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The relevance of financial analysts' teams: their impact on forecast accuracy

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Contents

Introduction

“Success in investing comes not from being right but from being wrong less often than everyone else.”

Aswath Damodaran

"The stock market is filled with individuals who know the price of everything, but the value of nothing."

Phillip Fisher

The dynamics underlying the functioning of the financial markets have always been extremely complex and subjected to academic and non-academic study. Especially since we have witnessed more complex events in the last few decades. What was once impossible is now possible. history helps us understand how the mechanisms that rule the world have radically changed throughout time. Who would have ever thought in the past that a company like Zoom, in May 2020, would have reached a higher market capitalisation than General Motors (Urietti, 2020)? Another important example is Amazon, who has experienced the same growth history in twenty years? Who would have ever thought that a company born at the end of the XX century, focused on e-commerce, cloud computing, digital streaming, would have boosted its stock price, between 2010 and 2020, of approximately 1.400%?

All these phenomena could potentially distract us from understanding a key important concept in Corporate Finance: value. In a lot of economic disciplines, like in management and in Finance, value is strongly employed in several fields such as company valuation process, securities pricing. Due to this fact, it can be difficult to give a unique definition to “value”. This thesis’ scope is therefore to investigate the main methods and aspects that determine the basis for the valuation process. The focus is about the dynamics concerning financial analyst companies’ valuations.

In the economic vocabulary the meaning of “value” can differ. One definition refers to an appreciation of resources and the companies’ current financial situation, especially in its ability to persist over time. Moreover, in the business world, it is related to the firm's

ability to grow and develop its people and structure. What it is important to bear in mind is that value concept is relative, and it depends on the area of interest.

As a matter of fact, in Management and Finance, value is not only linked to past/present elements. It is also correlated to dynamics concerning the future, such as forecasts. Especially in economic disciplines like Corporate Finance, the role of future value is strictly important to hypothesize and understand which is the direction of, for example, a share price trend. A lot of financial analysis are based on future forecasts. Discounted Cash Flows is one of the best important example of financial valuation methods which consider future sum of money or stream of cash flows, given a specified rate of return, to valuate an asset, a security or an entire company. It is important to bear in mind that in financial analysis future forecasts represents a key element to calculate an assets' value.

The "relativity of value" concept can better explain why in front of the same investment opportunities some people decide to buy shares from company A in place of company B. Everyone, in fact, perceive the value differently. Physical characteristics influence how we perceive and respond to information. Our character aspects, experiences, ways of thinking, lead us to give, *ceteris paribus*, different values to the same thing. This "imperfection" of human beings is linked to a very interesting and important research of Richard H. Thaler through which he won the Nobel Prize in 2017. He focuses on the fact that people tend to simplify financial decision-making by creating separate accounts in their minds, focusing on the narrow impact of each individual decision rather than its overall effect. He also showed how aversion to losses can explain why people value the same item more highly when they own it than when they do not, a phenomenon called the endowment effect (Vitasek, 2017).

The behavioural aspects play a relevant role in this thesis. We have assisted, in fact, to a growing widespread of valuation methods that are heuristic based. Market ratios represent an interesting example of method utilised by financial analysts to valuate firms. However, as it will be better explained in the next chapters, market ratios represent a heuristic methodology. They substantially represent a key example of valuation approach that is not scientifically based. Therefore, the risk of biased valuations can be higher. Behavioural finance, at this purpose, assist us to recognise in which biases analysts can occur and why scientific based methods are more reliable than the others. Anyway, this research does not only concern bias related to valuation methods. There exists, in fact,

some other elements that impact valuations. Therefore, the focus has regarded financial analysts who are an important example of economic agents that perform companies' valuations. Specifically, the started by wondering which are the most important factors that affect analysts' performances and how are they even affected by the macroeconomic arena.

Considering the previous aspects, it was decided to investigate which are the variables that affect analysts' activity. Specifically, which are the factors that may influence forecast accuracy. This thesis, in fact, focuses on financial sell-side analysts valuation methods and the role of analyst's teams in companies' valuation process. In the next chapters it will be examined if a relation exists between analysts' teams and forecast accuracy. Moreover, it will be investigated if financial and multiple methods impact on target price accuracy. To better understand who financial analysts are and which are the methodology that usually they adopt, it will be briefly analysed the role of the analyst inside financial markets. The final part concerns econometric analyses whose objective is testing and investigating the previously reported hypothesis. For the experimental part, the sample of analysts' reports prepared by Ca' Foscari professors Cavezzali and Rigoni was considered, which contains 4.670 observations relating to financial analysts' reports issued between 2007 and 2013.

After accurate descriptive analysis several important aspects concerning analysts' teams will be investigated. Precisely, several analyses will be performed to examine which can be the common variables that influence forecast accuracy. Forecast error is considered as the dependent variable for the analysis.

Therefore, the main objective in this analysis is demonstrating that forecast accuracy of analyst's teams is higher than single analysts, investigating which other variables drive to more accurate and inaccurate forecasts analysis. The outcomes are therefore supported by a scientific approach based on econometric analyses.

1. CHAPTER: ABOUT FINANCIAL ANALYSTS

1.1 Who Financial Analysts are?

In such a highly interconnected world as ours, we frequently hear about performance of financial markets and some agents that operate in the market. The structure of financial markets is very ample, and there are a lot of figures that play an active role in these financial organisations. The study of these agents that operate in financial markets is very useful to understand mechanisms that run markets. Especially the study of these agents is very useful when concerning forecasts about markets. Future uncertainty is what mainly affects financial markets. As it happened at the beginning of 2020 during COVID-19 widespread, when uncertainty was higher than past years, financial markets responded in very interesting ways. Inevitably, at the beginning, several securities' price plunged. Very important worldwide companies, such as Eni, lost billions of dollars in few days. On the other hand, the interesting fact is that there were some firms that exponentially boosted their market value. For instance, Zoom Video Communications approximately quadruplicated its market price between March (app. 116$) and September (app. 458$) 2020. As Zoom, other companies boosted their market values. However, the key fact is that it is very complex doing forecasts, especially in the presence of macroeconomic factors (such as economic crisis) and other worldwide events (such as COVID-19). From this prelude it is clear that forecasting companies' performances seems everything but simple.

The figure whose role is valuating companies' future performances giving investments opinion to public is the financial analyst. Financial Analysts are professionals that monitor and interpret the available data deriving from the market. They make recommendations forecasting a fair market value for the sale / purchase of shares of a specific company in order to be able to obtain an economic advantage. They do this by evaluating stocks, bonds and other investments, and assessing how or whether they can benefit the business. Financial analysts use past and present data to help companies to establish solid financial plans. They regularly adapt and learn alongside changing market conditions in order to forecast investment opportunities (Flavin, 2019). What represents a true challenge for

analysts is identifying a trend in the business that can help to determine a *Target Price*[1]. To Be more precise, there exist two types of financial analysts. The "buy-side" and the "sell-side". A "buy-side" analyst tends to work for institutional investors, such as hedge funds, pension funds, or mutual funds. These professionals realise research and recommendations for funds that employ them. Contrary to "buy-side" analysts, "sell-side" analysts are those professionals that issue the well-known recommendations about "BUY", "SELL", "HOLD". They are more concerned about making forecasts mainly through reports and notes. Its role is strongly important as they affect the market itself. Another key difference concerns this aspect. In fact, "sell-side" analysts are mainly concerned about issuing reports in which forecasts represent a relevant percentage. On the other hand, this is not the core activity for "buy-side" analysts who ponder their considerations more in the perspective of the fund that employs them.

The focus of this research is laid on "sell-side" analysts and financial reports that discuss issues concerning companies listed in the financial markets. Sell-side financial analysts, especially in the last years, have been subjected to significant interest to academic researchers.

A very important question is why are sell-side Financial analysts so academically interesting? The answer to this question can be found in their role. In fact, they are significantly interesting to academic researchers because of their prominent role in analysing, interpreting, and disseminating information to capital market participants (Brown et al., 2013). Tracing the coordinates of the areas of interest / study of analysts, it is possible to find out that the role of "sell-side" financial analyst is also subjected to interest from behavioural finance. Indeed, one of its most important representatives, Hersh Shefrin, has conducted some research about estimates of future fundamental value. He has raised about growth opportunity bias (GOB). A bias that may affect analyst reports while they are doing forecasts (Shefrin, 2014). This aspect will be also briefly analysed in the next chapters as it represents a key element while considering analyst forecasts, especially analysts methods adopted. Focusing on the role of "sell-side" analysts, they usually employ the so-called fundamental analysis techniques. They try to establish the price of a specific share based on inherent economic and financial information of a specific

[1] The price level that investors usually intend to reach in a specific time horizon when buying a security. Analysis of investment banks on equities usually take place side by side a rating and a target price projected on the time span of one year.

company. Results that emerge from this kind of analysis can be “BUY”, “SELL”, “HOLD”. These are indications that are based on expected performances. Beyond these methods, especially in the last decades, an increasingly number of analysts have employed methods that use market multiples. Multiple methods have been adopted both to sustain analysis and to implement their analysis. The importance of their analysis is the reason why in the recent years a growing number of academics have focused their analysis on them. The perspectives identified by analysts represent in fact an important source for understanding the possible performances and future scenarios of a company. These analyses can help reduce information asymmetries that exist between management and investors. In fact, analyst reports very often contain various information, even non-financial, which help to better understand the microeconomic and macroeconomic dynamics that shape the business. Research on the informative content of these forecasts suggest that investors perceive these analyses as containers of information of significant value for the decisions to be made (Waymire, 1984).

1.2 Financial Analysts’ Role

The growing level of sophistication reached by financial markets has increased the complexity of financial operators. On the other hand, investors' demand for transparent and rigorous information is growing too. In this complex contest do operate financial analysts.

Reports that are issued by financial analysts are a very important support to investment decisions. As it will be possible hereafter to see, reports written by analysts are the results of a complicated valuation process. The analyst, in fact, is a professional whose formation is aimed to evaluate companies, investments and issuing credit rating. One of his key roles consists of forecasting economic and financial perspectives about companies. Analysts that focus on stocks are more involved about gathering microeconomic information and data, of specific characteristics of the company analysed, and macroeconomic information about the market itself. The combination of this information is strongly important for analysts in order to build reports that analyse various corporate aspects. In fact, through their reports, analysts give information and prompts to investors. In a certain way,

analysts can thin the information asymmetry that exists between investors and company management. Inside the delicacy of the analyst role can be found his importance.

The issue of reports or notes that express opinions on the securities analysed is often part of the activity of sell-side analysts while, usually, it is not necessary for buy-side analysts. In both cases, at the end of the evaluation process, analysts should provide a target price and an investment recommendation (in the form of buy, sell or hold) for the valued security. It is important to highlight that recommendations published by sell-side analysts are called "blank recommendations" because they are not addressed to any particular investor, but rather to the company's customers. What it is important to specify is that these recommendations are very broad. Therefore, they may be inappropriate to define certain investment strategies. In fact, when considering a recommendation published by sell-side analysts it is important to verify that it is in line with their own investment strategy.

As it will be possible to understand better in the next paragraphs, analysts through their reports process and spread *price-sensitive* information that affect investors behaviours. Their valuation process includes elements of subjectivity about evaluation methods and approaches. Meaning that while analysing the same company two different analysts can employ different evaluation methods. With the possible result of two different target prices (TP). Referring to what was said above, this is another reason why analysts report techniques and approaches are very often the reason for academic and non-academic research. These researches are mainly focused on different ways by which analysts use to evaluate companies. Often, different phenomena, for nature and importance, are put together to understand if there exist correlation between macroeconomic aspects and microeconomic aspects. One important aspect that is often analysed in academic researches is the market reaction after analyst issue of reports. Some researchers conducted an experiment about this topic. The experiment was conducted by Hirst et al. (1995). They asked subjects about their pre-report expectation. The answers showed that those received a favourable report considered the report to be more consistent with their expectation in comparison to those receiving an unfavourable report. On the other hand, subjects that received an unfavourable report judged the report less consistent with their expectation. Finally, authors asked to 30 external people to state their expectations regarding the reports prepared by analysts affiliated to investment banks (*IB*) and not

affiliated (*NIB*). It emerged that subjects that received research reports from *IB* analysts considered such reports to be more biased than those received reports from *NIB* analysts. and they rated IB analysts as less independent than NIB analysts.
Another interesting experiment was conducted by (M. Chang et al., 2008). They manipulated the news released by analysts to observe effects that this news had on investor behaviour. The experiment revealed that investors tend to follow analyst recommendations rather than do the opposite. When analysts issue substantial justifications to support predictions. This aspect was particularly evident when the analyst predicted an expected loss.

Thanks to these two interesting researches, it is possible to realise which is the importance and which are the effects that analyst reports produce. Above all, these experiments emphasise the typical loss-aversion attitude that investors have. In fact, people are more willing to take risks (Schindler & Pfattheicher, 2017) to avoid a loss than to make a gain.

