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DOES MANAGERIAL SENTIMENT AFFECT ACCRUAL ESTIMATES?

AN ANALISIS OF NON-FINANCIAL S&P500 FIRMS

Gonçalo Filipe Pinheiro Almeida

Master in Financial Analysis

('Análise Financeira')

Supervisor

Professor Carlos Manuel Pinheiro,
Lisbon Accounting and Business School ISCAL

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Resumo

As Finanças comportamentais têm sido fortemente criticadas pelo confronto com o paradigma das Finanças tradicionais e pela aparente geração de paradoxos no mundo das finanças. É uma das áreas que gera controvérsia no mundo das finanças e, seguramente um tema discutido na atualidade, dando destaque à dúbia interpretação de aspetos como a maximização das decisões e identificação da escolha ótima considerando um conjunto de informações disponíveis ou por influências denominadas 'não racionais' (sentimentos/crenças).

Dando ênfase à evolução da teoria das finanças comportamentais, e tentativa de quantificar como os gestores são influenciados por sentimentos que não são quantificados em reportes financeiros, a presente dissertação analisa se os sentimentos ('sentiment' na língua inglesa) são relevantes para a tomada de decisões dos *Chief Financial Officers* (CFOs), num grupo de 64 empresas cotadas no índice bolsista S&P500, nomeadamente no que concerne ao financiamento de curto prazo medio pela variação do fundo de maneio ('working capital').

Com dados trimestrais e um período escolhido entre 2002 a 2017, que inclui condições de mercado heterogéneas que se fizeram sentir com a crise financeira, os resultados surgem que o impacto do 'sentiment' dos CFO na gestão de fundo de maneio, incluindo acréscimos e diferimentos desta rubrica contabilística.

Palavras-chave: Finanças Tradicionais, Finanças Comportamentais, Tendências Comportamentais, Interação Social, Tomadas de Decisão

Classificação JEL: G20 General Financial Markets, G31 Capital budgeting; Fixed Investment and Inventory Studies

Abstract

Behavioral finance has been heavily criticized for its confrontation with the paradigm of traditional finance and the apparent generation of paradoxes in the world of finance. It is one of the areas that generates controversy in the world of finance and, certainly a topic discussed today, highlighting the dubious interpretation of aspects such as the maximization of decisions and identification of the optimal choice considering a set of available information or by influences denominated 'non-rational' (feelings / beliefs).

Emphasizing the evolution of behavioral finance theory, and attempting to quantify how managers are influenced by feelings that are not quantified in financial reports, the present dissertation analyzes whether feelings 'sentiment' is relevant for making decisions of the Chief Financial Officers (CFOs), in a group of 64 companies listed on the S&P500 stock exchange index, namely with regard to medium-term working capital financing.

With quarterly data and a period chosen between 2002 and 2017, which includes heterogeneous market conditions that were felt by the financial crisis, the results appear that the impact of CFO sentiment on the management of working capital, including accruals and deferrals of this accounting heading.

Keywords: Traditional Finance, Behavioral Finance, Behavioral biases, Social Interaction, Decision Making

JEL Classification: G20 General Financial Markets, G31 Capital budgeting; Fixed Investment and Inventory Studies

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List of Abbreviations

APT – Arbitrage Pricing Theory

CAPM – Capital Asset Pricing Model

CFO – Chief Financial Officer

CPIR – Price index inflation Rate

EUT – Expected Utility Theory

EMH - Efficient Market Hypothesis

GDP – Growth Domestic Product

MPT – Modern Portfolio Theory

M&M – Modigliani and Miller

OLS – Ordinary Least Square

TBILL – Yield on the Three-Month Treasury Bill

UNEMP – Unemployment Rate

2SLS – Two-stage least-squares

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1. Introduction

"In order to do good economics, you have to keep in mind that people are human."

Richard Thaler

Investor agents are not fully rational machines, but rather subjective in terms of perception and beliefs. Such less rational aspects of behavior are considered the result of psychological biases on firms' decision-making processes, studded in economics and other social sciences, contrasting the traditional rational approach and behavioral theories.

The traditional finance paradigm is based on the rational form of economic agents and the support for the efficient market hypothesis, the latter widely accepted by all financial economists. Namely, securities markets are believed to be extremely efficient in pricing in information. The efficient market hypothesis (EMH) has been the dominant theory for more than 30 years (from the early 1960s to the mid 1990s). The Efficient Market Hypothesis is based on the concept of "random walk theory", which is used to characterize a price series. The view is that if the flow of information is unconstrained the information will immediately be processed. Then today's price change would reflect just only today's news, and will be independent of the price changes yesterday. Kendall, (1953) reinforces the view underpinning EMH theory, in positing that stock price fluctuations are independent of each other and have the same probability. This argument is commonly illustrated by the following story: a professor of Economics and a student come across a $100 bill. While the student is picking it up, the professor tries to prevent him to do so, by saying 'Don't bother – if it were really a $100 bill, it wouldn't be there'. EMH advocates the efficiency of the financial market in terms of the overwhelming information. According to Fama (1969), *'there are large number of rational profit maximizers actively competing, with each trying to predict future market values of individual securities, and where important current information is almost freely available to all participants'*. And for this reasoning economists believed on true fluctuations of prices and complete and trustful efficient markets that do not allow investors to earn

above-average returns without accepting above-average risk, characterized as efficient when they fully reflect available information.

However, market failures and not so 'rational' behavior from economic agents beg for a few questions regarding this deterministic world. Are people submitted to errors? Subject to beliefs not explained in a deterministic and predictable way?

Behavioral theories emerged as an alternative to address human biases that cannot be eliminated in decision-making, with the objective to enhance the explanatory power of traditional economic models leading to more realistic psychological foundations, by bringing about psychological and sociological frameworks. According to Sewell (2007), *Behavioral Finance is the study of the influence of psychology on the behavior of financial practitioners and the subsequent effect on markets*, allowing the investors be susceptible to emotions and reflecting a possibility of futures outcomes that are not justified by the information available to them (Baker & Wurgler 2002).

2. Literature Overview

Finance can be defined as the study of management, creation and study of money, banking, credit, investments, assets and liabilities and how all these resources are allocated by humans, and how resources can be managed, acquired and invested over time (Gitman 2006). Behavioral finance which is the discipline that attempts to explain the cognitive biases and emotions of investors and other economic agents on decision making according to Simpson (2013).

