.5524	-9729.015	**Tobin's Q**	0.0200	2.16	0.048	0.5941	0.5901	1148.270	**Tangibility**	0.1059	2.26	0.040	0.4978	0.4929	-4828.605
Repurchase	0.0562	1.17	0.260	0.5570	0.5526	-9723.768	**Inflation**	-0.0059	-1.69	0.113	0.5943	0.5902	1153.079	**Ind. Debt**	0.1281	1.71	0.110	0.4987	0.4937	-4831.335
Issue	-0.0855	-1.20	0.248	0.5572	0.5527	-9718.008	**Ind. Debt**	0.1045	1.73	0.105	0.5945	0.5904	1158.836	**WC**	-0.0771	-1.36	0.197	0.4998	0.4947	-4836.493
Profit	-0.0942	-1.37	0.192	0.5578	0.5532	-9717.110	**Ind. Cash**	0.3497	1.69	0.114	0.5977	0.5935	1116.692	**Profit**	0.1270	1.13	0.277	0.5003	0.4952	-4834.695
Spread	-0.0127	-1.51	0.153	0.5634	0.5589	-9791.704	**Volatility**	0.0017	1.39	0.185	0.5983	0.5941	1114.909	**Dividends**	-0.3128	-1.21	0.248	0.5011	0.4959	-4835.913
Tangibility	0.0419	1.31	0.211	0.5641	0.5595	-9792.621	**Dividends**	0.4065	1.58	0.136	0.5988	0.5945	1116.357	**Sal. Hedge (cf)**	0.0257	1.02	0.325	0.5017	0.4964	-4835.295
Sal. Hedge (cf)	0.0117	0.82	0.424	0.5643	0.5596	-9787.509	**EPS Sur.**	0.0002	1.52	0.150	0.5990	0.5947	1121.193	**Size**	0.0055	1.01	0.328	0.5024	0.4970	-4835.367
EPS Sur.	0.0001	0.77	0.452	0.5644	0.5596	-9779.723	**Sal. Hedge (cf)**	-0.0398	-1.26	0.227	0.5995	0.5951	1122.173	**Inflation**	0.0043	1.00	0.335	0.5028	0.4974	-4832.042
R&D hedge (fcf)	0.0060	0.57	0.577	0.5646	0.5597	-9772.990	**FCF**	0.1114	0.71	0.487	0.5997	0.5953	1127.522	**Ind. Cash**	-0.0506	-0.72	0.480	0.5030	0.4975	-4825.961
Ind. Cash	-0.0141	-0.51	0.617	0.5646	0.5597	-9764.664	**Profit**	-0.2129	-0.91	0.377	0.6002	0.5957	1128.914	**EPS Sur.**	0.0000	-0.52	0.614	0.5031	0.4974	-4817.452
Overinv.	-0.0032	-0.27	0.793	0.5646	0.5596	-9756.269	**Repurchase**	0.2747	1.07	0.301	0.6011	0.5965	1122.995	**Spread**	0.0027	0.46	0.651	0.5032	0.4975	-4810.270
Inflation	-0.0006	-0.20	0.842	0.5646	0.5596	-9747.720	**R&D hedge (fcf)**	0.0105	0.59	0.561	0.6012	0.5966	1130.621	**R&D hedge (fcf)**	0.0036	0.19	0.850	0.5032	0.4974	-4801.830

Table 13: Factor selection – context considering sector fixed effects

The table reports the values provided from the factor choosing methodology. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". The values attributed to each factor concern the regression made including just the factors reported above (meaning the regression before the variable is dropped). It is reported the coefficient (coef.), t-statistic (t-stat) and p-value (sign) of the factor and the cumulative r-squared (cum. R2) and the Bayesian information criterion (BIC) of the model regressed. The order of the variables list is from the bottom to the top, the order that the variable was dropped. The selection of the dropped variable (reported) concerns for each regression the "t-stat" closer to 0. In this study the variables Industry sigma was not included for collinearity problems by introducing sector fixed effects.