1.3 Financial software vs Financial analyst? Which one does fit better?

Frequently in these years we have heard a lot about financial software that can analyse huge quantities of information and data. This development is mainly determined by the spread of new technologies in financial markets. In fact, contrary to twenty/thirty years ago, now the employment of technological devices[2] in investment processes is almost mandatory. What is this software and how does it work? Financial software is a very powerful tool for anyone who wants to analyse specific aspects of companies. An example of a financial software is "Cloud Finance". Cloud Finance can be employed to investigate debt exposures of companies, to calculate the score of the new central medium credit rating, rather than to calculate financial ratios and evaluate assessment of company performances. Functionalities of this software are very broad. Like it there are many others that can even perform better. Hence, we are surrounded by a lot of programs that can give us hundreds of information in less than 10 seconds. Software that can calculate companies' financial ratios in 1 minutes. Therefore, why do investors still rely on financial

[2] Such as smartphones, personal computers, tablets.

analysts? The answer to the question is not so simple. In order to answer this question, it is possible to employ a simple example. Let us consider a professional computer (PC). Its computing power is huge, thousands of times more than a human one. Even so, without a human directive a computer is nearly useless. The same happens for financial software and financial analysts. The first one can be complementary/auxiliary to the second one. A financial software without human contribution is end.

Financial software is very useful, they can facilitate a lot of investors and analysts in their analysis. However, it is not possible to think about analysis carried out exclusively by software. In fact, human intervention is needed to interpret and process the output of the analysis. As a matter of fact, even if algorithms behind this software can be highly sophisticated, human contribution remains fundamental.

It is important to consider that analyst's work is not limited to processing data and information. They regularly interact with brokers, banking institutions and with figures that belong to companies themselves. Especially in the past, financial analysts come in possession of private information. Before Regulation Fair Disclosure, the Sarbanes-Oxley Act and the Global Settlement Act[3], it was possible to employ information and data without citing sources. This practice facilitated and allowed analysts to perform their analysis well. Prior forecast accuracy is related to analysts' ability to generate private information. In summary, analysts forecast accuracy is related to analysts' ability to generate private information (Keskek et al., 2017).

From this we understand that human activity in the reporting process is a fundamental component. Above all, analysts often become aware of information that cannot be assessed at a mathematical / statistical level; but which can nevertheless be important for the identification of target price. Moreover, there are other factors that affect quality of reports. For instance, experience, effort, brokerage house size, All-Star status, prior forecast accuracy, forecast horizon, forecast boldness are all elements that contribute in analyst reports and more specifically to identify an accurate target price. While performing their analysis they do not only consider numerical evidence. A recent research, in fact, demonstrates that CSR[4] reports quality is linked to quality of analysts'

[3] Reforms introduced in the United States between 2000 and 2003.

[4] Corporate Social Responsibility, it represents the idea that a company should be interested in an effort to improve society and the environment as well as be concerned about making profits.

reports. It was found out that analyst forecast accuracy increases with CSR report disclosure scores (Muslu et al., 2019). This means that the completer and more accurate a CSR report, the more it contributes to improving Target Price accuracy.

These facts provide some hints about the importance of human role. There does not really exist one single answer about which one between humans and machines are better. However, what is clear is that analysts and software, in this field, complement each other.

In conclusion, man's ability to read data is as important as the ability of a machine to know how to process them. The challenge lies in knowing how to interpret them properly.

1.4 Financial analysts and financial crisis

In the last paragraph it was possible to see similarities and dichotomies between financial analysts and financial software. What it is important to highlight is that the role of financial analyst is strongly affected by the market. More in detail, activities of analysts may match the financial and economic situation of the market. This means that analyses made are often more affected by the market situation than the intrinsic components of the company being assessed[5]. One important example is linked to the 2007-2008 Financial Crisis.

Performances of listed companies are very often closely correlated to macroeconomic components that permeate the market constantly. These components can be considered among the main sources of risk and uncertainty. However, it is not always possible to predict the future performance of securities in presence of particular macroeconomic conditions such as the economic crisis. The macroeconomic environment of companies is constituted by several elements: exchange rates, interest rates, inflation rates and political risk premiums[6]. Nowadays, no company can state any longer to be unaffected by what it is happening on the global economic arena (Oxelheim et al., 1988).

Therefore, how do macroeconomic elements affect analysts' work? Uncertainty is one of the key variables that affect analysts' reports. It is strictly correlated to the macroeconomic current area. What is important is that uncertainty is a result of a crisis.

[6] Premium charged by firms due to uncertainty about rules of the market in which they operate.

As a matter of fact, during the global financial crisis, uncertainty was so high that analysts adopted some expedients in assessments and assumptions contained in their reports. An interesting example is given by Sidhu and Tan (2011) who focused their work on Australian and US listed companies. Their research shows that reported errors during the crisis increased by 40% in comparison to previous years. Figure 2 shows absolute forecast errors between 2003 and 2008.

As it is possible to notice, there was an important increase in terms of forecast error. However, the fact that forecast errors during the period were considerable is not unexpected considering difficulties of doing forecasts. What is interesting is that during the financial crisis analysts tended to adjust their forecasts in order to compensate for uncertainty effects (Sidhu and Tan, 2011).

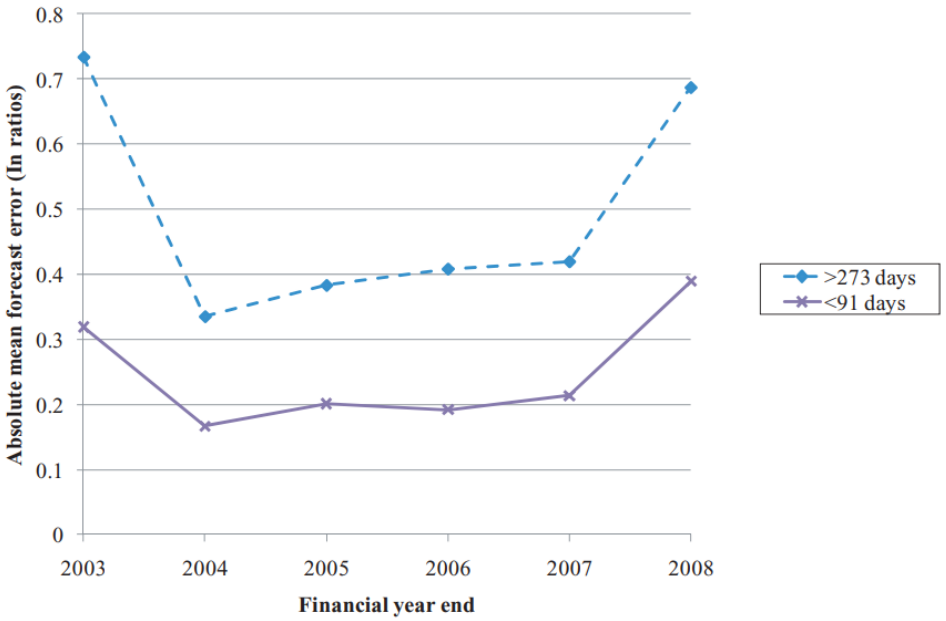

Figure 2 Forecast accuracy

Source: Sidhu and Tan (2011)

The case that has just been mentioned is not the only one. In fact, it can be interesting examining analysts' behaviour during the financial crisis for IPO firms[7]. As a matter of fact, it seems that analysts changed their *modus operandi* by considering different elements of the company analysed. What was founded is that in the pre-crisis period analysts used to

[7] Initial public offering (IPO) concerns to the process of offering private company shares to the public in a new stock issuance.

do their forecasts considering several factors such as prior year earning change, rating of companies, under-pricing. While on the other hand, in the post crisis period it seems that analysts started to consider only the firm size and the number of IPO. This may be caused by the belief that a larger company can have bigger opportunities to overcome challenges due to financial crises. These new and unfounded forecasts bias can lead investors to undertake more optimistic decisions (Hsu et al., 2013). These biases are chiefly linked to the employment of non- financial information. As a matter of fact, during the crisis period (2007-2009) analysts used more nonfinancial than financial information in their reports. Financial-based information are more verifiable than nonfinancial information. So, analysts are more incited to use nonfinancial information without being shown to be wrong especially in an environment of deep uncertainty. Analysts remain overconfident despite a poor economic arena. This is because they know they can sustain their assumptions and support their forecasts through nonfinancial information. Especially in case anything goes awkward in future (Tan, 2019).

2. CHAPTER: KEY ELEMENTS FROM BEHAVIOURAL FINANCE

In recent decades we have attended the development of an innovative approach to finance: behavioural finance. Throughout the XX century the predominant approach of finance was the classical one, which bases its foundations on theoretical models. These models, basically, are based on assumptions that do not exist. The most important one regards the human rationality embodied in the figure of "homo economicus". According to classical models, the investor is perfectly rational, risk averse and uses a utility curve to maximize his benefit.

Especially in the last decade, due to numerous financial scandals that involved a large part of the world, these assumptions have failed. This gave space to behavioural economics theories that help to understand processes that drive investors to operate in financial markets. What H. Shefrin points out is that emotional and psychological factors do not only influence ordinary (or non-professional) investors. They also affect the so-called professional investors (or analysts) on decision-making processes, reaching an assessment of the intrinsic value of a security that is sometimes even very distant from reality. Hence a branch that studies the correlation between analysis carried out by analysts and the cognitive sphere which characterizes human beings.

Some phenomena such as overconfidence, optimism, gambler's fallacy can be shaped as biases to the probability representing investors' beliefs (Shefrin, 2007). Hence, the study of the effects that these behaviours generate at market level. Focusing on the main useful aspects for the current analysis, this chapter aims to show the main behavioural traps to which financial analysts are subjected.

2.1 Valuation heuristics

Heuristics, even known as *"rule of thumb"*, consist of those mental procedures that simplify complex methods and procedures usually required in certain situations to make thoughtful decisions. Facing too complex logical and cognitive procedures, the human brain develops some "shortcuts" that simplify the decision-making process itself,

reducing effort and time required to reach an acceptable solution. However, although these shortcuts sometimes can be useful, changing their application context may no longer be useful, leading to rather serious evaluation errors that can take the form of valuation bias.

What it is important to understand is if financial analysts[8] base their valuations on techniques taught in finance manuals or on heuristics. This chapter is focused on three usual heuristics:

1. *Price / earnings ratio (P/E)*
2. *Price / earnings ratio adjusted for growth (PEG)*
3. *Price-to-sales ratio*

2.1.1 Price/earnings heuristic (P/E)

The valuation based on P/E ratio is given by the product between P/E ratio and earnings estimate.

The valuation model is:

$$\mathbf{P_0 = P_0 / E_1 \times E_1}$$

Where:

P_0: current price

E_1: estimate of earning per share (EPS)

2.1.2 Price / earnings ratio adjusted for growth (PEG)

PEG ratio (price-earnings [PE] ratio divided by the short-term earnings growth rate) emerged as a markedly popular approach. It blends prices, earnings and growth forecasts into a single ratio that is very popular as a basis for investment advices. Contrary to P/E ratio, PEG ratio considers differences in short-run earnings growth. The premise for a PEG

[8] Most of them are models based on Discounted Cash Flow (DCF).

valuation is that shares of companies that have high growth merit higher P/E ratios than companies with lower growth (Shefrin, 2007).

The valuation model is:

$$\mathbf{P_0 = PEG \times E_1 \times G}$$

Where:

P_0: current price

E_1: estimate of earning per share (EPS)

G: 100 x growth rate

PEG heuristic can be employed to estimate the one-year price (P_1). However, by examining more deeper this heuristic, as Easton et al., (2004) noted, it inherently hypotheses that the short-term growth forecast can also seize the long-run ones.

2.1.3 Price-to-sales ratio

Price-to-sales heuristic has the same structure as PEG's one. Where future sales substitute future earnings.

The valuation model is:

$$\mathbf{P_0 = P_0 / S_1 \times S_1}$$

Where:

P_0: current price

S: sales

2.2 Heuristic sources

These heuristics affect the way in which financial analysts calculate the value of companies. As a matter of fact, most of them employ valuation heuristic rather than

valuation methods from financial manuals[9]. The large use of these techniques is essentially due to their simplicity and immediacy of calculation. P/E, PEG and price-to-sales ratios need a limited number of variables. On the other hand, techniques taught in finance courses, such as the DCF one, are more detailed and less intuitive and require more complex formula (Shefrin, 2010). What is important to highlight is that these equations, under the mathematical point of view, are correct. However, it is the way in which these models are used that is biased. These distortions belong to incorrect assumptions about P/E, PEG and price-to-sales ratios. First, PEG heuristic assumes that P/E ratio is directly proportional to the growth rate *g.* This means that the relation between the two variables should be as follow:

$$P/E = Kg$$

Where *K* is a proportionality constant.

What Shefrin underlines is that it is possible that firms with positive growth opportunities grow faster than those with no growth opportunities. This is because the first ones usually have higher return on equity and choose to reinvest most of their profits. What is important to bear in mind is that the long-term growth rate *g* is given by expected ROE times profit retention rate. When profit retention rate is equal to 0, even *g* is equal to 0. While, when it is equal to 1 it means that *g* is equal to ROE. Given the equation:

$$P_0 / E_1 = 1/r$$

It is possible to notice that P/E is 1/r. Regardless of the value of *g*, price/earnings ratio variations are not in function of *g.*

To consolidate Shefrin's studies about analysts' heuristics and bias, it would be interesting to examine which are the main valuation methods adopted by analysts in their reports. To implement this analysis, it has been started from an analysis performed by Ca' Foscari University professors Cavezzali and Rigoni. They collected a sample of 4,670 reports issued between 2007 and 2013 by 111 analysts. Methods that were employed by analysts are summed in the following table. What is interesting to notice is that Market ratios methods are the most popular (51.96%). Market ratios methods will be analysed in detail

[9] Such as the discount cash flow method (DCF)

in the next chapter. Anyhow, as a matter of fact, reports issued by analysts are based in a large part on heuristics rather than methods based on cash flows analysis.