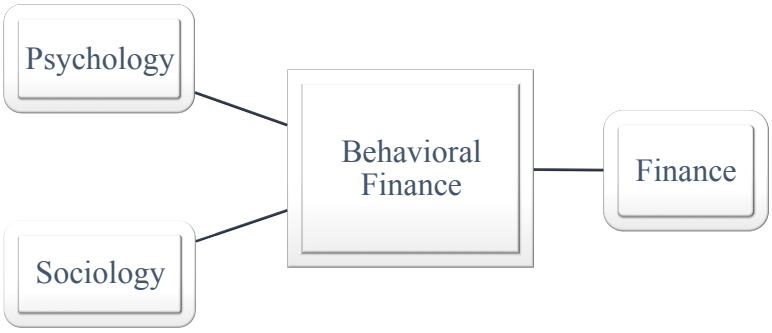

Figure 2.1 – Evolution of Behavior Finance. (adapted from Schidler 2007)

Figure 2.1 depicts the evolution of Finance, plugging in Psychology and Sociology to form the underpinnings of Behavioral Finance and making sense of biases plaguing financial decisions. Publishing more than 200 articles Dr. Daniel Kahneman in 2002 was awarded with a Nobel Prize in Economics for having integrated insights from psychological research into economic science, especially concerning human judgment and decision making under uncertainty, (Horta & Pinheiro 2016). More recently Richard Thaler received the same award for processing for progressing Behavioral Economics (Thaler 2017). Meanwhile a number of studies on behavioral finance have been published (See for example, (Hanoch 2005); Ellis et al., 2009; Hribar 2012; Hribar & Quinn, 2013; Hribar et al., 2017; Graham et al., 2013; Simpson, 2013; Horta & Pinheiro, 2016)).

Behavioral biases can be grouped in two categories: cognitive and emotional. Cognitive biases stem from non-rationality in judgment characterized by information-processing rules that our brain uses to come out with decisions. They differ from mechanic-like processes where all parts are well known and always determined no matter in what context. Economic agents decide according to the available information as per the efficient market hypotheses, but also on their beliefs and the sentiment on the evolution of the market, that is their expectations about uncertain events – e.g. returns - which are not the same for all.

Conversely, emotional biases such as optimism, overconfidence, loss aversion and regret are triggered by impulsive feelings. It is intuition instead of logical reasoning, According to Bernstein (1998), *evidence reveals repeated patterns of irrationality, inconsistency and incompetence in the way human beings arrive at decisions and choices when faced with uncertainty.* If we take a number of human decisions we witness a plethora of outcomes, suggesting that rationality or logic reasoning might not be enough to explain what is happening in the markets.

3. Traditional Finance

The traditional finance paradigm seeks to understand the finance world using models in which investors are "rational". Although many traditional theories along the time have been adjusted and progressed, even so the rationality of investors remain one of the main assumptions.

There are two key tenets in the traditional theory of Finance:

(i) Market agents are absolutely rational, implying that any new available information is interpreted properly and consistently, while the market agents regularly update their beliefs and remain insensitive to subjective stimulations,

(ii) Markets are efficient: The Efficient Market Hypothesis (EMH), hailing Random Walk Theory stating all relevant information is reflected in the prices immediately; additionally, when this hypothesis holds prices are fair and incorporate all information available; in fully efficient markets, there is no investment strategy that can earn excess return even when adjusted by risk;

Other models have emerged and were tested to corroborate and support EMH and the efficient markets view, in which agents are 'rational'; namely

- Harry Markowitz (1952; 1959), developed the MPT (Model of Portfolio Theory) choice which is commonly referred to as the mean-variance model. This model explains how to select a portfolio to maximize the expected return while minimizing risk by selecting securities according to their covariance. Investors invest in an asset that bears the highest expected return taking into account not only the risk associated with it, but also how their returns covariate. "*There is a rate at which investor can gain expected return by taking on variance, or reduce variance by giving up expected return*" (Markowitz 1952; Elton et al, 2009).

- Modigliani and Miller developed the denoted M&M theory, Ross (2016) based on perfect capital market for which the capital structure of the form is irrelevant, also based on investors behaving rationally (Modigliani, F., & Miller, 1958).
- The CAPM (Capital Asset Pricing Model) building on the groundbreaking work of Treynor (1961), Sharpe (1964), Lintner (1965), Mossin, (1966), laid the basis for modelling the risk-return relationship in one single equation. It is considered "*the basic theory that links risk and return for all assets*" Gitman (2006). CAPM predicts that security rates of return will be linearly related to a single common factor - the rate of return on the market portfolio.
- The APT (Arbitrage Pricing Theory) assuming asset pricing model based on the idea that an asset's returns can be predicted using the linear relationship between the asset's expected return and a number of macroeconomic variables that capture systematic risk. An alternative to the standard CAPM and was developed predominantly by Ross (1976). APT shows that the linear pricing relation is a necessary condition for equilibrium in a market where agents maximize certain types of utility.

These theoretical models are based on the rational expectations of economic agents. Behavioral theorists posit that beyond rational expectations the sentiment of economic agents has also to be factored in, so to cast a holistic view on markets and make better sense of reality. Otherwise, only a part of the reality is analyzed, missing the human nature of agents.

4. Human Behavioral Theories

Behavioral finance highlights the relevance of entering 'irrational' factors in the equation when analyzing management decisions, supported by social sciences. It can be divided in two major theories, Heuristics and Prospect Theory.

4.1. Heuristics

Heuristics are defined as the rules of thumb, which makes decisions making easier. Known as shortcuts that ease the cognitive load of making a decision is an approach to problem solving especially in complex and uncertain environments (Ritter 2003) by reducing the complexity of assessing probabilities and predicting values to simpler judgments (Tversky & Kahneman 1974). Overall, these heuristics, also acknowledged as beliefs, are widely used, predominantly when time is limited.