Appendix XIV

Percentages BIC			
Variable	Leverage	Cash Hold _lead	Net Leverage
Size	100%	86%	14%
Tobin's Q	100%	86%	71%
Dividends	100%	71%	0%
Profit	100%	71%	29%
Tangibility	57%	100%	100%
Inflation	0%	43%	14%
Ind. Debt	100%	50%	100%
Ind. Cash	0%	100%	75%
Cash avg.	83%	100%	83%
FCF	100%	43%	100%
Ind. Sigma	67%	33%	67%
WC	86%	100%	86%
R&D hedge (fcf)	0%	0%	0%
Sal. Hedge (cf)	67%	67%	67%
Issue	71%	86%	86%
Repurchase	43%	71%	86%
Spread	86%	100%	29%
EPS Sur.	14%	29%	0%
Overinv.	50%	83%	100%
Volatility	43%	100%	100%

Table 14: Summary of variables included in minimum Bayesian Information Criterion

The table reports the percentage of times that each variable was included in the minimum bayesian criterion models for each dependent variable observed by the minimum value of "BIC" in the tables 7, 8, 9, 10, 11, 12 and 13.

Appendix XV

Percentages of Sig 1% to use				Percentages Sig 1% in BIC			
Variable	Leverage	Cash Hold _lead	Net Leverage	Variable	Leverage	Cash Hold _lead	Net Leverage
Size	100%	29%	14%	Size	100%	33%	100%
Tobin's Q	100%	29%	29%	Tobin's Q	100%	33%	40%
Dividends	71%	0%	0%	Dividends	71%	0%	-
Profit	29%	14%	14%	Profit	29%	20%	50%
Tangibility	43%	100%	43%	Tangibility	75%	100%	43%
Inflation	0%	0%	0%	Inflation	-	0%	0%
Ind. Debt	75%	0%	50%	Ind. Debt	75%	0%	50%
Ind. Cash	0%	75%	50%	Ind. Cash	-	75%	67%
Cash avg.	50%	83%	83%	Cash avg.	60%	83%	100%
FCF	100%	0%	100%	FCF	100%	0%	100%
Ind. Sigma	33%	33%	33%	Ind. Sigma	50%	100%	50%
WC	71%	71%	43%	WC	83%	71%	50%
R&D hedge (fcf)	0%	0%	0%	R&D hedge (fcf)	-	-	-
Sal. Hedge (cf)	0%	0%	0%	Sal. Hedge (cf)	0%	0%	0%
Issue	14%	86%	14%	Issue	20%	100%	17%
Repurchase	0%	0%	43%	Repurchase	0%	0%	50%
Spread	0%	57%	0%	Spread	0%	57%	0%
EPS Sur.	0%	0%	0%	EPS Sur.	0%	0%	-
Overinv.	0%	0%	50%	Overinv.	0%	0%	50%
Volatility	0%	71%	100%	Volatility	0%	71%	100%

Table 15: Summary of factors reported with coefficients significant at 1% level

The left table reports the percentage of times that each variable were reported with a p-value under 0,01 for each dependent variable observed "sign." in the tables 7, 8, 9, 10, 11, 12 and 13. The right table presents the percentage of times that each variable were reported with a p-value under 0,01 but in the number of times that the variable were included in the minimum bayesian information criterion.