Table 2.1 - Methods used in financial analysts' reports in the sample

Methods	N°	%
Cash flows-based Methods	1689	36,65%
Earnings-based Methods	153	3,32%
Net Assets based Methods	243	5,27%
"Hybrid" Methods"	129	2,80%
Market ratios Methods	2395	51,96%
TOTAL	**4609**	**100%**

Source: Cavezzali et al., 2015

2.3 Analysts approach to growth opportunity and GOB

Very often, while valuing companies, financial analysts consider in their valuations the expected free cash flow[10]. When forecasting the Target Price, it is common to make biased analysis of terminal value. This is because analysts fail to take into account the implications of disappearing growth opportunities during the terminal period (Shefrin, 2014). For this reason, it is said that their reports are subjected to "*growth opportunity bias*" (GOB). In other words, analysts consider a positive growth rate *g* when forecasting the value of a company. However, these assumptions can be biased.

Considering the traditional approach to valuation, in the long term, a great part of companies expects to earn exactly their cost of capital. In rare cases, companies can

[10] It is given by expected: Net Profit + Interest expense - (CAPEX + Net Changes in Working capital + Tax Shield).

possess a long run competitive advantage, hence can expect to earn more than their cost of capital. Practically, terminal value present value of growth opportunities (PVGO) is zero for companies that expect to earn their cost of capital exactly, and positive for companies holding a long run competitive advantage (Shefrin, 2019).

As a matter of fact, all companies are subjected to their own life cycle. This cycle is composed by 4 steps:

1. *Launch*
2. *Growth*
3. *Maturity*
4. *Decline*

In every cycle growth opportunity, and consequently *g* rate, are different. In principle, growth opportunities in the "*growth*" step are higher than growth opportunities in the "*maturity*" step. In other terms, all companies should expect that at some stage they will mature, and not expect their projects to generate positive net present value (NPV). Consequently, it is expected that for a large part of mature companies aggregate NPV, known as the present value of growth opportunities (PVGO), is zero (Brealey et al., 2013).

What Damodaran underlines is that, technically, zero terminal value PVGO should be the rule rather than the exception. Nevertheless, only several sell-side analysts provide detailed discounted cash flow (DCF) based valuations that permit an independent test of the assumption of zero terminal value PVGO (Shefrin, 2018). At this purpose, there were developed some studies by Cassia & Vismara (2009) and Shefrin (2014) that show sell-side analysts that provide detailed DCF valuations, zero terminal value PVGO appears to be the exception rather than the rule. A recent research made by a Ca' Foscari MA graduated student Salvadego (2019), following Shefrin's findings, shows that almost nobody respects the ZTP condition. It requires some internal consistency in support of the hypothesis that in the long run most companies should get to earn exactly the cost of the capital. At this purpose, it is very difficult to imagine that, in a highly competitive world where technological development has significantly reduced time and shortened distances, a company has a perpetual competitive advantage that allows it to constantly have positive NPVGO by increasing its value over time in an unlimited way.

Therefore, how can analysts reduce the magnitude of GOB and consider a proper growth rate *g*? The answer is more complicated than expected. This is because, as Shefrin (2019) noticed, analysts adopt corrective nudges[11] in their self-interest. This leads to real cognitive bias that can generate inaccurate analysis. Then the question connects to an open debate. Analysts must predict the one-year price and yet they must consider elements that occur in the long term (such as the life cycle of the company). Therefore, the difficulty also lies in reconciling the multiple elements that shape the business arena and which directly influence company performances.

[11] Nudges are considered as such intervention aimed to improve the quality of decisions.

3. CHAPTER: COMPANY VALUATION METHODS AND ANALYSTS' REPORTS

3.1 Introduction to valuation methods

Frequently in the previous paragraphs the term "value" has been mentioned. As it was already specified in the introduction, the concept of value is very broad and divided according to the specific discipline. Concerning this research, what is important to understand is the concept of "Enterprise Value". In other words, the company value that is forecasted and analysed by financial analysts.

First, what is strongly important to state is that price and value are seldom, if ever, the same. There is an interesting Warren Buffet's quote that states "Price is what you pay; value is what you get." For those who operate in the financial market, as Buffet does, value concepts represent a key element to invest. The most important distinction between price and value is the fact that price is arbitrary, and value is fundamental (Town, 2018). For example, considering a person who sells gold bars for $5 apiece. In this case the price of gold bars is 5$. This is an arbitrary amount chosen by sellers for reasons known only to them. However, even if those gold bars price is $5, their value is so much more.

This brief example shows what usually happens in the stock market. What is relevant to notice is that the price of a share is determined by multiple factors complicated to understand and consider in the short term. Many of them are driven by human behaviour and emotions, such as fear and greed, market tendencies and events that may seem to be remotely correlated but they are not. All these elements shape the stock price. What it is important to consider is that, at some point or another, a stock's price almost always levels back out with its value (Town, 2018). This presumption allows some brilliant investors, such as Warren Buffet, to create a highly performing portfolio.

Notwithstanding, the difficulty of company valuation arises mainly from the fact that corporate valuations can have many purposes that lead to significantly different value configurations. For instance, an evaluation of a company is performed mainly if sales, M&A, contributions, spin-offs, transformations, capital increase, Public Purchase Offers, Public Sale Offers, Leveraged Buyout (LBO). As a matter of fact, evaluation is necessary in

a wide range of cases, mainly related to extraordinary operations but also for communication purposes. In fact, as it is possible to note, value represents a relative and not absolute concept. The value of a company is therefore an indicator that does not assume the features of uniqueness, but it is affected by the purposes for which it is quantified. In addition, even the specific method employed in the valuation produces a different result than another method. This is mainly due to the different starting hypotheses and the different elements considered in the analysis (Balducci, 2001).

As it was possible to notice in the first chapter, analysts interpret data and arrange reports with the results. In doing so, they exploit their proper knowledge and skills which diverge from analyst to analyst and which represents elements of uniqueness and personality. As a matter of fact, analysts often use to think out of the box" An interesting example is given by Shefrin who report an analysis of eBay prepared by Mary Meeker[12]. In 2003, she had to establish a target price for eBay. In doing this, she employed DCF and several heuristics. Since with the different methods the results were different, she averaged the results to determine the Target Price. Therefore, analysts' reports are even shaped according to their intrinsic characteristics. These aspects spotlight the fact that analysts' reports present a rose of subjective and relative elements which differ from analyst to analyst.

Although there are several exceptions in the market, such as Meeker's ones, valuations should be conducted following specific parameters accepted in the scientific literature (i.e., DCF). As a matter of fact, despite uncertainty that shapes financial markets, valuation of companies should express a function of value provided with the following attributes (Guatri, 1990):

- Rationality, the output should be the synthesis of a logical, clear, convincing, and shareable process.
- Demonstrability, the output should be supported by verifiable data.
- Objectivity, the influence of the evaluator should be eliminated as much as possible.
- Stability, value calculated should not continuously changes due to different opinion or other facts.

[12] One of the most paid and well-known Wall-Street financial analysts from Morgan Stanley. She evaluated several Internet companies during the 1990s and eBay in 2003. She was given the nickname "Queen of Internet" thanks to her valuations on internet companies.

As a way of understanding the different uses and applications that analysts do when evaluating companies, it is essential to specifically understand which are the main characteristics of these methods. To perform their forecast analysis, analysts have a rose of well-established valuation methods available. Some methods are more suitable for certain companies than others. As it will be possible to see in the next paragraphs, Discounted Cash Flows methods can be more appropriate to evaluate a company that operates in the utilities sector, as it is considered more stable. On the other hand, multiples method can be easier for evaluating banking companies. In fact, given the complexity of that sector, market ratios requires easier information and data to perform the analysis in comparison to DCFs, for instance, which require a cash flow analysis.

Considering the recent study, realised by (Cavezzali et al., 2015), it is possible to notice which is the number of valuation methods.

Table 3.1 - Summary of the methods used for each report

N°_approach	n°	%
1	1562	50,85%
2	1251	40,72%
3	238	7,75%
4	18	0,59%
5	3	0,10%
TOTAL	**3072**	**100,00%**

Source: (Cavezzali et al., 2015)

Considering 3.072 reports that disclose the number of approaches employed, it is possible to note that approximately half of them use two or more approaches. This underlines that analysts very often employ for several reasons more than one method. One key reason concerns the elements that are considered in each method. The DCF in fact considers parameters, such as cash flows indeed, which the market multiples method does not consider. As a matter of fact, target prices based on more than one method are significantly more accurate than those based on one single method (Cavezzali et al., 2015). It is interesting to note that the aforementioned relation supports the hypothesis that

there exist several factors that impact on target price accuracy and that very often depend on the analysts themselves. Such argumentation will be better explained and tested later. Whereas in this next chapter an overview of valuation methods will be provided.

The methods used in analysts' reports are not always clearly indicated. The first step was therefore to identify the indications regarding the evaluation approaches used in the text of the report. Referring then to the previous studies and in particular to the work of Cavezzali et al. (2015), five categories of valuation methods have been identified (Table 3.2).

From table 3.2 it is interesting to note that the analysis of the reports has emphasised the wide use of other evaluation methods, called heuristic methods, or estimates of the value that are easier to apply and that do not have a scientific basis.

Table 3.2 - Summary of valuation methods used in the sample

Valuation methods classification	
Category	**Methods**
Asset-based methods	Embedded Value (EV)
Earnings-based methods	Residual Income Model (RIM) Warranted Equity Method (WEM) Warranted Equity Valuation (WEV)
Hybrid methods	Economic Value Added (EVA) Return on Tangible Equity (ROTE) Return on Invested Capital (ROIC)
Cash flow-based methods	Discounted Cash Flow (DCF) Discounted Dividend Model (DDM) Gordon Growth Model (GGM) Adjusted Present Value (APV) Cash Flows Return on Investment (CSROI-HOLT)
Market ratios methods	EV/EBITDA P/NAV P/E P/BV

Source: Cavezzali et al. (2015)

In order to facilitate the understanding of the research realised below, the five macro-families of the evaluation methods will be described. The focus will be placed on the methods employed in the sample of the reports considered. The methods proposed by financial theory and the so-called heuristic methods are included within the proposed classification.

3.2 Net Assets based Methods (NAV)

Net Assets based Methods are based on the estimate of the price that should be paid to acquire the individual elements of the company's capital. Specifically, The NAV approach considers the underlying value of the company assets net of its liabilities. In this approach, the book value is adjusted by substituting the market value of individual assets and liabilities for their carrying value on the balance sheet (Cavezzali et al., 2015).

According to this approach, the company's value is given by:

$$Net\ Asset\ Value = \ Value\ of\ assets - Value\ of\ liabilities$$

This calculation reports the mathematical relationships between assets and liabilities listed on the company's balance sheet. Concerning balance sheets prepared according to GAAP, these accounts should normally be recorded on a historical cost basis. As it is possible to note, this historical cost basis approach does not consider a current value estimation for the company owners' equity.

Very often the number of outstanding shares is considered in the calculation. The result therefore represents the value of the company for each outstanding share.

$$Net\ Asset\ Value = \frac{Value\ of\ assets - Value\ of\ liabilities}{N.\ of\ outstanding\ shares}$$

Although nowadays the historical capital method is no longer counted among the valuation models, the information and the equity analysis retain a role for nothing

secondary in the evaluation process. Currently, financial valuation methods (especially those based on the discounting of flows) and methods that combine the elements of capital and income methods (EVA) are widely used by financial analysts in determining company value. One of the key aspects is that Net Assets based Methods consider that a company's value lies basically in its balance sheet. One of the most important characteristics of NAV methods is that they determine the value of a company from a static point of view. This is because they do not consider the company's possible future scenarios and money's value over time. In addition, NAV methods do not consider several elements that also impact a company's value. Specifically, industry scenario, human resources or organizational problems, contracts (Fernández, 2007). Therefore, the approach is almost exclusively based on the Financial Statement.

3.2.1 The Embedded Value

In the sample of financial reports considered the only net asset-based approach is the Embedded Value. This method consists of the valuation of a firm's current value without considering its capacity to generate new business. It represents then a minimum value for the company. In order to fill this gap, the Embedded Value can be adjusted by adding the estimated value of future new sales to obtain the Appraisal Value of the company (Cavezzali et al., 2015). It is a value-based measure that emphasises the value created that can provide a value for new business.

The EV method is particularly used to evaluate Insurance companies. This is because the EV methods are based on an estimate of a company's future cash flows and their discounting. Cash flow refers to income (outgoing and incoming) that comes from insurance activities already in the portfolio. The net present value of a of future cash flows will therefore indicate the capital immediately available and equivalent to the sum of the calculated future cash flows. In this context, the discount rate used for these assessments and linked to various factors such as the cost of money and the degree of risk associated with the various items and future developments in cash flows acquires considerable importance.