4.2. Prospect Theory

Prospect Theory and Expected Utility Theory (EUT) are considered as two distinct theories to decision-making from distinctive standpoints that are connected. EUT focuses on investors' rational expectations, whereas Prospect theory, Kahneman & Tversky, (1979) emphasizes subjective decision-making influenced by the investors' value system. EUT is the theory of rational choice and narrative model of economic behavior, which controls the analysis of decision making under risky or uncertain prospects by comparing their predictable utility values, i.e., the weighted sums obtained by adding the utility values of outcomes multiplied by their respective probabilities. Nevertheless, this theory is also criticized for inadequate explanation why people are prone to both insurance and gambling. On the other hand, the Prospect Theory complements the EUT theory concentrating on some states of mind affecting an individual's decisions and therefore investors underestimate probable outcomes compared with certain ones. So investors react contrarily to the comparable situations depending on the context of losses or gains (Kahneman & Tversky 1979). In essence, the theory explains how some sates of mind justify irregularities in human behavior and affect the decision-making process.

The most central element of the prospect theory is the S-Shaped value function depicted in figure below:

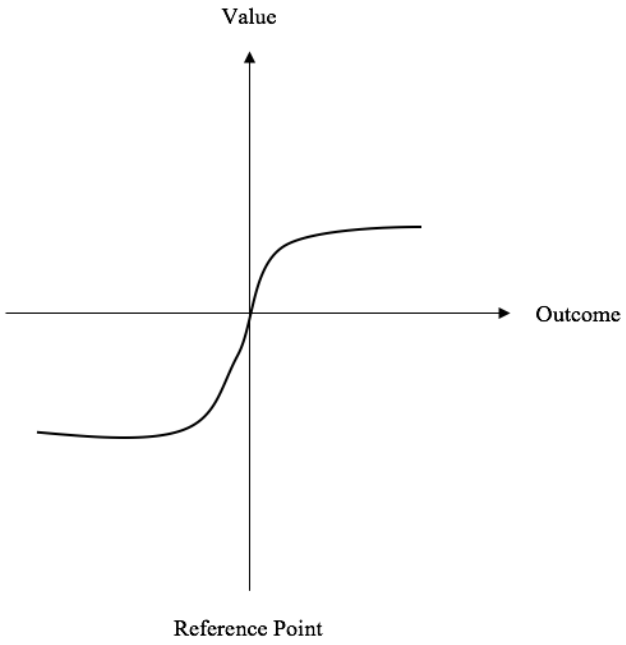

Figure 4.1 – Prospect Theory Value Function (adapted from Kahneman and Tversky, 1979)

Considering three elements of prospect dimension: Loss aversion, Regret aversion, and Mental accounting are used to measure their impact levels on the investment decision making as well as the investment performance. Correlating these states of mind with the figure above, the shape of the function is concave in the region of gains and convex in the loss region, reflecting risk aversion in the domain of gains and risk seeking in the domain of losses. This view contends that people value gains and losses differently. Thus, if an investor is given two equals choices, one expressed in terms of possible gains and the other in possible losses, investors would choose the former – even when they achieve the same economic end result.

"I should have computed the historical covariance of the asset classes and drawn an efficient frontier. Instead, I visualized my grief if the stock market went way up and I wasn't in it - or if it went way down and I was completely in it. My intention was to minimize my future regret, so I split my [pension scheme] contributions 50/50 between bonds and equities."- Harry Markowitz, Founder of Modern Portfolio Theory Pompian (2006). In other words, putting the same situation in a different setting can make the same person to act either overconfidently or conservatively and these assumptions recall the

premise of the fact on the stock market every time one person buys, another sells and both think they are astute - William Feather.

4.3. Overview - Biases, Effects on Investor, and Consequences

Table 4.3.1 - Biases, Effects on Investors, and Consequences (adapted from Wagner & Janssen (1999))

Bias Name	Key Effects on Investor	Consequences
Trend-Chasing	Tendency to chase past performance	Risk of failure, each performance has its own way
Hindsight	Tendency to feel that a past event was obvious when it really was not, at onset	Incorrect oversimplification of decision making
Worry	Visions of possible future scenarios that alter an investor's judgment	Perceived risk and limit the earnings
Anchoring	Tendency to consider logically more attention to information that supports our opinions while ignoring the rest.	Missed investment opportunities, or bad entry timing into the market
Regret Aversion	Cutting winners to soon, riding losers too long	Reduced Returns
Gambler's Fallacy	Taking too much risk after a lucky win	Change of high losses
Representativeness	Tendency to associate new event to a known event and make investments based on it	Overrated investment, Possible losses.
Overconfidence	Overestimating a task performance	High risks and losses.

There are numerous identified psychological biases in the Behavioral finance literature. Each has implications on financial decision-making and behavior. Table 4.3.1 shows the most common known biases that can affect investors.

5. Behavioral Bias

As this is an ongoing analysis, encompassing all that has been said previously the choice now facing is whether or not to abandon the conceptual approach that led to our past success and replace it with a more behavioral approach. Based on what was mentioned above is related not to an inadequate but overtaken financial theory. Events damaged Traditional Finance image due to an alternative theory fathered by Daniel Kahneman and Amos Tverky was developed to evaluate individuals' decision-making progress. Now can be explained the various irrational investor behaviors in financial world. In contrast of traditional finance this social science aims to explain how markets are inefficient and how beliefs and psychological factors have a tremendous impact.

As in traditional finances also in behavioral finance the information available is relevant. An underlying assumption of behavioral finance is that, the information structure and characteristics of market participants systematically influence the individual's investment decisions as well as market outcomes. In more detail, in occurrence of this assumption others comes contradicting the traditional assumptions such as agents fail to update their beliefs correctly and there is a systematic deviation from the normative process in making investment choices. Thereby such decision making is not so trivial and straight. In Short, behavior biases allow to find the correlation between behavioral factors and investment performance.

6. Accruals and Earnings Management

6.1. Accrual Accounting

Accounting is an important and necessary science since it is supposed to represent economic reality, Accounts often resource to accruals when events are do not occur contemporaneously to accounts charging (Dechow et al., 2010). Studying accruals is relevant for decision-making analyses and to cater to financial and accounting dynamics, which might occur in different points in time. But financial dynamics will always include human judgement, as Mura (2016) refer *"An Accounting system that measures an unobservable construct (Financial performance) inherently involves estimations and judgment .. has the potential for unintentional errors and intentional bias"*.

6.2. Earning Management

Earnings management arises from choosing accounting policies and accrual-based earnings management. Linking these two points, a primary objective of accruals is to demonstrate the performance of the firm recording revenues and expenses to rather than presenting the cash in- and outflow. This can lead to Accrual-based earnings management which might be at the discretion of managers (Dechow et al., 2010). However, Earnings Management might entail the manipulation of earnings by managers, even when accounting standards are in place. Managers can book accruals to obtain better performance indicator in the short-run (Healy, 1999), which boils down to manipulation of results to try to signal an increase in shareholders' value.