Signals Reported							Signals in BIC							Signals in Coeficient Significance Level at 1%						
Variable	Leverage		Cash Hold _lead		Net Leverage		Variable	Leverage		Cash Hold _lead		Net Leverage		Variable	Leverage		Cash Hold _lead		Net Leverage	
Size	100%	+	100%	-	57%	+	Size	100%	+	100%	-	100%	+	Size	100%	+	100%	-	100%	+
Tobin's Q	100%	-	86%	+	100%	-	Tobin's Q	100%	-	100%	+	100%	-	Tobin's Q	100%	-	100%	+	100%	-
Dividends	100%	-	100%	+	100%	-	Dividends	100%	-	100%	+	n.o		Dividends	100%	-	n.o		n.o	
Profit	100%	-	86%	-	86%	+	Profit	100%	-	100%	-	50%	+	Profit	100%	-	100%	-	100%	+
Tangibility	71%	+	100%	-	100%	+	Tangibility	100%	+	100%	-	100%	+	Tangibility	100%	+	100%	-	100%	+
Inflation	71%	-	86%	-	100%	+	Inflation	n.o		100%	-	100%	+	Inflation	n.o		n.o		n.o	
Ind. Debt	100%	+	100%	+	100%	+	Ind. Debt	100%	+	100%	+	100%	+	Ind. Debt	100%	+	n.o		100%	+
Ind. Cash	100%	-	100%	+	100%	-	Ind. Cash	n.o		100%	+	100%	-	Ind. Cash	n.o		100%	+	100%	-
Cash avg.	83%	-	100%	+	100%	-	Cash avg.	100%	-	100%	+	100%	-	Cash avg.	100%	-	100%	+	100%	-
FCF	100%	-	86%	+	100%	-	FCF	100%	-	100%	+	100%	-	FCF	100%	-	n.o		100%	-
Ind. Sigma	67%	+	100%	+	67%	+	Ind. Sigma	50%	+	100%	+	50%	+	Ind. Sigma	100%	-	100%	+	100%	-
WC	100%	-	100%	-	100%	-	WC	100%	-	100%	-	100%	-	WC	100%	-	100%	-	100%	-
R&D hedge (fcf)	100%	+	100%	+	100%	+	R&D hedge (fcf)	n.o		n.o		n.o		R&D hedge (fcf)	n.o		n.o		n.o	
Sal. Hedge (cf)	100%	+	100%	-	100%	+	Sal. Hedge (cf)	100%	+	100%	-	100%	+	Sal. Hedge (cf)	n.o		n.o		n.o	
Issue	100%	-	100%	+	100%	-	Issue	100%	-	100%	+	100%	-	Issue	100%	-	100%	+	100%	-
Repurchase	86%	+	86%	+	100%	+	Repurchase	100%	+	100%	+	100%	+	Repurchase	n.o		n.o		100%	+
Spread	100%	-	100%	+	71%	+	Spread	100%	-	100%	+	50%	+	Spread	n.o		100%	+	n.o	
EPS Sur.	86%	+	100%	+	57%	+	EPS Sur.	100%	+	100%	+	n.o		EPS Sur.	n.o		n.o		n.o	
Overinv.	50%	+	100%	+	100%	-	Overinv.	100%	+	100%	+	100%	-	Overinv.	n.o		n.o		100%	-
Volatility	71%	+	100%	+	100%	-	Volatility	100%	+	100%	+	100%	-	Volatility	n.o		100%	+	100%	-

Table 16: Summary of signals reported

The tables report the signal and percentage of times that the coefficients signal was reported in the tables 7, 8, 9, 10, 11, 12 and 13 (that appeared more than 50%) for each independent variable. The left tables' percentages have the denominator the number of times the variable was used in the quoted tables; the middle table concerns the number of times that the variable was included in the minimum bayesian information criterion model; the right table's percentages have the denominator the number of times that the variable was reported with a p-value under 0,01.

Appendix XVII

Leverage					Cash Hold					n_lev_3lead				
R2	0.5202				R2	0.5782				R2	0.4233			
BIC	-9225.880				BIC	1386.147				BIC	-3944.513			
Variables	Coef.	Std. Err.	t-stat	sign.	Variables	Coef.	Std. Err.	t-stat	sign.	Variables	Coef.	Std. Err.	t-stat	sign.
Size	0.0131	0.0034	3.89	0.000	Tangibility	-0.1354	0.0309	-4.38	0.000	Ind. Debt	0.5510	0.0493	11.18	0.000
Tobin's Q	-0.0179	0.0031	-5.85	0.000	Ind. Cash	0.4215	0.0927	4.55	0.000	Cash avg.	-0.1214	0.0226	-5.38	0.000
Dividends	-0.5354	0.1286	-4.16	0.000	Cash avg.	0.3834	0.0316	12.12	0.000	FCF	-0.7808	0.0888	-8.79	0.000
Ind. Debt	0.6074	0.0410	14.83	0.000	WC	-0.1844	0.0717	-2.57	0.010	WC	-0.1121	0.0507	-2.21	0.027
Cash avg.	-0.0157	0.0061	-2.59	0.010	Issue	0.8190	0.1799	4.55	0.000	Repurchase	0.1911	0.1003	1.91	0.057
FCF	-0.4292	0.0581	-7.39	0.000	Spread	0.0188	0.0056	3.33	0.001	Overinv.	-0.0672	0.0186	-3.62	0.000
WC	-0.1274	0.0310	-4.10	0.000	Volatility	0.0031	0.0007	4.20	0.000	Volatility	-0.0055	0.0007	-7.87	0.000
_cons	-0.0312	0.0607	-0.51	0.607	_cons	-0.0194	0.0247	-0.78	0.433	_cons	0.2078	0.0234	8.90	0.000