In particular, in the case of insurance companies the incoming or outgoing flows often are affected by unpredictable events and therefore cannot be strictly determined. but must

be estimated through stochastic models and probabilistic calculations. This has led several operators to create models based on specific hypotheses through profit-testing activities. In particular, through profit tests now it is possible to project expected profit flows in the future for each individual policy. This allows to estimate the expected value of the contract itself.

In general, the main disadvantage of net asset-based methods is that they do not consider the expected cash flows and the specific risks that may occur in the future. In other words, they ignore the essential levers of value. Thus, they are usually incorporated into analyses that combine both net asset and income methods. The most important is the EVA (Economic Value Added) method, which will be discussed in the fifth paragraph.

3.3 Earnings-based methods

As imaginable from the current market arena characterized by a deep interconnection between companies and markets at a global level, an analysis based only on asset base could be reductive. Therefore, it was studied how to consider companies' profitability and their ability to generate incomes. At this purpose, the evaluation of the company's economic capital through earnings-based methods shifts the focus on the value / profitability relationship. Company's value is therefore quantified based on its profitability.

Unlike net asset-based methods, earnings-based methods are linked to the company's economic indicators. In fact, they seek to determine the company's value through the size of its earnings, sales or other economic indicators. The relation is therefore possible to represent it as follows:

$$Profitability \rightarrow Value$$

From a practical point of view, the value of the company is calculated discounting the expected economic results. Therefore, the mathematical approach that make it possible is the perpetual annuity[13] one. The perpetual annuity model is used frequently in corporate

[13] In finance, perpetual annuity (or perpetuity) is a constant stream of identical cash flows with no end.

finance, especially in pricing stocks and bonds. In this case it is used to discount the future incomes produced by the company.

The simplest perpetuity formula applicable in earnings-based valuations is given by:

$$W = \frac{R}{i}$$

Where:
W: value of the company

R: average expected revenues

i: discount rate

It is a suitable method for companies with a low level of capitalisation and with a high presence of intangible assets. The income method evaluates the company in its entirety and does not split its components as in the case of net asset-based methods. Being a method based on flows, the value of the company is obtained according to the results of past management and the expected future trend. As it is easy to note the equation, this formula cannot be applied in case of non-monetary income (i.e. increase in fixed-assets value).

Beyond the first formulation proposed, there were developed two more formulations based on perpetuity: limited life, limited life, and final value. Limited life differs from the perpetuity as it introduces a specific time horizon:

$$W = R \times a_{n\neg i}$$

Thus, it is possible to express the formula as follow:

$$W = R \frac{(1+i)^n - 1}{i\,(1+i)^n}$$

As it is possible to note, it has been added the multiplier *$[(1+i)^n - 1]/(1+i)^n$.* This factor allows to set a specific temporal horizon.

On the other hand, the third formulation, compared to the second one, introduces the discounted final value. It is important to report that this formula is normally limited to companies that have developed plans and duration management programs not exceeding 5 years (Rutigliano, 2010).

The formulation can be computed as follow:

$$W = R \times a_{n\neg i} + FV \times v^n$$

Where:

FV: final value

v^n: discounted factor

This formulation permits to consider the discounted final value of the firm at the time *n.* However, it is preferable to use the perpetual annuity formula since the company is, in theory, an entity intended to last over time. In addition, it is very difficult to estimate the future duration of a firm. In fact, there are rare cases in which it is possible to predict the duration of a company. Some examples can be companies based on concessions, licenses, or if they are connected to a person's life. As a matter of fact, these methods are basically not very complex and do not require a substantial expenditure of time.

Most earnings-based methods were developed in the past decades, principally in the accounting community. As Damodaran (2006) underlines, most of these models are a combination of book values and expected future earnings. Such models are an evolution of those reported by Feltham and Ohlson (1995) and Ohlson (1995). Particularly, Ohlson's basic model states the true value of equity as a function of its book value of equity and the excess equity returns that the firm can generate in the future (Aswath Damodaran, 2006). In a practical way, as Damodaran suggests, the model can be computed as follow:

$$Value\ of\ Equity_{\ 0} = BV\ of\ equity_0 + \frac{\sum_{t=1}^{t=\infty}(Net\ income_t - Cost\ of\ equity_t \times Book\ Value\ of\ Equity_{t-1})}{(1 + Cost\ of\ Equity_t)^t}$$

Consequently, the value of equity in a company is given by the sum of the current book value of equity and the present value of the expected excess returns to equity investors in perpetuity. The Ohlson model represents an implementation of the more restricting dividend discount model when EVA model constitutes an extension of a more general firm valuation model.

In the sample of analysts' reports considered in this research, earnings-based methods are among the less employed. In fact, as it was possible to deduce concerning their limits and their merits are, they are less preferred by analysts. In order to facilitate the understanding, in the following paragraphs it will deal theoretically which are the specific earnings-based methods used by financial analysts in the sample.

3.3.1 Residual Income Model (RIM)

The RIM starts from several concepts that concerned cash-flows based methods. This approach states that a firm's share value equals the PV of future residual incomes discounted at an appropriate rate of return[14]. As previously argued, it was introduced by Feltham-Ohlson. One of the key elements of this model is that earnings generated by an organisation should be accounted for the true cost of capital (i.e., both the cost of debt and cost of equity). Despite this model considers the cost of debt[15], it does not consider the cost of equity since the dividends and other equity distributions are not involved in the calculation. The net income does not represent the firm's economic profit. On the other hand, residual income represents the firm's adjusted income for the cost of equity. For these reasons, the value of a firm computed through this model is normally more accurate since it is based on the economic profits of an organisation. Under the mathematical perspective, the model can be summarized as follow:

[14] Cost of equity (K_e) represents the rate of return that a company remunerates to its investors. In financial literature one of the key models is the CAPM one which basically is given by the risk-free rate (R_f) increased by the product between the Beta of a title and the market risk premium (R_m-R_f). The output of CAPM represents a key input for calculating a firm's Weighted Average Cost of Capital (WACC).

[15] Cost of Debt (K_d) represents the rate of return that a firm corresponds to its debtholders and creditors. These third parties are compensated for any risk exposure that is subjected whenever they lend financial resources to a company. K_e represents the default risk of a company. Moreover, it reflects the level of market interest rates. As K_e, the cost of debt is a key element for calculating a firm's Weighted Average Cost of Capital.

$$V_0 = BV_0 + \sum \frac{RI_t}{(1+r)^t}$$

Where:

BV_0: Current book value of the firm's equity

RI_t: Company's residual income at the period t

r: Cost of equity (K_e)

Practically, RIM is appropriate for mature organisations that do not distribute dividends or follow variable dividend payments models. Concerning this aspect, RIM is a feasible alternative to the well-known dividend discount model (DDM). In addition, RIM is suitable for companies that do not produce positive cash flows yet. In any case, what a financial analyst shall consider is that this approach is founded principally on forward-looking assumptions with a marginal scientific base that can be easily influenced and can be subjected to several biases. Even if in the common practice RIM represents a widely used approach, in total, in the considered sample earrings-based models represent a significant small percentage (3,32%).

3.3.2 Warranted Equity Method and Warranted Equity Valuation compared

In the Warranted Equity Method (WEM), the value (W) of a company can be determined based on a relationship among ROE, growth rate (g) and the Cost of Equity (K_e). This method is particularly widespread for valuing banks. The relation among the three variables can be reported as follow:

$$W = \frac{(ROE - g)}{(K_e - g)} \times Shareholder's\ Equity$$

Where:

ROE: estimated future returns expected over the long run;

g: expected Growth Rate in income over the long run[16];

K_e: cost of equity required by shareholders[17]

The affiliation among these elements is represented based on the perpetual dividend growth formula. This means that, as it is possible to see in the formula, the magnitude of a firm's net income (in terms of ROE) on valuation is multiplied by the firm's estimated growth.

Rewriting the formula introducing "P" it will be:

$$P = BV \times \frac{(ROE - g)}{(K_e - g)}$$

Now, in this form, it is easier to note the relation between *P* and *[(ROE-g)/(K_e-g)]*. Now, by isolating *g*, the result is *g = ROE (1-p)*. This means that the growth rate depends on the profitability on equity and the pay-out. From a different point of view, it can be stated that *g* is the maximum debt growth rate compatible with a given financial structure in terms of Debt / Equity ratio and excluding capital transactions.

On the other hand, the Warranted Equity Valuation differs to WEM as it assumes a zero-growth rate (*g*). As WEM, Warranted Equity Valuation is considered a heuristic valuation approach.

3.4 Hybrid methods

So far there were analysed two main valuation approaches: net-asset based and earnings-based methods. Substantially, the income approach employs the company's estimated future income flows for the valuation. On the other hand, the asset-based approach focuses on calculating firm's asset values. Therefore, "hybrid" models have been developed as they exploit both asset and economic elements. In a nutshell, advantages deriving from the two methods are conveyed in a single method. In addition, hybrid methods allow to reduce the subjectivity of the earnings-based methods. They also permit

[16] The value employed is equal to that applicated for the Dividend Discount Model
[17] The value employed is equal to that applicated for the Dividend Discount Model

to quantify assets objective elements. In other words, these methods combine the objectivity and verifiability of asset-based methods with the rationality of earnings-based methods.

3.4.1 Economic Value Added (EVA)

The idea of residual income was supported by accountants for a long time. Its calculation is quite simple: the cost of capital (K_c) is subtracted from accounting profit to identify how much is remaining for reinvestment or distribution to shareholders. Lately, there was a tendency, especially in North America, to involve the concept of residual income into a new calculation approach. This approach is known as economic value added (Simons, 2014). EVA is an indicator of a company's performance calculated as the difference between the net operating income and the cost of capital used to produce that income (Sharma, 1994). In different terms, EVA assesses a company's financial performance by trimming its K_c from its operating profit, adjusted for tax on a monetary basis. Consequently, EVA can be represented as the net operating profit minus a proper charge for the opportunity cost of all the capital invested in a company. As a matter of fact, EVA is an assessment of true economic profit by which earnings exceed or fall short of the necessary minimum rate of return that stockholders and lenders can obtain by investing in other securities with the same level of risk.

In fact, EVA represents a quantification of real business profits. Through this quantification, analysts can see if the return is higher or lower than the minimum return rate that it is possible to gain buying other securities with equal riskiness.

Under a practical point of view, there exist several EVA adjustments used to change accounting income (given by revenue minus expenses) into a factor that nearby estimates economic income (given by cash flows in excess of the opportunity cost of capital).

Concerning the mathematical formula, EVA is represented by the surplus left after making a proper charge for the capital employed. It can be stated as follow:

$$EVA = NOPAT - (TCE \times WACC)$$

Where:

NOPAT: et operating profit after taxes

TCE: capital employed

WACC[18]: weighted average cost of capital

Specifically, as the calculation of NOPAT is considered, non-operating expenses etc. will not be involved. The capital employed is given by the sum of stockholders' funds as well as the lender's capital. However, this does not include investments outside the business. When determining the WACC, cost of debt (K_d) is considered after taxes, while cost of equity (K_e) is calculated through the CAPM.

What is important to underline is that EVA method is not appropriate for all companies. As with ROI-type measures, EVA requires that company's assets are valued precisely. However, it is very difficult for knowledge - intensive businesses or any business with intangible resources that are not stated on the balance sheet. Moreover, EVA is hard to calculate for any business that allocates large-scale production and corporate assets in a lot of different business units. Last but not least, EVA is not appropriate for financial firms that are held to accrue an appointed amount of capital for regulatory purposes. In the last years, EVA was criticized because of its near-sighted measure that does not consider the industry and competitive arena. Simons (2014) suggests that, as EVA measures firm's ability to earn more than their cost of capital, they fail to consider how firms performed in comparison to their competitors. Furthermore, losing underperforming business, repurchasing stocks, and cutting costs may raise a firm's short-term share price and EVA. Nevertheless, these actions do not certainly lead companies to generate sustainable wealth.

[18] WACC is the cost of capital for the company based on D / E ratio that characterizes it and is the result of the following equation:

$$WACC = k_e \times \frac{E}{D+E} + k_d \times (1-t) \times \frac{D}{D+E}$$

3.4.2 Return on Tangible Equity (ROTE)

Concerning valuation methods used mainly for financial institutions the ROTE represents an emerging method that has partially replaced the analyses realised using ROE index. return on tangible equity is an indicator that measures the operating profitability of a company. It is widely used for assessing banks' profitability. In fact, it was a wide-used method during the pre-financial crisis period (2007-2008). The formula of ROTE is:

$$\text{ROTE} = \frac{\text{Net profit}}{Tangible\ equity}$$

Where:

Tangible equity: Equity less tangible part of assets

Nowadays, this indicator is more widespread than the ROE for these types of analysis, because it better reflects the operations of a firm. ROTE is calculated by dividing net profit by tangible assets: that is, the assets from which intangible assets are excluded (such as goodwill). This exclusion serves to better reflect the real operating profitability of a bank. In the computation, goodwill is withdrawn from equity. On average, some banks may report RoTE beyond 40%. In an analysis realised by Causse (2011), it is emphasised that the average for banks in his sample is between 15% and 20%. Nevertheless, this ratio is defective as it can be manipulated by investing in risky activities. Moreover, it can be inflated by leveraging the BS to take advantage from the gearing effect[19]. This measure is most significant when weighed against the cost of equity as it can indicate the capacity of a company to generate value for its stockholders (Causse, 2011).