Earnings management and earnings quality are directly correlated. In reality earnings quality can be indicated from the result of earnings management and vice-versa.

Earnings quality, is defined only in a context of a specific decision model, only has relevance when the reported earnings numbers reflect the firm's financial performance as long as many headings are unobservable and lastly the term "earnings quality" isolated is meaningless. When these assumptions are respected, higher quality earnings became the base to make a rational decision, *"Higher quality earnings provide more information about the features of a firm's performance that are relevant to a specific decision made by a specific decision-maker"* (Dechow et al 2010; Lev et al., 2010).

An extent of the importance of the earnings management concept is that it allows to observe the investors responsiveness and note the 'irrational' factors in the equation when analyzing management decisions which supports the underlying behavioral bias theory, that has a roll on this study.

6.3. Working Capital Accruals

Working Capital is defined in terms of net working capital, i.e, being the difference between current asset and current liabilities. Working Capital also encompasses cash management and therefore is linked to the earning management paragraph described above. Prior research used total accruals as the proxy of working capital accruals and afterwards was fragmented in two measures (i.e discretionary and non-discretionary) (Dechow et al., 2010). Non-discretionary reflects business conditions performance while discretionary accruals are associated with several performance measures, and concludes that managers' accrual choices increase the informativeness of accounting earnings (Bernard & Skinner 1996). Moreover, according to Zietlow & Maness (2005) "*The management of working capital involves the management of the transformation process of resources from the cash invested in inventory once payables and operating accruals are paid, through the operations or production process, followed by the selling process, and finally, the credit collection process. The management of this transformation process has a profound impact on the liquidity position of the firm*" and so, corroborates that this balance sheet item that is part of this study evidence a strong factor in the investor's decision to be analyzed.

7. Conceptual Framework

Following the literature review, there are some questions to take into in terms of the conceptual framework. The following picture represents the overall framework for the present work, linking concepts, theoretical underpinnings and the dependent variable (accruals).

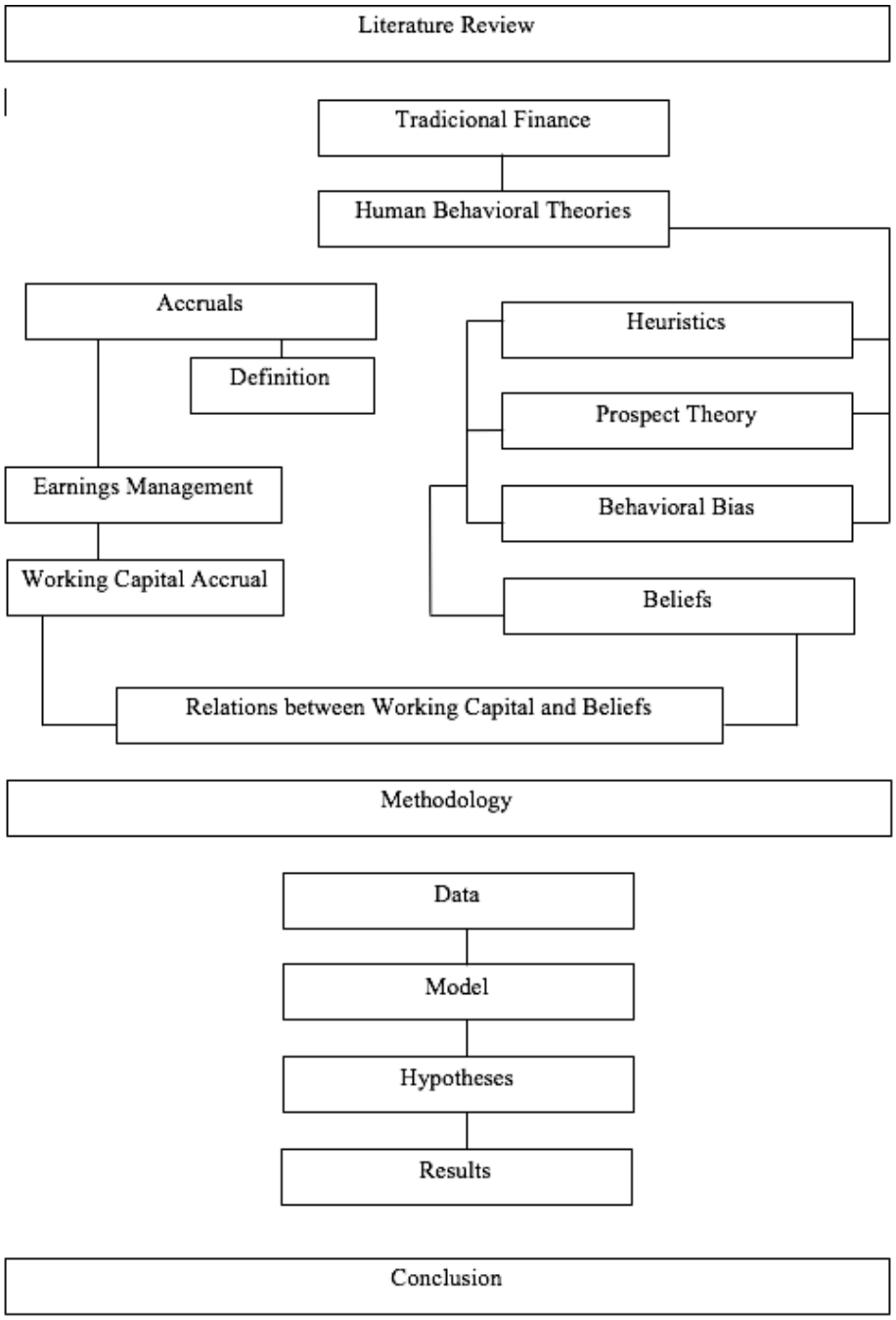

Figure 7.1. – Conceptual Framework

8. Methodology

As mentioned in the literature review above, we posit that behavioral factors impact the investment decisions of investors in Accruals Estimates. This study explores the influence levels of the behavioral of chief's financial officers' difficulties in projecting future outcomes due to environmental uncertainty, management lapses decisions and their investment performance at their companies, in particular how CFOs manage the Working Capital estimates. Considering that unintentional errors in accruals estimates are behavioral biases (Hribar et al., 2017), one possible source is managerial sentiment, expressed as beliefs about future firms outcomes that are not justified by the information available to managers (Simpson, 2013; Horta & Lobão, 2016; Horta & Pinheiro, 2016) as in the following research model and hypotheses explain further on.