Table 17: Regression using the selected factors

The table reports the values provided by OLS Regressions of the models of with the selected factors. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". For each factor is reported the coefficient (Coef.), standard error (Std. Err.), the t-statistics (t-stat), the p-value (sign) and for each regression is reported the r-squared (R2) and the bayesian information criterion.

Appendix XVIII

Leverage					Cash Hold					n_lev_3lead				
R2	0.0846				R2	0.5277				R2	0.1979			
BIC	-5099.489				BIC	2073.663				BIC	-1858.934			
Variables	Coef.	Std. Err.	t-stat	sign.	Variables	Coef.	Std. Err.	t-stat	sign.	Variables	Coef.	Std. Err.	t-stat	sign.
Cash avg.	-0.0661	0.0124	-5.33	0.000	Cash avg.	0.4833	0.0317	15.26	0.000	Cash avg.	-0.1711	0.0291	-5.87	0.000
WC	-0.2917	0.0480	-6.08	0.000	WC	-0.1841	0.0702	-2.62	0.009	WC	-0.2035	0.0569	-3.58	0.000
_cons	0.2240	0.0114	19.72	0.000	_cons	0.1128	0.0089	12.65	0.000	_cons	0.1383	0.0116	11.91	0.000

Table 18: Regressions using the common factors

The table reports the values provided by OLS Regressions of the independent variables with only the common factors between them. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". For each factor is reported the coefficient (Coef.), standard error (Std. Err.), the t-statistics (t-stat), the p-value (sign) and for each regression is reported the r-squared (R2) and the bayesian information criterion.

Appendix XIX

Leverage					Cash Hold				
R2	0.5202				R2	0.5501			
BIC	-9225.880				BIC	1803.725			
Variables	Coef.	Std. Err.	t-stat	sign.	Variables	Coef.	Std. Err.	t-stat	sign.
Size	0.0131	0.0034	3.89	0.000	Size	-0.0174	0.0056	-3.12	0.002
Tobin's Q	-0.0179	0.0031	-5.85	0.000	Tobin's Q	0.0249	0.0100	2.50	0.013
Dividends	-0.5354	0.1286	-4.16	0.000	Dividends	-0.7165	0.2502	-2.86	0.004
Ind. Debt	0.6074	0.0410	14.83	0.000	Ind. Debt	-0.1743	0.0499	-3.49	0.000
Cash avg.	-0.0157	0.0061	-2.59	0.010	Cash avg.	0.4385	0.0351	12.51	0.000
FCF	-0.4292	0.0581	-7.39	0.000	FCF	0.1426	0.1902	0.75	0.453
WC	-0.1274	0.0310	-4.10	0.000	WC	-0.3052	0.0855	-3.57	0.000
_cons	-0.0312	0.0607	-0.51	0.607	_cons	0.3933	0.1008	3.90	0.000
Leverage					n_lev_3lead				
R2	0.5210				R2	0.3742			
BIC	-9228.369				BIC	-3417.359			
Variables	Coef.	Std. Err.	t-stat	sign.	Variables	Coef.	Std. Err.	t-stat	sign.
Cash Hold (t-1)	-0.0185	0.0103	-1.80	0.071					
Size	0.0128	0.0034	3.76	0.000	Size	0.0087	0.0048	1.82	0.069
Tobin's Q	-0.0174	0.0030	-5.87	0.000	Tobin's Q	-0.0076	0.0069	-1.10	0.271
Dividends	-0.5448	0.1272	-4.28	0.000	Dividends	0.7212	0.2617	2.76	0.006
Ind. Debt	0.6042	0.0417	14.48	0.000	Ind. Debt	0.5324	0.0517	10.30	0.000
Cash avg.	-0.0061	0.0059	-1.02	0.307	Cash avg.	-0.1347	0.2463	-5.47	0.000
FCF	-0.4268	0.0582	-7.33	0.000	FCF	-0.6429	0.0970	-6.63	0.000
WC	-0.1336	0.0320	-4.17	0.000	WC	-0.0847	0.0555	-1.53	0.127
_cons	-0.0251	0.0622	-0.40	0.686	_cons	-0.0642	0.0801	-0.80	0.423