In order to better understand the mechanism behind ROTE, let us consider two companies with the same net profit and operating in the same sector. But the first one generates this profit through careful management of its finances or because of extraordinary transactions. On the other hand, the second one achieves the same result, but almost exclusively for its ability to generate incomes from operating management. In the first case, the EBITDA (Earnings before interest, taxes, depreciation, and amortisation) could also be negative, but because of financial or extraordinary transactions, the profit is positive. In the second case, however, the company is apparently solid in relation to the

[19] The technique in which the capital gearing of a firm affects its shareholders' dividends and EPS

purpose for which it was born. To produce a specific good or the provision of a service. As a matter of fact, one of the most important weak points is that ROTE does not provide any indication regarding this aspect, limiting analysts to indicate the rate of return on the physical and financial capital invested.

3.4.3 Return on Invested Capital (ROIC)

ROIC is a financial ratio that is employed to evaluate a companies' profitability. It is composed of three different elements: net operating profit after taxes (NOPAT), net fixed assets (NFA) and net working capital (NWC). The denominator (NFA + NWC) is equal to the capital required to operate the business (Baldwin, 2016). The ratio can be computed as follows:

$$ROIC = \frac{NOPAT}{NFA + NWC}$$

For companies which are not part of a business group (they operate as a single entity), the NFA + NWC can be substituted by the sum of the company's debt (D) and equity (E).

$$ROIC = \frac{NOPAT}{D + E}$$

While calculating ROIC, the analyst's objective consists of measuring the earning power of a company as regards to the capital required to run it. As it is possible to see in the formula above, ROIC is normally represented by the net operating profit after tax (NOPAT) divided by net fixed assets (NFA) added to net working capital (NWC). Concerning fixed assets, they are considered net of accumulated depreciation, while net working capital is given by current asset balances (operating cash, accounts receivable, inventories) less accounts payable, accrued expenses and accrued taxes. At this purpose there is a rule concerning liabilities. Debt and equity have to be separated from "free" financing coming from trade credit and delays in payments to the employees and the government. Concerning the asset side, it is necessary to divide the assets required to run

the business from non-operating assets (i.e. excess cash or securities and property held for investment purposes).

The ROIC model can be employed for determining whether a company is attractive concerning being a worthy target for investments and a candidate for growth. The fundamental test is to compare the company's ROIC with WACC based on the opportunity cost of debt and equity.

A company in which its ROIC is considerable above its WACC is considered as an attractive opportunity. Suitably, reinvesting profits in the firm is reliable with the stockholders' value maximization. They in fact can earn more from reinvesting in the company than from equivalent risky opportunities in the capital market.

One interesting aspect concerning ROIC concerns sustainable growth. In fact, a company with steady operating ratios and no debt, which does not pay dividends and does not issue new shares, can grow at its ROIC rate (Baldwin, 2016). To prove this let us define:

- *I(t)* is the company's invested capital at the beginning the period *t*
- *Δl(t)* is the increase in company's invested capital in the period t
- *Π (t)* is company's profit during the period
- *g(t)* is the business's rate of growth is *Δl(t)/l(t)*

If the company does not pay dividends, all of its profits are ready for reinvestment. Moreover, if it gains no external capital, as of new debt or equity, then this is the only money available:

$$max\ \Delta l\ (t) = \ \Pi\ (t)$$

Substituting, the result is:

$$g(t) = \frac{\Delta l\ (t)}{l(t)} = \frac{\Pi(t)}{l(t)} = ROIC(t)$$

The growth rate (g) that results from this model is named "'sustainable growth rate".

Under another point of view, ROIC shows how a company will manage the competition in the business arena. The ROIC measure strictly regards the process of creative destruction. Baldwin and Clark (2006) noted that in head to-head competition, subject to conditions

discussed below, a company with a 'ROIC advantage' can grow rapidly and more advantageously in every time period (because of the sustainable growth formula). In conclusion, for companies involved in Schumpeterian[20] competition, innovator firms with a ROIC advantage can drive their precursors to the border of their market arenas. In this way, ROIC represents the basis of innovative success and survival.

3.5 Cash flows-based methods

This paragraph analyses a rose of widely used methods which are considered as the most reliable ones in the academic literature. For cash flows-based methods the value of a company is linked to its ability to produce an adequate level of financial flows to meet the remuneration expectations of shareholders. In other terms, these methods attempt to understand the value of a company today, based on the projections of how much money it will generate in the future. Comparing it to a real investment in the market. One important characteristic of these methods is to highlight the ability of the company to make available to the investors those cash flows that remain after making the investments in working capital and fixed assets necessary to guarantee the persistence of the same business operativity.

The classical formula that represents cash flows methods is:

$$V = \sum_{t=1}^{n} \frac{F}{(1+i)^t} + \frac{V_r}{(1+i)^n}$$

Where:

V: company's value

F: cash flows

i: evaluation rate

t: duration expressed in years

[20] He famously asserted that the process of change and "creative destruction" represents the essence of capitalism. "New combinations" produce material progress and economic development in the long run (Schumpeter 1934, 1942).

V_r: residual value of the company

As it is possible to note there are three key factors. Specifically, the expected financial flows (F), their distribution over time (t) and the rate used for their discounting (i). The main difficulty is so the correct forecast of these flows.

For understanding better these methods it is important to comprehend the *ratio.* These methods, indeed, attempt to evaluate the company not based on historical results but based on future cash flows from a financial perspective. From this it can be noted an important difference in comparison to the other methods. Moreover, from this point of view, cash flows methods can be considered as an evolution of the income method where the criterion of "financial competence" is used instead of the criterion of "economic competence". At operative level, this is translated by considering only monetary costs and revenues or cash inflows and outflows, eliminating the accounting effects that instead characterize the criterion of economic competence.

Another feature that is important to underline is that cash flows-based methods are characterised by a high rate of subjectivity. In fact, as they are based on the company's ability to generate cash flows, it requires some assumptions by analysts regarding criterions to employ in the evaluation. As a matter of fact, the cash-flow itself is subjected to an estimate. In any case, this cluster of methods is considered by the doctrine to be the most rigorous and reliable (Guatri and Fusa, 1999 and Balducci, 2001).

Cash flows-based methods are easily applicable to companies whose cash flows can be estimated with sufficient reliability. However, there exists a factor that limits its applicability: the difficulty to estimate cash flows. This is because they are strictly related to the company's financial policies and managerial choices that are difficult to predict.

Regarding incompatibility, these methods are not suitable to companies characterised by a high level of asset capitalisation, poor monetary flows and companies with irrelevant or negative cash flows. On the other hand, it is ideal for firms financially dynamic.

In the sample of analysts reported in this analysis, cash flows methods are employed in approximately 37% of the reports. Specifically, these methods are mainly employed for telecommunications, apparel and textile products, consumer products and chemicals companies.

3.5.1 Discounted Cash Flow (DCF)

DCF is without a doubt one of the most widespread valuation approaches in literature. As a matter of fact, the scientific literature identifies DCF as one of the most reliable methods in evaluations. In DCF valuations it is estimated the asset is calculated using expected cash flows, discounted at a specific discounting rate that symbolises its risky level. Consequently, it is estimated the inherent value of an asset. Under the mathematical point of view, the value of any asset is a function of the cash flows produced by that asset, the life of the asset, the expected growth in terms of cash flows, and the level of risk related to these cash flows. In concrete, it represents the present value of the expected cash flows on the asset (Damodaran, 2015).

The classical DCF formula is represented by the equation:

$$W = \sum_{t=1}^{n} \frac{E(Cash\ flow_{t)}}{(1+r)^t}$$

Where:

N: time life

r: discount rate

However, it is important to underline that DCF can be employed for valuing the equity or the entire firm. Even though both approaches do discount expected cash flows, the relevant cash flows considered, and discount rates applied are nonidentical. The value of equity is given by discounting expected cash flows to equity at the cost of capital (K_e) which is a measure of the return demanded by company's shareholders. On the other hand, firm valuation approach is the one employed in financial analysts reports. As it was seen several times, analysts use cash flows in order to estimate the value of the company. Cash flows analysis, in fact, represents a scientific-based technique.

Concerning the value of the firm approach, it is obtained by discounting expected cash flows to the company. Specifically, it is given by residual cash flows (after all operating

expenses), taxes, reinvestment, the cost of the different components of financing used by the firm, weighted by their market-value proportions.

The equation that represents value of the firm approach is:

$$Value\ of\ firm = \sum_{t=1}^{t=n} \frac{CF\ to\ firm_t}{(1+WACC)^t}$$

Where:

CF to firm$_t$: expected cash flow to firm in period t

WACC: weighted average cost of capital

As it is possible to observe, this "value to firm" approach employs different definitions of cash flows and discount rates. As a matter of fact, the equity approach employs CF to equity and k_e as discount rate, while the firm approach employs CF to firm and WACC as discount rate. However, these two approaches will generate uniform estimates once applied the same rose of assumptions for both. This is because it is strongly significant to avoid discordant cash flows and discount rates. In fact, discounting cash flows to equity at WACC will produce an overstated biased estimate of the value of equity. On the other hand, discounting cash flows to the firm at the k_e will generate an understated biased estimate of the value of the firm. At this purpose it is always important to employ logical discount rates as well as coherent and mindful estimates of cash flows.

To better understand which are the different DCF approaches and the different assessment of each method it is reported an interesting framework (exhibit 8.1) which reports the different models adopted for DCF valuations.

EXHIBIT 8.1 **Frameworks for DCF-Based Valuation**

Model	Measure	Discount factor	Assessment
Enterprise discounted cash flow	Free cash flow	Weighted average cost of capital	Works best for projects, business units, and companies that manage their capital structure to a target level.
Discounted economic profit	Economic profit	Weighted average cost of capital	Explicitly highlights when a company creates value.
Adjusted present value	Free cash flow	Unlevered cost of equity	Highlights changing capital structure more easily than WACC-based models.
Capital cash flow	Capital cash flow	Unlevered cost of equity	Compresses free cash flow and the interest tax shield in one number, making it difficult to compare operating performance among companies and over time.
Equity cash flow	Cash flow to equity	Levered cost of equity	Difficult to implement correctly because capital structure is embedded within the cash flow. Best used when valuing financial institutions.

Source: Koller et al. (2019)

Some of the models that will be exhibited in the next paragraphs represent variations of Discounted Cash Flows.

3.5.2 Dividend Discount Model (DDM)

The DDM is a particular case of DCF equity valuation, where a share's value is given by the present value of expected future dividends. This approach states that a securities' value is represented by the PV of expected future dividends on it. Especially in past years, as Damodaran (2015) underlines, several analysts have swerved from DDM because they consider it as obsolete. However, it is important to report that a lot of DCF intuitions are the same that shape the Dividend Discount Model. Indeed, for several companies the model remains a useful approach for estimating the companies' value.

The key assumption of the DDM is that when investors buy shares, they should expect to receive two typologies of cash flows. Firstly, dividends in the holding period. Secondly, the price (P) at the expiration of the period. Consequently, considering that P is related to the future cash flows (that represent the dividends), the share's value is equal to the PV

of perpetual cash-flows (dividends). In a mathematical way, it is possible to represent this statement as follows:

$$Value\ per\ share = \sum_{t=1}^{t=\infty} \frac{E(DPS_t)}{(1+k_e)^t}$$

Where:

DPS_t: Expected dividend per share

k_e: Cost of equity

As it is possible to notice there are two key inputs: expected dividend (DPS_t) and cost of equity (k_e). Therefore, analysts make several assumptions. Firstly, about expected future growth rates in income. Secondly about pay-out ratios. The return rate on a share is outlined by its riskiness that is calculated in different ways depending on models selected. For example, in CAPM it is represented by the market beta (β). One important advantage of DDM is that it is adjustable to permit time-varying discount rates, that are due to expected variations in interest rates or risk across time. However, in order to adapt this model to the practice there have been some adaptations, especially related to the growth variable (g). One of the most famous is the Gordon Growth Model (GGM).

3.5.3 Gordon Growth Model (GGM)

As it was seen for the Dividend Discount Model, the Gordon Growth Model represents a variation of the DCF that employs the growth variable (g) in its equation. The Gordon Growth Model links the value of the share to the expected dividends in the following period, the required rate of return on the stock (k_e) and the expected growth rate of dividends[21]. As arise from Dividend Discount Model, a way to estimate the final price to be used in calculating the intrinsic value of a share is to assume that the dividend received in the last year of the forecast period will grow at a constant perpetuity rate g. If it is assumed that growth does not begin at the end of the forecast period but immediately (i.e.