8.1. Description of Data

To test the hypotheses, the impact of changes in the independent variable upon the dependent variable is considered in data analysis. The main variables are described below.

8.1.1. Duke University Survey

Consistent with previous works (Brown, Christensen, Elliott, & Mergenthaler, 2012; Hribar et al., 2017; Horta & Pinheiro, 2016) in order to analyze the relationship between CFO Sentiment changes and variations of Working Capital for U.S firms, managerial sentiment is sourced from Duke University/CFO Magazine Business Outlook Survey[1]. This Survey's questions are meant to capture inter-temporal changes in such things as growth expectations, corporate optimism/pessimism among other variables. For each quarter, the survey collects the individual response of hundreds of CFOs from companies in different Industries, collecting data on managerial sentiment and on the economy to form a novel database on U.S. listed firms, excluding financial institutions. To develop the CFO sentiment measure is used the median response to the follow questions "Rate your optimism about the financial prospects for your own company on a scale from 0-

[1] See https://www.cfosurvey.org/ for additional information about the survey.

100, with 0 being the least optimistic and 100 being the most optimistic" and "Rate your optimism about your country's economy on a scale from 0-100, with 0 being the least optimistic and 100 being the most optimistic.", this questionnaire addressed to CFOs is used to proxy firms' CFO sentiment. Also, the results spanning from 2002 to 2017. This survey is meant to define the Beliefs for the first model.

8.1.2. Variables

Adding macro-economic variables[2] on model 2 and 3 such the ones below, and given beliefs are driven by information about macroeconomic conditions, it is essential include on analysis macroeconomic factors that can affect working Capital Accruals and Beliefs.

- GDP;
- UNEMPLOYMENT;
- TBILL;
- CPIR;

Also, is important to refer the model 3 is composed by profitability, Size and quality variables in order to have the full vision of type of variables that are being crossed and measured.

- EBIT;
- Total Assets;
- Market Capitalization;
- Normalized Accruals Operating Cash Flow;
- Normalized Accruals Cash Flow;
- Normalized Accruals Balance sheet;

[2] https://data.worldbank.org/ for additional information about the macro-economic variables

8.1.3. Companies

A sample of 81 firms selected from S&P500. Group selection derived from a trusted market indexed where is promoted a homogeneous sample avoidance of miss disclosure of information. In the annex 9.1 it is possible to find which companies made part of this study.

8.2. Model

As explained above, we address the effect that managerial sentiment has on accruals estimates, specifically Working Capital accrual. To obtain this component, we use OLS to estimate the model present in Eq. (1):

$$y_i = \beta_0 + \beta_1 x_{i,1} + \beta_2 x_{i,2} + \ ... + \beta_{p-1} x_{i,p-1} + \varepsilon_{i,t} \quad (1)$$

where,

y_i - response;

$\beta_0, \beta_1 \ldots \beta_{p-1}$ - regression parameters;

$x_{i,1}, x_{i,2} \ldots x_{i,p-1}$ - constants;

ε_i - independent random residual error associated with the response.

Primarily resulting in model in Eq.(2),

$$CFO\ BELIEFS_t = \beta_0 + \beta_1 GDP_t + \beta_2 TBILL_t + \beta_3 UNEMP_t + \ \beta_4 CPIR_t + \varepsilon_{i,t} \quad (2)$$

Considering CFO BELIEFS is a measure of sentiment is that managers' beliefs are undoubtedly driven by information about macroeconomic conditions, which justifiably affect managers' estimates of accruals estimates. To test the effect on OLS we will focus on the Beliefs caused by the event. Having all the information of the above formula, the market model will be used to calculate $\varepsilon_{i,t}$.

Once extracted the residual error ($\varepsilon_{i,t}$), is labeled the residual from model (2) $SENTIMENT_t$ and is used this as a primary measure of managerial sentiment throughout the study.

Secondly to contemplate the association between managerial sentiment and Working Capital, is estimate the following pooled base line model using three measures to test Hypothesis. According to the study model, the possible occurrence of sentiment influence on decision making needs to be crossed and tested against Profitability and Size independent variables.

$$
\begin{aligned}
Working\ Capital_t \\
&= \beta_0 + \beta_1 Sentiment_t + \beta_2 Ebit_t + \beta_3\ Total\ Assets_t \\
&+ \beta_4\ Market\ Capitalization_t \\
&+ \beta_5\ Normalized\ Accruals\ Operational\ Cash\ Flow_t \\
&+ \beta_6 Normalized\ Accruals\ Operational\ Balance\ Sheet_t \\
&+ \beta_7 Normalized\ Accruals\ Cash\ Flow_t + \beta_8 Gdp_t + \beta_9 Tbill_t \\
&+ \beta_{10} Unemp_t + \beta_{11} Cpir_t + \varepsilon_{i,t} \quad (3)
\end{aligned}
$$

In the second part of econometric model, is used the residual of equation (2) and equation (3) to analyze the relationship between managerial sentiment of CFO of U.S. firms and accruals estimates for companies. Also, was made a robustness test where by excluding a few variables of quality proxies can show the sensitive of specification base model used.

8.3. Hypotheses

In the null hypothesis (H_0) the mean and variance of the Working Capital will be equal to zero. This would mean that the event (Managerial Sentiment) has no statistically significant effect on the working Capital Accruals, which could either be explained by CFOs hailing from the firms industry quoted in stock market might be more sophisticated professionals or lack of power from the test, although unlikely, since several publications defend the same methodology (Horta & Pinheiro, 2016; Hribar, et al., 2017).

The alternative hypothesis (H1) admits that the variance of the Working Capital reacts to the CFOs' Managerial Sentiment changes. This can occur if at least a part of the CFO would keep using these High positive (negative) variations of CFO Sentiment optimism (pessimism) as decision making.

According to behavioral finance literature expectations reside on the null hypothesis, which could prove that Managerial Sentiment has no positive correlation to Working Capital changes.