Table 19: Regressions comparison by using the leverage "most reliable factors"
The table reports the values provided by OLS Regressions of leverage, cash holdings and net leverage with the variables used in table 17 to regress leverage. Another regression is made on leverage by adding the unlagged cash holding as independent variable. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". For each factor is reported the coefficient (Coef.), standard error (Std. Err.), the t-statistics (t-stat), the p-value (sign) and for each regression is reported the r-squared (R2) and the bayesian information criterion.

Appendix XX

Leverage					Cash Hold				
R2	0.4855				R2	0.5589			
BIC	-8774.544				BIC	1676.157			
Variables	Coef.	Std. Err.	t-stat	sign.	Variables	Coef.	Std. Err.	t-stat	sign.
Ind. Debt	0.6615	0.0470	14.07	0.000	Ind. Debt	-0.2138	0.0509	-4.20	0.000
Cash avg.	-0.0396	0.0071	-5.61	0.000	Cash avg.	0.4398	0.0322	13.66	0.000
FCF	-0.6597	0.0660	-10.00	0.000	FCF	0.2428	0.1708	1.42	0.155
WC	-0.1914	0.0307	-6.24	0.000	WC	-0.2166	0.0676	-3.20	0.001
Repurchase	-0.0092	0.0523	-0.18	0.860	Repurchase	0.4302	0.2350	1.83	0.067
Overinv.	0.0227	0.0124	1.83	0.067	Overinv.	0.0329	0.0184	1.79	0.074
Volatility	0.0001	0.0005	0.10	0.918	Volatility	0.0060	0.0010	5.90	0.000
_cons	0.1438	0.0233	6.17	0.000	_cons	-0.0211	0.0270	-0.78	0.436
Leverage					n_lev_3lead				
R2	0.4883				R2	0.4233			
BIC	-8801.961				BIC	-3944.513			
Variables	Coef.	Std. Err.	t-stat	sign.	Variables	Coef.	Std. Err.	t-stat	sign.
Cash Hold (t-1)	-0.0345	0.0103	-3.35	0.001					
Ind. Debt	0.6541	0.0477	13.72	0.000	Ind. Debt	0.5510	0.0493	11.18	0.000
Cash avg.	-0.0214	0.0064	-3.35	0.001	Cash avg.	-0.1214	0.0226	-5.38	0.000
FCF	-0.6496	0.0647	-10.03	0.000	FCF	-0.7808	0.0888	-8.79	0.000
WC	-0.2004	0.0308	-6.50	0.000	WC	-0.1121	0.0507	-2.21	0.027
Repurchase	0.0002	0.0514	0.00	0.996	Repurchase	0.1911	0.1003	1.91	0.057
Overinv.	0.0238	0.0124	1.92	0.055	Overinv.	-0.0672	0.0186	-3.62	0.000
Volatility	0.0002	0.0005	0.42	0.673	Volatility	-0.0055	0.0007	-7.87	0.000
_cons	0.1435	0.0232	6.18	0.000	_cons	0.2078	0.0234	8.90	0.000

Table 20: Regressions comparison by using the net leverage "most reliable factors"

The table reports the values provided by OLS Regressions of leverage, cash holdings and net leverage with the variables used in table 17 to regress net leverage. Another regression is made on leverage by adding the unlagged cash holding as independent variable. The variables computation is described in table 2. The data treatment is described in the chapter "Data and Methodology". For each factor is reported the coefficient (Coef.), standard error (Std. Err.), the t-statistics (t-stat), the p-value (sign) and for each regression is reported the r-squared (R2) and the bayesian information criterion.