[21] https://www.borsaitaliana.it/borsa/glossario/gordon-growth-model.html

in the first year following the estimate date), the intrinsic value of the share is given by the capitalization of a perpetual annuity at growing rates. It is possible to represent this statement as follows:

$$EV = \frac{FCFE}{r - g}$$

Where:

FCFE: Cash flows for shareholders as required by the Gordon formula

r: discount rate, for a firm evaluation it can be employed the WACC

g: growth rate

Very often in practice the growth rate is calculated as differential growth, (i.e. dividing the expected future growth process into different subperiods). Usually, the first period refers to a time span of 3-5 years coinciding with the business plan set out by the management of the company itself, in which there is a higher growth rate that exhausts after a few years.
This approach is known as the Gordon Growth Model. GGM can be employed to evaluate a company that is in a steady growth phase, when its dividends grow at a constant rate (g). However, it is important to consider that even if the Gordon Growth Model represents a simple and powerful approach to company valuation, it is also true that its application is limited to companies that are in "steady state" having perpetuity growth dividends.

3.5.4 Adjusted Present Value (APV)

The adjusted present value approach, as DDM and GGM, belongs to the cash flows-based approach. This approach starts from the premise that, often, an investment is not completely financed with equity, but also through available funds from third parties (Debt). The calculation begins by estimating the value of the company without debt. When debt is added, the analyst considers the net effect on firm value by considering both the benefits and the costs of financing. So, the value of the levered company can be estimated

at different levels of the debt. The debt level that maximizes company value is considered as the optimal debt ratio.

In the APV method, it is supposed that the most important benefit of borrowing is represented by a tax benefit and the most relevant cost of borrowing is given by the connected risk of bankruptcy. In order to better understand the mechanism behind the APV it is important to state the three steps that allow to calculate the company value.

The first step consists of estimating the value of the firm with no debt, that is called value of the unlevered. The calculation is quite simple, it is possible to compute the value of an unlevered firm by discounting the expected after-tax operating cash flows at the unlevered k_e. Considering the scenario where cash flows grow constantly rate in perpetuity.

$$Value\ of\ Unlevered\ firm = \frac{FCFF}{\rho_u - g}$$

Where:

FCFF: expected after-tax operating cash flow

ρ_u unlevered cost of equity[22]

g: expected growth rate

The second step consists of estimating the PV of tax benefits from debt. In this step are calculated the expected tax benefit from a given level of debt. This tax benefit is a function of the company's tax rate and it is discounted at the k_d that reflects the degree of risk of cash flows. For the calculation if the aforementioned tax savings are considered as a perpetuity it will have:

[22] The unlevered cost of equity can be computed by using the unlevered Beta that can be computed as:

$\boldsymbol{\beta}_{Unlevered} = \boldsymbol{\beta}_{Levered} / [1 + (1 - t) \times Debt/Equity]$

$$Tax\ benefits = \frac{(Tax\ rate\ \times Cost\ of\ debt\ \times Debt)}{Cost\ of\ debt} = Tax\ Rate\ \times Debt = \boldsymbol{t_c D}$$

The tax rate employed for the calculation is the company's marginal tax rate; it is estimated to stay constant over time.

The third step is important too because it can assess the impact of debt levels on the company's default risk. In theory, this requires at least an estimation of the probability of default of additional units of debt and the direct and indirect costs of bankruptcy. Therefore, it is necessary to assess the riskiness of bankruptcy. Considering "π_a" as the risk of default, after the further unit of debt, and "BC" as the PV of bankruptcy costs, it is possible to address the PV of bankruptcy costs:

$$PV\ of\ expected\ bunkruptcy\ costs = \ P\ of\ Bankruptcy\ \times PV\ of\ Bankruptcy\ Cost = \boldsymbol{\pi_a BC}$$

As Damodaran (2015) highlights, the third step arises the most relevant estimation problem, since neither the probability of bankruptcy (π_a) nor the bankruptcy cost (BC) can be calculated directly. Therefore, there exist two ways to estimate indirectly the probability of bankruptcy. The first one consists of estimating a bond rating, at each level of debt by looking at the past to assess the probability of default for a given rating. The second one is to employ a statistical approach (through a Probit model for instance) to calculate the probability of default, according to the observable characteristics of the firm, at each debt level.

Finally, it is possible to combine the net effect of adding debt by gathering costs and benefits at each debt level:

$$Value\ of\ Levered\ firm = \frac{FCFF}{\rho_u - \ g} + \ t_c - \ \pi_a BC$$

At this point it is possible to state that the level of debt that maximizes the levered company's value represents the optimal debt ratio (Damodaran, 2015)

3.5.5 Cash Flow Return on Investment (CFROI-HOLT)

Still in financial-based methods, it is important to cite the CFROI. In fact, it symbolises the company's internal rate of return (IRR) on its investments. Being a financial approach, it is based on real companies' cash flows. Commonly, it should be compared to the real cost of capital to make judgments about the quality of these investment (Damodaran, 2015). This approach starts from the valuation of the assets, and then it is possible to value the entire company. The CFROI is constituted by four key elements:

1. The *gross investment* (GI)
2. The *gross cash flow* (GCF)
3. The e*xpected life of the asset* (n)
4. The *expected value of the asset* (SV)

The gross investment in assets that the company has in place. The GI is estimated by summing depreciation back to the BV of the assets[23] to come to an estimation of the initial investment on assets. The gross investment, hence estimated, is transformed into a currency (such as Euro or Dollar) in order to show the occurred inflation since the asset was purchased. Mathematically, this statement can be computed as:

$$GI = Net\ assets\ value + Accumulated\ depreciation\ on\ them + Currency\ adjustments$$

Secondly, it has to be calculated the gross cash flow (GCF) achieved in the present year on that asset. This indicator is usually defined as the sum of operating income after taxes of a firm and the non-monetary costs, such as depreciation and amortization. Then, the operating income is aligned for operating leases and any extraordinary or single expenses.

$$GCF = Adjusted\ EBIT\ (1 - t) + Current\ Year's\ Depreciation\ and\ Amortization$$

The third element is constituted by the *expected life of the assets* (n) considered, calculated at the time of the investment, which, of course, can differ depending on different business. Anyway, it reflects the pay-off life of the considered investment. Finally, the *expected value*

[23] BV of assets is given by the net asset value.

of the assets (SV) at its life's end, in a specific currency, represents the final key element. Normally, it is constituted by the part of the initial investment, (such as land and buildings), that is not depreciable.

Given these elements, it is easier to understand this method thorough a cash flow timeline:

As it is possible to see in the timeline, the gross investment is treated as the starting investment. The gross cash flow as an annuity for the asset's life, and finally the expected value of the asset is considered as the salvage value (SV). Considering these elements, the CFROI represents the IRR of these cash flows. Specifically, the discount rate that conveys the NPV of the total cash flow and residual value equal to the discount rate of the total investment. The result is measured against the company's cost of capital to understand whether assets are creating or destroying value (Damodaran, 2015).

3.6 Market ratios method

Market ratios method represents a cluster of valuation approaches very widespread and discussed at the same time in the academic environment. This is because they do not have a scientific base in comparison to the other method. They are, as it was partially seen in the second chapter, heuristic methods. In the sample of data considered, the multiples method, in general, is the most widespread (52%). As a matter of fact, the multiples method is the most common in Banking (57%) and Insurance (52%) sectors. Nonetheless, in general, it is a widely used method by financial analysts even for valuing less dynamic sectors, such as utilities one (43.4%) and retail one (46%). For the purposes of the research that will be proposed in the next chapter, it is useful to understand how these indicators work to understand the differences between the different models on which analysts' assessments are based. Especially their complexity and risks.

Market ratios method is considered as a relative approach because it is aimed to value assets, based on how analogous assets are priced in the market. Hence, to compare similar assets values in the market, it is important to standardise the values. In general, they can be standardised in relation to earnings and revenues they produce or to the book value assets. In practice, this cluster of methods is based on the price of comparable assets (listed firms from the same sector), applied to balance sheet data; such as turnover, EBITDA, EBIT, net profit, shareholders' equity, net financial position and cash flow. Therefore, the multiples represent a relationship that occurs between market data and balance sheet data. In other terms, the idea is that, when companies are comparable, market ratios can be employed to determine the value of one firm based on the value of another. For this reason, to frame a market ratios analysis it is necessary to identify those companies that have certain similarities in terms of business and market.

Market ratios can be segmented into three categories. The first one concerns earnings multiple. It includes the easier and most intuitive market ratios that are employed in the analysis. It starts from the premise that for valuing an asset, the calculation starts from considering that the asset value is given by a multiple of the incomes generated by the asset itself. As a matter of fact, it is typical for investors when purchasing shares to look at the price paid considering it as a multiple of the EPS produced by the firm. This ratio is called price/earnings ratio (P/E) and it can be estimated through EPS over the last four quarters, or an expected EPS in the next financial year. Opposite to just purchasing shares that is when an entire business is bought, it is normal to examine the company's value as a multiple of the operating income or the EBITDA.

The second category concerns book value multiples. Very often in practice it happens that market estimations of a business are very far from a book value-based estimation. As it is possible to note by its name, the book estimation (even named accounting estimate of book value) is shaped by accounting rules and is very influenced by the initial price paid for the asset plus any adjustments (such as amortisation) produced. As a matter of facts, investors frequently investigate the relationship that exists between the market side equity valuation and the book side equity valuation. This happens because some investors want to understand how over or undervalued a share is. The price/book ratio that arises from this way of thinking can be very different among industries. It mainly depends on growth opportunities and investment qualities of companies in that sector. In practice,

when valuing a company using this approach, it is estimated by the company's value and the book value of all capital[24] (debt and equity).

The third category regards revenue multiples. Despite earnings multiples are very attractive and widespread, recently analysts have increasingly focused on alternative multiples. In particular, for new technology companies that generate negative earnings, revenue multiples have replaced earnings multiples in several situations. In practice, revenue multiples measure the equity value in relation to the revenues that it produces. This type of multiples remains very attractive for analysts for several reasons. Firstly, in contrast to earnings and book value ratios, that can be negative for several companies being not significant, revenue multiples can be employed even for extremely troubled companies and for young companies. Secondly, in contrast to earnings and book value, that are affected by accounting adjustments and decisions (i.e. about depreciation, inventory, R&D, acquisition accounting and extraordinary charges) revenues are reasonably difficult to manipulate. In conclusion, revenue multiples are not as variable as earnings multiples. Consequently, they can be more reliable in valuations.

Even though market ratio multiples are not considered as "scientific approaches", contrary to DCF for instance, in the academic environment researchers have started to consider and analyse them. Actually, some academics have developed several interesting analyses concerning market multiples and stock returns. Mentioning one, Barbee et al. (2008) argued that that P/S is the only market ratio for which value shares significantly outperform growth stocks on an equally consistent basis. Cavezzali et al. (2014) considering that an important part of financial analysts uses market multiples, found that there are no significant differences in terms of accuracy associated with company fundamentals methods and those on market ratios.

In the next paragraphs there will be examined the main market ratios that are used in the dataset considered in the research. The market ratios are mainly four and they belong to the three categories cited above. In order they are enterprise value to EBITDA (EV/EBITDA), price to net asset value (P/NAV), price to earnings (P/E) and price to book value (P/BV).

[24] Alternatively, it is possible to use the asset replacement cost (i.e. the amount a company must spend to replace an essential asset.

3.6.1 Enterprise value to EBITDA (EV/EBITDA)

Enterprise value to EBITDA is given by the ratio between the value of a company and the gross operating margin (EBITDA). Conditional on the debt level of the company, there are two ways of calculating the Enterprise Value (EV). The first case concerns levered companies. In this case the formula is:

$$EV = stock\ market\ capitalization + net\ debt$$

On the other hand, in the case of unlevered companies the enterprise value is given by:

$$EV = market\ capitalization - net\ liquidity$$

The company value just calculated represents the price that a buyer would have to pay to acquire the unlevered company. Concerning the denominator, the gross margin can be computed as:

$$EBITDA = Revenues - Cost\ of\ goods\ sold.$$

The EBITDA allows to verify whether the company produces a profit surplus from ordinary operations.

So, the EV/EBITDA ratio is given by:

$$\frac{EV}{EBITDA} = \frac{Enterprise\ value}{Gross\ operative\ margin}$$

In any case, the main limitation of this market multiple is the existence of a time lag between the numerator and denominator. In fact, as a numerator there is a current market value, while on the other hand as a denominator there is a book value that belongs to a different temporal horizon. Furthermore, in comparison to EV / EBIT, EV / EBITDA is not affected by the company's budget policy. This allows for a more accurate comparison between share prices of different companies. Analysts evaluate positively a high-tech company that in the first years produces a positive EBITDA value. As a matter of fact, a

positive EBITDA indicates that the company generates enough profits to cover operating costs and salaries.