To summarize,

$$\begin{cases} H_0 : \tau \leq 0 \\ H_1 : \tau > 0 \end{cases}$$ [3]

H_0 – Managerial Sentiment for all events during period *t* are not statistically significant, i.e. are equal to zero.

H_1 – Managerial Sentiment for all events during period *t* are statistically significant, i.e. are different than zero.

Developed several hypotheses to test and provide evidence on whether Manager Sentiment affects manager's estimates of accruals estimates. First, if managerial sentiment affects estimates of accruals, then when managerial sentiment is high (low) (i.e., managers hold unjustifiably positive (negative) beliefs about expectations of future firms' prospects), managers will under (over) position for working capital accruals, resulting in a working capital that is lower (higher) than what is justified by information available to the manager. Being proposed the following hypothesis:

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[3] τ represents the contemporaneous global correlation between changes in Managerial Sentiment and the symmetric of changes in Working Capital for U.S firms.

Hypothesis 1: There is correlation between changes in Managerial Sentiment and changes in Working Capital for U.S firms;

Hypothesis 2: Predicts that sentiments will have a stronger association with Ebit than Market Capitalization or Total Assets from operations over short measurement variations of Working Capital for U.S firms in three pooled regressions;

Hypothesis 2.1: Examining Sentiments Correlation between changes in EBIT and changes in Working Capital for U.S firms;

Hypothesis 2.2: Examining Sentiments Correlation between changes in Market Capitalization and changes in Working Capital for U.S firms;

Hypothesis 2.3: Examining Sentiments Correlation between changes in Total Assets and changes in Working Capital for U.S firms;

Hypothesis 3: Examining a robust regression on Hypothesis 2;

Hypothesis 4: 2 stage least-square regression on Hypothesis 2.

9. Empirical Results

In hypothesis 1 estimation of sentiment throughout model 2 and descriptive statistics are provided. Hypothesis 2 Wald test and present the base model regression results of sentiment impact on working capital, respective descriptive statistics and Pearson correlations. Robustness test is performed hypothesis 3. Last but not least, in hypothesis 4 the 2SLS test.

Hypothesis 1- Estimation of Sentiment model 2

The sentiment is that managers' beliefs are undoubtedly driven by information about macroeconomic conditions, in this case to obtain this component is used OLS to estimate the model (2) pointed above. Where the extraction of error $\varepsilon_{i,t}$ represents the sentiment unjustified by macroeconomics conditions. Table 9.1 presents the results of the regressions to estimate this sentiment.

Table 9.1 - Macroeconomic Determinants of Beliefs

Independent Variables	Beliefs
TBILL	0.5512*
	(0.2895)
GDP	0.7598***
	(0.1269)
Unemployment	-1.1341***
	(0.1712)
CPIR	1.3366**
	(0.5446)
Constant	69.4726***
	(1.6354)
Observations	64
R-squared	0.7026

Standard errors in parentheses

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

As used in prior studies (Hribar et al., 2017), to regress the proxy for Managers' beliefs (sentiment) on macroeconomic variable listed (see Eq.(2)) , denotes aspects such as 1% increase variation in TBILL is expected to increase 5.12% positive variation in CFOs optimism about financial prospects and statistically significant at the 10% level. 1% variation in GDP is expected to increase 7.6% and statistically significant at the 1% level, the same reasoning for CPIR, with 1% variation is expected an increase of 13.3% positive variation in CFOs optimism and statistically significant at the 5%level. In other hand, Unemployment as expected negatively affects the level of optimism of the CFOs, the results point to a 1.13% decrease in optimism associated with a 1% increase in the unemployment rate and statistically significant at the 10% level. The results of this regression denote the parameter R^2 has a reasonable explanatory power of 0.7026 and so these four macro variables explain about 70% in beliefs, leaving the remaining 30% unexplained, which is concluded this remaining part represents the sentiment unjustified by macroeconomics conditions. Additional statistic information on table 9.2 where can be seen for the principal variable (Beliefs), has a mean of 66.3% with a minimum of 53.40% and a maximum of 73.57%.

Table 9.2 – Descriptive Statistics of Model (2)

	(1)	(2)	(3)	(4)	(5)	(11)	(19)
Variables	N	mean	sd	min	max	p1	p99
Beliefs	64.0000	66.3039	4.0228	53.4000	73.5700	53.4000	73.5700
TBILL	64.0000	3.2838	1.0720	1.5600	5.1100	1.5600	5.1100
GDP	64.0000	1.9719	2.3742	-8.2000	6.9000	-8.2000	6.9000
Unemployment	64.0000	6.3266	1.7407	4.1000	9.9000	4.1000	9.9000
CPIR	64.0000	0.5223	0.5781	-2.2900	1.5417	-2.2900	1.5417

Hypothesis 2 - Estimation of Baseline

In second part of our econometric model is used the residuals of equation (2) to analyze the relationship between managerial sentiment of CFOs of US firms and working capital and depicts the attenuated variation in sentiment. As referred on hypotheses 2 in hypotheses chapter on table 9.4, the baseline will be pooled three similar regressions predicting different associations when alternating different independent variable (Ebit, Market Capitalization and Total Asset) simultaneously is run a parametric statistical test (Wald test) to substantiate whether the sentiment is verifiable or not in table 9.3. Also, pairwise correlations in table 9.5, along with descriptive statistics in table 9.6.

By means of run the Wald Test or Wald Chi-Squared Test, allows to find out if explanatory variable has significant means to the model matter in question, which could prove that Managerial Sentiment has or not positive correlation to Working Capital changes.

Table 9.3 – Wald Test.

Wald Test	
Sentiment = 0	
Chi2 (1) =	8.58
Prob > chi2 =	0.0034***

Standard errors in parentheses

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

As it is shown by table 9.3 above, the calculated P-value is 0.0034 (p-value < 0.01) which means the null hypothesis H0 defined in hypotheses chapter is rejected and so affirm the sentiment is statistically significant at the 1% level on model 3.