3.6.2 Price to Net asset value (P/NAV)

Price to Net asset value ratio compares the price (that represents the company market value) to the net asset value[25]. As this ratio gives the possibility to compare the market price of the shares to their corresponding book value, very often it is employed especially for valuation of real estate companies. The ratio is represented as:

$$\frac{P}{NAV} = \frac{Market\ capitalisation}{Net\ asset\ value}$$

3.6.3 Price to Earnings (P/E)

Price to Earnings ratio is composed by the market price of a company's share and EPS. It indicates how many times the share price incorporates the expected profits and therefore how many times the company profit is contained in the value that the market confers to it[26]. The equation can be written as:

$$\frac{\mathrm{P}}{\mathrm{E}} = \frac{\text{Market Price per Share}}{\text{Earnings per Share}}$$

As it is possible to note, the higher the P / E ratio is, the higher are investors' expectations about the company's growth. Actually, a high P / E ratio value indicates that the market is willing to pay a lot to have the level of EPS indicated in the denominator. Inasmuch, for instance, the market believes in the company's ability to increase them. Under the perspective of constant profits, P / E ratio indicates the number of years required by the

[25] Net asset value (NAV) is a widespread term used when valuing investment trusts. It is given by the difference between total assets and total liabilities and divided by the number of issued shares:

NAV = (Asset - Liabilities) / n. of outstanding shares

[26] https://www.borsaitaliana.it/borsa/glossario/price-earnings.html

investor to return the invested capital. In practice, the P/E ratio is one of the most used market multiples for some reasons. P / E is the most widely used multiple for the following reasons. Firstly, it is a very intuitive statistic that relates the price to current profits. Secondly, it is simple to calculate and for most securities it is widely available. Finally, it can be seen as an approximation of other company factors. For example, it can partially indicate the possibilities of growth and the related risks. Evidently, for these types of analysis it should be contextualised and not considered as a stand-alone indicator. Using the P/E ratio, analysts can avoid stating their assumptions on risk, growth and pay-out ratios. They are much more likely to reflect market moods and perceptions, but this can be viewed as a weakness, especially when markets make systematic errors in valuing entire sectors.

3.6.4 Price to Book value (P/BV)

The P/BV multiple estimates a company's share price by capitalizing book value at a benchmark P/BV multiple determined from a set of comparable companies (Cheng and McNamara, 2000). As it is possible to notice given the equation:

$$\frac{P}{BV} = \frac{Market\ capitalization}{Book\ value\ of\ assets}$$

P/BV represents the relation between the total value of companies' outstanding shares and the book value of its equity. In substance, the P/BV ratio describes the connection between the company's market capitalisation and the book value of its assets. Through this indicator, it is possible to determine when shares are overvalued or undervalued. In fact, Bernard (1994) argues that any variation in P/B ratios can be explained by future rates of probability. He also suggests that the P/B ratio is related to discount rates, hence, related to risk and growth.

4. CHAPTER: ANALYST TEAMS AND TARGET PRICE ACCURACY

In the literature of the past years, when examining the accuracy of analysts' forecasts, researchers focused on the impact of very different elements that led them to very different results. Applying the Asquith et al. (2005) measure[27] of the target price (TP) accuracy in the sample of reports considered it results that more than a half of reports seem to be accurate (app. 54%). While, considering other studies conducted by Vincentiis, (2014), Kerl (2011), (Bilinski et al., 2012), it seems that the TP is only partially accurate. At this purpose, Vincentiis (2014)focuses on the so-called accuracy issue to measure the ability of individuals or companies to predict prices. He concluded that analysts' forecasts on the TP are rather inaccurate. In addition, more recently, (Bradshaw et al., 2013) reported a high level of accuracy of the target price over a time horizon of 12 months. The results are exceptionally different since, indeed, the elements that are considered are broadly different. In recent years, Hashim & Strong (2018) found that the TP accuracy improves when the analyst discloses the forecast of future cash flows. It seems, in fact, that the TP accuracy is directly proportional to the accuracy of the cash flow forecasts. The result is that analysts who demonstrate more accurate cash flow forecasts also publish the most accurate TP. Under the valuation methods perspective, Cavezzali et al. (2014)state that TP accuracy does not depend on the choice of specific valuation method, but on the valuation procedure adopted by analysts. Shifting the focus to the behavioural perspective, (Shefrin, 2014) and (Shefrin, 2019) exhibits that there are behavioural elements, that are intensely personal, that contribute to shape analysts' analysis. Heuristics, on which several analysts base their forecasts, represent a very relevant matter.

5.1 Focus on analyst teams

The researches about TP accuracy are numerous and in constant evolution. However, in literature, it was given limited attention to analyst teams. Specifically, there was not given

[27] This formula considers if the price of the stock reaches the TP in the 12 months following the publication of the reports.

sufficient attention to how analyst team features can affect forecast accuracy. Thus, it could be important to investigate if analyst teams and analysts' personal characteristics can influence the way in which analysts perform their reports. Overall, it is important to consider that, especially for US analysts, there was a highly important reform at the beginning of 2000s. In fact, between 2000 and 2003 there were introduced important regulations on analyst reporting regulations (including Regulation Fair Disclosure, the Sarbanes-Oxley Act and the Global Settlement Act). They established new rules about analysts and forecast characteristics for analyst forecast accuracy. The result was that more experienced analysts and All-Star analysts did not maintain their superior forecast accuracy, and analysts employed by leading brokers performed worse than the others (Keskek et al., 2017).

In the past years, except for (Brown & Hugon, 2008) there was a lack in considering analyst team performances. The authors investigate the performance and purpose of sell-side analyst teams' earnings research. In particular, they found that analyst teams make less accurate forecasts but timelier than those of individual analysts. This was one of the prior researches about the topic. However, in the following years, (Brightbill, 2018) documented that analyst teams issue more accurate forecasts than single analysts. In addition, this effect is partially driven by the post 2000-2003 regulatory changes that apparently shifted the relative benefits of analyst teamwork on forecast quality. Overall, it seems that analyst teams produce higher quality forecasts than those issued by single analysts. Lately, (Fang & Hope, 2020) find that the organisational structure of information intermediaries, such as analyst teams, plays an important role in driving the nature of information in the capital markets. In other terms, there is empirical evidence that analysts' teamwork affects forecast accuracy. Specifically, as Cavezzali et al. (2015) previously reported, it seems that analyst teams perform better (in terms of forecast accuracy) than single analysts. As it was noticed by Fang et al. (2020) analyst teams can run more accurate forecasts when facing very complex business realities. Even the gender variable has a positive impact when facing companies that are complex to analyse. Moreover, the authors emphasize another extremely interesting aspect. They find, indeed, that performances are associated with team diversity in relation to analysts' educational background, experience, and gender.

5.2 Focus on forecasts accuracy

Oftentimes the term “accuracy” is employed when analysing analysts’ reports. However, this term has a very broad rose of different meanings. Declining the word accuracy from a financial analyst's perspective, it can mainly refer to two different meanings. The first one concerns target price accuracy, while the second one concerns earnings forecasts accuracy. Especially, while testing the accuracy of a report, it is important to bear in mind which is/are the different accuracy measure/s. In particular, (Mikhail et al., 1997) demonstrate a significant decrease in the number of errors regarding earnings forecasts when analyst's experience increases. (Clement & Tse, 2003) underline that analysts' forecasts accuracy is positively linked to some factors (i.e. the accuracy of past forecasts, the size of the brokerage firm, the frequency of the forecast and the experience acquired evaluating certain companies). Moreover, the authors found a negative relationship between forecast accuracy and time horizon. Another important contribution is given by Merkley et al. (2013) who show that increases in the overall number of analysts drive into more accurate and less biased aggregate forecasts at the industry level. Under a macroeconomic perspective, forecast accuracy can be affected, for example, by the geographical area to which the company belongs. The factor to which confer this difference would be for example the growth rate (Allen et al., 1997), the institutional and legal environment (Chang et al., 2000) the accounting and tax system see for example (Hope, 2003). Regarding this topic, Cavezzali et al. (2014) hypothesized that the geographical proximity of financial analysts to the "hubs of information and expertise" can positively influence the accuracy of their forecasts. However, Cavezzali et al. (2014)found this hypothesis by stating that analysts’ nationality, this indicates that this variable does not add any useful information about target price accuracy.

Considering the importance of target price accuracy, part of academic interest has focused on the drivers that determine the accuracy of TP. To examine the TP accuracy, (Asquith et al., 2005) considered the TP accurate if the stock price reached the TP in the 12 months following the publication of the report. Using this measure of accuracy, it was observed that approximately 54% of analyst target prices were met or exceeded. The remaining 46% of the stocks in the sample reached an average of 84% of the target price over a 12-month period. Other authors, Vincentiis (2014), Kerl (2011), and (Bilinski et al., 2012) conducted another research about TP accuracy. In particular, De Vincentiis (2010)

focused on the "accuracy issue" in order to measure the ability of individuals or companies to predict prices. He concluded that analysts' forecasts on the target price are rather inaccurate.

Lately, Bradshaw et al. (2013) instead reported a high level of target price accuracy over a time horizon of 12 months.

As it is possible to note, empirical results are highly debatable and contradictory. This is mainly due to several factors that affect these variables, factors that concern analysts who perform the assessment, the analysed company, or the share itself.

Another recent section of analyst literature focused on the effect of cash flow forecasts on capital market results. Specifically verifying whether the disclosure on cash flow forecasts can improve or not the target price accuracy. In particular according to (Hashim & Strong, 2018), TP accuracy seems to improve when analysts disclose forecasts of future cash flows. Therefore, there seems to be reason to believe that analysts who demonstrate better cash flow predictions also issue the most accurate target prices.

Finally, Fontaine & Roger (2020) propose a new approach in which the stock volatility is considered. They introduced a new approach for calculating TP accuracy. Basically, it considers how though is performing an accurate forecast given the stock volatility and forecast horizon. In fact, they found that there exists a non-linear relation between stock return volatility and forecast error. However, this model also implies very complex estimations mainly based on the Black and Scholes model.

As shown in the literature review, it does not exist a unique standard for measuring the accuracy of analysts' forecasts. Therefore, the different formulas that exist in the literature are based on very disparate assumptions. In addition, very often, for verifying the TP accuracy different elements are considered.

Focusing on practice, one very simple methodology to examine analysts' forecast performances is calculating the distance between the target price and the market price at 12 months. Therefore, the formula can be written as:

$$\delta = TP_t - P12M$$

Thus, it can be written as:

$$\delta = \frac{TP}{P_m} - 1$$

Where:

δ: accuracy measure

TP: target price given analysts at the report issue date

P_m: the maximum/minimum price considering the prediction time horizon. It has to be considered that it is considered the maximum price if TP is higher than the share price at the report publication ($TP_t > P_t$). On the other hand, it is considered the minimum price if the target price is lower ($TP_t < P_t$)

The result represents the geometrical distance between two points. In other words, it represents the forecast error, since the lower is the output the higher is the forecast accuracy.

In the next chapter, performing the research, the different forecast accuracy measures will be presented. However, for the analysis, it will be contemplated one specific measure of forecast accuracy proposed by Bonini et al. (2010), which considers target price, price at twelve months and the current price. The final stage of the analysis, though an econometric analysis, will investigate several factors that impact on the target price accuracy.

5. CHAPTER: THE RESEARCH ARCHITECTURE

5.1 Research hypothesis

The research conducted is aimed at verifying if analyst teams affect forecasts accuracy. In other words, if as relation exists between target price accuracy and analysts' teams. More in detail, the research hypothesis to be tested are listed below. Firstly, the analysis started from Fang (2020) findings, where the focus is on analyst teams. Specifically, if the teams affect the accuracy of analysts' forecast in terms of TP accuracy.

- ***H1****: Analysts' teams disclose more accurate target prices than single analysts.*

Concentrating on valuation methods, the focus was shifted on valuation approaches employed by single analysts and analyst teams. In particular, if target price forecasts based on financial methods drive to more accurate forecasts. In fact, since the type of information and assumptions required, DCF represents a more complex and specific scientific approach. Academically speaking, it is considered par excellence model. The structure of a DCF-based report is therefore elaborated, especially for analysis performed by one single analyst.

- ***H2****: Target price forecasts based on financial methods are more accurate than other methods.*

Successively, the attention has regarded the market multiples method that, in the sample, are one of the most adopted approaches by analysts. Especially in some sectors (i.e. banking, insurance) they seem to be predominant in comparison to DCF. Moreover, the market ratio approach is not a scientific method, but it is a heuristic approach. Consequently, analysts' reports can be more affected by biased valuations than, foe example, DCF.

- ***H3****: Target price forecasts in which are employed market ratios are less accurate than those performed with others.*

5.2 Dataset description

In order to perform the empirical analysis, there were employed data collected directly from financial analysts' reports. With these data, it was built a dataset containing information on 4,670 reports issued between 2007 and 2013 by 111 international brokers for 59 companies (appendix A1). A s a way for having a feedback on the actual trend after 1, 3 and 5 years the reports contained in the dataset are those published over a period between 2007 and 2013, mainly concerning companies belonging to the Euro Stoxx 50. The data were collected by analysing one by one all the reports and extrapolating the relevant information for testing the starting hypotheses.

The database was initially created by Ca' Foscari university of Venice professors Elisa Cavezzali and Ugo Rigoni. The first aim of their research concerned methods used by analysts, they therefore related the methods used with 12 months target price accuracy (2015). The dataset was subsequently modified and adapted in order to allow the empirical analysis.

The reports included in the sample had minimal research content. There are some reports that present most of extensive analysis regarding the procedures followed in order to calculate the target price and perform investment recommendations. On the other hand, do not entirely disclose some relevant information and calculations. In other terms, there are reports that, for example, do not present the valuation methods used (32,4%), analysts' names (44%). They, in fact, contain limited information only regarding the presentation of the main outputs or target prices, investment recommendations and EPS forecasts.

The dataset was implemented by extrapolating each analysts' name, when disclosed, and other data that will be analysed hereafter that are linked to the relation between analyst teams and valuation methods.