Be consistent with baseline table 9.4 is estimated the sentiment for each OLS regression, can be seen a result of decreasing range between 3.5% to 3.4% on working Capital associated with 1% increase in Sentiment, and statistically significant at the 1% level for the three baseline models. Also, doing interpretation of other variables we see that on the three baseline models (1), (2) and (3) with 1% variation on EBIT, Market Capitalization and Total Assets has a positive impact range between 0.1% and 2% in working Capital and statistically significant at the 10% level. Also, for TBILL variable on three baseline models, statistically significant at the 1% level for baseline (1) and statistically significant at the 5% level for (2) and (3), the result point to a positive range impact between 7.2% and 7.9% associated with 1% increase in Treasury Bill. Focusing on the study variable Sentiment, the best result is the baseline (1) having the higher variation with coefficient value of 3.5120%. These findings of accruals are affected by managerial sentiment to a greater degree when uncertainty is higher. Additional statistic information on table 9.5.

Furthermore, doing the parallelism with Pearson Correlations table 9.6, indicates that Sentiment are significantly correlated with several variables, included as independent variables in baseline model. Even so, some are positively and others negatively correlated, which is linked to the state of mind of the CFO, being optimistic vs. pessimistic.

Table 9.4 – Test of Hypothesis 2, Baseline

VARIABLES	(1) Working Capital	(2) Working Capital	(3) Working Capital
Sentiment	-3.5120***	-3.4890***	-3.4225***
	(1.1991)	(1.2596)	(1.2535)
EBIT	0.0200*		
	(0.0109)		
Market Capitalization		0.0000*	
		(0.0000)	
Total Asset	0.0003	0.0005*	0.0005*
	(0.0003)	(0.0003)	(0.0003)
Normalized Accruals bs	5.8096	5.4274	5.6896
	(4.1622)	(4.1603)	(4.1595)
Normalized_Accruals_cf	-15.1854*	-13.8995	-13.9838
	(9.1096)	(9.0825)	(9.0857)
Normalized_Accruals_op	10.9225	9.6044	9.8032
	(7.7921)	(7.7674)	(7.7697)
TBILL	7.9630***	7.2406**	7.2481**
	(2.8024)	(2.9069)	(2.8943)
GDP	1.5730	1.7108	1.6753
	(1.1498)	(1.2084)	(1.2027)
Unemployment	7.5079***	7.1759***	7.1560***
	(1.6051)	(1.6759)	(1.6682)
CPIR	-2.6882	-2.4503	-2.5841
	(4.9436)	(5.2001)	(5.1758)
Constant	-64.6467	-3,040.2327*	-60.5862
	(42.3484)	(1,552.8126)	(42.5312)
Observations	4,602	4,602	4,602
Number of date	64	64	64

Standard errors in parentheses

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

Table 9.5 – Descriptive Statistics of Model (2)

	(1)	(2)	(3)	(4)	(5)	(11)	(19)
VARIABLES	N	mean	sd	min	max	p1	p99
Sentiment	5,184	-1.26e-08	2.177	-5.449	5.540	-5.449	5.540
EbIT	4,743	329.1	517.4	-2,937	6,174	-36.10	2,321
Total Asset (million)	4,699	18,477	60,403	186.2	623,026	613.0	515,437
Market Capitalization (million)	5,120	3.173e+10	3.525e+10	4.902e+09	2.120e+11	4.913e+09	2.118e+11
normalized_accruals_bsm	4,695	0.0150	0.629	-29.80	27.87	-0.400	0.597
normalized_accruals_cfm	4,604	0.0635	0.862	-41.55	27.97	-0.523	1.100
normalized_accruals_ofm	4,608	-0.0571	1.019	-50.92	28.52	-0.519	0.936
Working Capital	4,699	20.73	175.0	-289.3	342.8	-289.3	342.8
TBILL	5,184	3.284	1.064	1.560	5.110	1.560	5.110
GDP	5,184	1.972	2.356	-8.200	6.900	-8.200	6.900
Unemployment	5,184	6.327	1.727	4.100	9.900	4.100	9.900
CPIR	5,184	0.522	0.574	-2.290	1.542	-2.290	1.542
Number of date	64	64	64	64	64	64	64

Table 9.6 - Pearson correlation between Sentiment and variables

	1	2	3	4	5	6	7	8	9	10	11
Working Capital	1.0000										
EBIT	0.0831***	1.0000									
Market Capitalization	0.0937***	0.8043***	1.0000								
Total Asset	0.0506***	0.7669***	0.6952***	1.0000							
Normalized Accruals Bs	0.0184	-0.0385***	-0.0288**	-0.0181	1.0000						
Normalized Accruals Cf	-0.0141	-0.0058	0.0094	-0.0187	0.1084***	1.0000					
Normalized Accruals Op	-0.0065	-0.0087	0.0139	-0.0080	0.1464***	0.9385***	1.0000				
Sentiment	-0.0357**	0.0139	0.0000	0.0013	0.0004	0.0108	0.0222	1.0000			
TBILL	0.0159	-0.0793***	0.0000	-0.0245	0.0201	0.0112	0.0197	-0.0000	1.0000		
GDP	0.0176	0.0243	-0.0000	0.0013	-0.0114	0.0020	0.0034	-0.0000	0.0990	1.0000	
Unemployment	0.0536***	-0.0465***	0.0000	-0.0044	0.0043	-0.0348**	-0.0226	-0.0000	-0.2674	-0.1263	1.0000
Cpir	0.0027	-0.0145	-0.0000	-0.0109	0.0445***	0.0115	0.0036	0.0000	0.3172	0.3058	-0.1295

Standard errors in parentheses

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

Hypothesis 3 - Robustness tests

Performed a robustness test to control for a few variables, removing one Size (market capitalization) and other two proxy quality variables (Normalized Accruals Operating Cash Flow and Normalized Accruals Cash Flow) to test the strength and robustness of the model.

Table 9.7 – Robustness test

Variables	(1) Working Capital
Sentiment	-3.1754**
	(1.3045)
EBIT	0.0194*
	(0.0108)
Total Asset	0.0003
	(0.0003)
Normalized Accruals Bs	5.9061
	(4.0774)
TBILL	8.2910***
	(3.0389)
GDP	1.6280
	(1.2561)
Unemployment	7.7012***
	(1.7507)
CPIR	-3.1568
	(5.4005)
Constant	-62.3909
	(40.0745)
Observations	4,694
Number of date	64

Robust standard errors in parentheses

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

After run the new regression but without the variables specified on table 9.7 above, can be affirmed that we have a good baseline model (1) since is not observable significant changes on the above robustness test. Despite of the decrease of sentiment coefficient value (from -3.5120 observed on baseline (1) to -3.1754 on robustness test) the effect after exclusion of variables from the model shows that the impact of the sentiment on working capital is maintained in comparison to the baseline model (1), which reveals that the model has a great explanatory power. Maintaining a positive result and the economic significance of the model.

Hypothesis 4 - two stage least-square regression

An of extension of the OLS method the two stage least-square regression, is suggested to solve the issue of causality. Instruments, which are variables that are correlated with Dependent variable and Interest variable but are not included on regression and so is explain by the error $\varepsilon_{i,t}$.

$$Working\ Capital_i = \beta_0 + \beta_1 Sentiment_{i,1} + \beta_2 x_{i,2} + \ \ldots + \beta_{p-1} x_{i,p-1} + \varepsilon_{i,t}$$

where,

Working Capital – Dependent Variable;
Sentiment – Interest Variable;
$X_2 \ldots X_{p-1}$ – other control variables;

Table 9.8 - Two Stage Least-Square Regression

Variables	(1) Working Capital
Sentiment	72.4423**
	(31.1137)
EBIT	-0.0078
	(0.0196)
Total Asset	0.0001
	(0.0006)
Constant	6.7234
	(27.3012)
Observations	4,608

Robust standard errors in parentheses

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

Considering only two variables profitability and Size one (EBIT and Total Asset), and testing the model two stage least squares regressions, imply that Sentiment may have a causal positive effect on Working Capital. Being the variable sentiment statistically significant with the value of 72.44% and statistically significant at the 5% level. Come to corroborate that are elements not contain in the regression that explain the correlation between the Dependent variable and the variable of interest Sentiment.

10. Conclusion

This thesis objective, to assess whether managerial sentiment results in unintentional errors in accruals estimates. Using a sample of 81 firm's observations from 2002 – 2017, was study whether managerial sentiment affects firms' working Capital.

Starting with measure of managerial sentiment is derived from Duke University/CFO Magazine Business Outlook Survey, when crossing the data with the macroeconomic variables allowed to confirm the existence of feeling between the CFO and their decision making as in past studies (Horta & Pinheiro, 2016;Hribar, et al., 2017). None the less these past studies did not found a statistically significant correlation between the sentiment and decision making.

To the contrary, this thesis that reflect the opposite. Through OLS estimate Baseline and corroborate by robustness test and Causality test, it is possible to prove with confidence after several tests described above CFOs of Non-financial firms are influenced by sentiment on decision making.

Consistent with all previous literature, this result attests the 'sentiment' is under the spotlight and all the Human Cognitive biases theories are valid, i.e, stem from rationality in judgment characterized by information-processing rules that brain uses to produce decisions.

11. References

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12. Appendix

12.1. List of Companies used on the study

S&P 500			
Company Code	**Long Name**	**Company Code**	**Long Name**
PH UN	Parker Hannifin Corp	**NOC UN**	Northrop Grumman Corp
BA UN	Boeing Co/The	**NOC UN**	Northrop Grumman Corp
CAT UN	Caterpillar Inc	**SRCL UW**	Stericycle Inc
ROK UN	Rockwell Automation Inc	**RHI UN**	Robert Half Intl Inc
GE UN	General Electric Co	**RSG UN**	Republic Services Inc
LLL UN	L3 Technologies Inc	**CTAS UW**	Cintas Corp
MMM UN	3M Co	**WM UN**	Waste Management Inc
RTN UN	Raytheon Company	**VRSK UW**	Verisk Analytics Inc
UTX UN	United Technologies Corp	**DHR UN**	Danaher Corp
PWR UN	Quanta Services Inc	**WRK UN**	Westrock Co
HON UN	Honeywell International Inc	**SHW UN**	Sherwin-Williams Co/The
AYI UN	Acuity Brands Inc	**SEE UN**	Sealed Air Corp
TXT UN	Textron Inc	**BLL UN**	Ball Corp
JCI UN	Johnson Controls Internation	**VMC UN**	Vulcan Materials Co
ALLE UN	Allegion Plc	**PKG UN**	Packaging Corp Of America
FLR UN	Fluor Corp	**MLM UN**	Martin Marietta Materials
COL UN	Rockwell Collins Inc	**MTD UN**	Mettler-Toledo International
AOS UN	Smith (A.O.) Corp	**A UN**	Agilent Technologies Inc
TDG UN	Transdigm Group Inc	**PKI UN**	Perkinelmer Inc
PCAR UW	Paccar Inc	**ACN UN**	Accenture Plc-Cl A

CMI UN	Cummins Inc	**GPN UN**	Global Payments Inc
DE UN	Deere & Co	**ADS UN**	Alliance Data Systems Corp
DOV UN	Dover Corp	**TSS UN**	Total System Services Inc
ETN UN	Eaton Corp Plc	**ADP UW**	Automatic Data Processing
FLS UN	Flowserve Corp	**FIS UN**	Fidelity National Info Serv
EMR UN	Emerson Electric Co	**FISV UW**	Fiserv Inc
FAST UW	Fastenal Co	**PAYX UW**	Paychex Inc
XYL UN	Xylem Inc	**PYPL UW**	Paypal Holdings Inc
PNR UN	Pentair Plc	**APH UN**	Amphenol Corp-Cl A
GD UN	General Dynamics Corp	**XRX UN**	Xerox Corp
FTV UN	Fortive Corp	**TEL UN**	Te Connectivity Ltd
GWW UN	Ww Grainger Inc	**FLIR UW**	Flir Systems Inc
ROP UN	Roper Technologies Inc	**CHRW UW**	C.H. Robinson Worldwide Inc
URI UN	United Rentals Inc	**UNP UN**	Union Pacific Corp
ITW UN	Illinois Tool Works	**KSU UN**	Kansas City Southern
IR UN	Ingersoll-Rand Plc	**CSX UW**	Csx Corp
FBHS UN	Fortune Brands Home & Securi	**EXPD UW**	Expeditors Intl Wash Inc
JEC UN	Jacobs Engineering Group Inc	**FDX UN**	Fedex Corp
MAS UN	Masco Corp	**JBHT UW**	Hunt (Jb) Transprt Svcs Inc
AME UN	Ametek Inc	**UPS UN**	United Parcel Service-Cl B
LMT UN	Lockheed Martin Corp	**NSC UN**	Norfolk Southern Corp