5.3 Sample composition

The dataset contains 59 companies (listed on EURO Stoxx 50) that belong from 8 different countries. Considering that the sample is related to the period 2007-2013, some of the

companies are not part of the index anymore. As table 5.1 exhibits, the companies belong to 21 different sectors. Specifically:

Table 5.1 - Sample composition by sector

Sector	n°	% of reports for sector
Insurance	491	10,51%
Aerospace & Defence	132	2,83%
Chemicals	260	5,57%
Hardware	138	2,96%
Media	62	1,33%
Consumer Products	337	7,22%
Semiconductors	78	1,67%
Banking	811	17,37%
Biotech & Pharma	249	5,33%
Automotive	262	5,61%
Retail	188	4,03%
Transportations & Logistics	76	1,63%
Telecommunications	335	7,17%
Utilities	462	9,89%
Oil, Gas & Coal	195	4,18%
Medical Equipment & Devices	231	4,95%
Apparel & Textile Products	100	2,14%
Construction Materials	69	1,48%
Software	107	2,29%
Electrical Equipment	67	1,43%
Real Estate	20	0,43%
TOTAL	**4670**	**100%**

Table 5.2 - Sample composition by country

Country	n°	% of report for country
Netherlands	469	10,04%
France	1576	33,75%
Germany	1435	30,73%
Ireland	12	0,26%
Belgium	75	1,61%
Italy	482	10,32%
Finland	115	2,46%
Spain	506	10,84%
TOTAL	**4670**	**100%**

Table 5.2 shows the number of reports issued for each country. In total, the reports were issued by 111 international brokers. The three brokers that issued most of the sample's reports are Société Générale (11,1%), Deutsche Bank (10,1%), Natixis Securities (9%). For all of the detailed information about brokers refer to appendix A2 , where there are disclosed the absolute and relative number of reports divided per year for each broker house.

The number of variables included in the dataset are 85, however in order to allow a superior accuracy and depth of the analysis there were added some variables concerning analysts' names and valuation methods employed. As it was said at the beginning of the chapter, only some concerned information were found in the reports. Several data were extrapolated from Bloomberg, while others were specifically calculated through formulas. Finally, there are several Dummy, which are binary variables, that were integrated to support the analysis. In the appendix there are entirely reported the variables with a respective description.

5.3.1 Sample information from reports

The following information were collected from each analysts' reports, where it was not possible to collect the data with sufficient objectivity, the field within the dataset is considered as blank. Concerning the reports' variables:

- *Company name*
- *Country*
- *Broker name*
- *Name / Surname of the analysts* (if disclosed)
- *Analysts' telephone prefix*
- *Number of team members*
- *Broker nationality*
- *Report date*
- *Report year*
- *Current price*
- *Target price*
- *Previous target price* (if disclosed)
- *Recommendation*
- *Change in recommendation* (if disclosed)
- *Actual Earning Per Share* (reported)
- *Forecast EPS 1 year ahead*

5.3.2 Sample information from Bloomberg

There is a cluster of information that were extrapolated from Bloomberg that mainly concerns market information about the stocks:

- *SEDOL*, Stock Exchange Daily Official List
- *ISIN*, International Securities Identification Number
- *Bloomberg sector*
- *Market capitalisation*
- *Price at 12 months*
- *Price at report issuing date*

- *PMIN_12M*, minimum price reached in the 12 months after report issuing date
- *PMAX_12M*, minimum price reached in the 12 months after report issuing date
- *Volatility*, it measures the security uncertainty regarding future price movements. It represents the equity volatility and, therefore, is one of the most important indicators of risk
- Total assets, it indicates the total assets of the company
- Total liabilities, it indicates the total liabilities of that company
- *Growth*, business growth indicator
- *Beginning of the year price*, value on the first trading day of the year
- *End of the year price*, value on the last trading day of the year

5.3.3 Variables calculated though formula

Some variables were specifically computed through formulas or proxies based on the data obtained from the reports and from Bloomberg:

- *Number of reports issued by 1 broker per year per company*
- *Number of reports issued per year per company*
- *Number of reports issued by 1 broker divided by the number of reports issued per year per company*
- *TP direction*, it indicates the target price direction. If the target price is higher than the current price (TP>CP) the result is "Appreciation". Otherwise, it is "Depreciation"
- *TP_ACC1st*, it represents the first TP accuracy measure resumed by Asquith et al. (2005). TP accuracy is calculated as a complementary element of the Forecast Error. The output is dichotomous, so it is not possible to perceive the extent of accuracy. In fact, if the P12M ≥ TP the forecast is considered “Accurate”. On the other hand, if the P12M < TP it is considered “Not Accurate”
- TP_ACC2nd, it represents the second TP accuracy measure from De Vincentiis (2010) e a Cavezzali et al. (2015). It is calculated as:

$$FE2 = \begin{cases} \frac{TP - P_{max}}{CP} & \text{if } TP > CP \\ \frac{TP - P_{min}}{CP} & \text{if } TP < CP \end{cases}$$

- *AbsFE2nd*, absolute value of TP_ACC2nd
- *TP_ACC3rd*, it represents the third formula of TP accuracy. It belongs to Bradshaw et al. (2013), Bonini et al. (2010), Cavezzali et al. (2015) and it is calculated as follows:

$$\mathrm{ACC3} = \frac{\mathrm{TP} - \mathrm{P12M}}{\mathrm{CP}}$$

Where:

ACC3: Forecast Error
TP: target price
P12M: 12 months price
CP: current price

- *AbsFE3rd*, absolute value of TP_ACC3rd
- *ACTUALFE*, indicator of the forecast analysis quality compared to the price after 12 months. It is given by the difference between the TP and the current price 12 months after the date of report issue
- *SIZE1*, company size indicator. It is given by the natural logarithm of assets
- *SIZE2*, company size indicator. It is given by the natural logarithm of the company market capitalisation at the report issue date
- AAFE, average AFE in the year (by company by year)
- *EPSACC1(AFE)*, it represents the absolute forecast error, in other words a measure for earnings forecast accuracy. It is computed as the difference between AFE and AAFE divided for AAFE:

$$EPSACC1 = \frac{AFE - AAFE}{AAFE}$$

- *AFE_NEW,* proxy for the earnings forecasts accuracy calculated as absolute value of the difference between AFE and AAFE divided for beginning of the year price:

$$\text{AFE NEW} = \left|\frac{\text{AFE} - \text{AAFE}}{\text{BEG OF THE YEAR PRICE}}\right|$$

- *FORAGE*, it measures the time span, in days, between the report issue date and the end of the companies' financial year end date;
- *BOLDNESS*, it measures the goodness of the forecast analysis compared to the current price. It is given by the absolute value of the difference between stock's TP and CP divided for the same CP:

$$\text{BOLDNESS} = \left|\frac{\text{TP} - \text{CP}}{\text{CP}}\right|$$

- *Kind of primary*, it represents the primary method employed.

5.3.4 Dummy variables

In the dataset are included 30 dummy variables which, being binaries variables, are included between 0 and 1:

- *Naz*: it is 1 if the nationality of the company and the nationality of the broker who performs the assessment correspond. Otherwise the value is 0
- *d2007, d2008, d2009, d2010, d2011, d2012, d2013*, they represent reports issue year. They take value 1 in the column corresponding to the year of report publication
- *Disclosed_notdisclosed*: the dummy variable is equal to 1 if there are information about valuation methods used. Otherwise is 0.
- *N ° approach*: it indicates the number of valuation approaches employed in the report
- *m_financial, m_income based, m_NAV based, m_blended, m_multiple*: these variables are linked to the different valuation methods used in analysts' reports. The five variables represent a different category of valuation methods (cash flow-based methods, earnings-based methods, hybrid methods, net asset-based methods,

market ratios method). In the dataset they assume a value of 1 when that specific approach has been employed. It is not considered whether the method is primary or secondary

- *Sum of the Parts* is a valuation approach that separates in different units companies that are valued separately. The variable is equal to 1 if this valuation approach is employed. Otherwise it is 0
- *Primary_no primary*: it concerns whether there is a primary method employed, or there is only method. The variable is equal to 1 if there is a primary method. Otherwise is 0.
- *mm_financial, mm_income based, mm_NAV based, mm_blended, mm_multiple*, these variables that represent the five categories of primary valuation methods (cash flow-based methods, earnings-based methods, hybrid methods, net asset based methods, market ratios method). The variable is equal to 1 when that specific method can be classified as a primary method. Otherwise the value is 0;
- *Primary_only*, its value is 1 whether it employs only one method. It is 0 if there are more methods
- *Primary_many*, the variable is 1 whether a method is considered primary regard to other methods. Otherwise it is 0
- *Primary_fund_multiple*, it indicates whether the primary method belongs to the fundamental methods, the value in this case is 1, or to market ratios, in this case it is 0
- *mm_financial, sm_income based, sm_NAV based, sm_blended, sm_multiple*: they concern the five categories of secondary valuation methods (cash flow-based methods, earnings-based methods, hybrid methods, net asset-based methods, market ratios method). The variable is equal to 1 when the method is present and is classified as a secondary method. Otherwise it is 0

5.3.5 Other variables

Furthermore, there were integrated some variables in the database in order to support to analysis:

- *Report date + 1*

- *Year of the report* + 1
- *Recommendation Rank*, analyst recommendations were assembled, given them a number from 1 to 5, to be more efficiently analysed
- *Recommendation Type*, analysts' recommendations were assembled into one of five categories: *strong buy, buy, hold, sell, strong sell*
- *FY End Month*, the last month of the fiscal year
- *FY End*, the last day of the fiscal year

5.4 Descriptive statistics and preliminary analysis

This paragraph reports some descriptive statistics that mainly concern analysts' teams and valuation methods. As it was specified in the past chapters, it will consider each analyst report from which it is possible to obtain specific information (i.e. the TP, number of analysts who perform the analysis, a disclosure about valuation methods employed).

5.4.1 Focus on broker houses

The first step to address the research is comprehending which and who are the main broker houses that performed the analysis. Almost 1 out of 3 reports were issued by three analysts. Therefore, it is clear that the distribution of reports per analyst is quite different.

Table 5.3 - Classification of the 10 main analysts

Broker Name	%
Societe Generale	11,11%
Deutsche Bank	10,13%
Natixis Securities	9,01%
UBS	6,38%
Credit Suisse	5,91%
Morgan Stanley	5,37%
Unicredit Equity Research	4,67%
J.P. Morgan	4,56%
Raymond James Euro Equities	3,51%
Barclays Capital	3,15%

As the table 5.3 highlights, the first 10 analysts (out of 111 in total) realised most of the sample reports (app. 60%). For this reason, the distribution is not equal at all. Specifically:

Table 5.4 - Distribution of first 10 broker reports

Broker Name	2007	2008	2009	2010	2011	2012	2013	TOTAL	%
Societe Generale	4	170	119	57	55	59	55	519	11,11%
Deutsche Bank	2	129	89	75	54	73	51	473	10,13%
Natixis Securities	0	173	146	15	16	53	18	421	9,01%
UBS	0	0	0	85	75	72	66	298	6,38%
Credit Suisse	2	21	31	62	44	61	55	276	5,91%
Morgan Stanley	0	0	0	70	47	82	52	251	5,37%
Unicredit Equity Research	121	54	0	23	20	0	0	218	4,67%
J.P. Morgan	0	0	0	76	42	59	36	213	4,56%
Raymond James Euro Equities	0	39	10	37	38	17	23	164	3,51%
Barclays Capital	0	0	0	35	29	46	37	147	3,15%

As it can be noted in table 5.4, the distribution is tendentially linear between year and number of reports, except for four brokers which did not issue any reports between 2007 and 2009. On the other hand, there are some brokers (especially UniCredit and Deutsche Bank) that issued a relevant number of reports between 2007 and 2009. It is interesting to reflect that approximately 24% of reports were issued during the financial crisis blast.

Table 5.5 - Methods employed by the first 10 brokers

Broker Name	% di report	cash-flows based methods	%	earnings based methods	%	asset based methods	%	hybrid methods	%	market ratios method	%	TOTAL
Societe Generale	**11,11%**	168	36,13%	10	2,15%	20	4,30%	13	2,80%	254	54,62%	**465**
Deutsche Bank	**10,13%**	154	36,49%	8	1,90%	9	2,13%	19	4,50%	232	54,98%	**422**
Natixis Securities	**9,01%**	72	37,11%	0	0,00%	3	1,55%	0	0,00%	119	61,34%	**194**
UBS	**6,38%**	189	42,57%	12	2,70%	29	6,53%	9	2,03%	205	46,17%	**444**
Credit Suisse	**5,91%**	149	37,82%	11	2,79%	18	4,57%	11	2,79%	205	52,03%	**394**
Morgan Stanley	**5,37%**	128	38,55%	14	4,22%	9	2,71%	8	2,41%	173	52,11%	**332**
Unicredit Equity Research	**4,67%**	45	27,27%	4	2,42%	11	6,67%	5	3,03%	100	60,61%	**165**
J.P. Morgan	**4,56%**	101	32,48%	6	1,93%	32	10,29%	7	2,25%	165	53,05%	**311**
Raymond James Euro Equities	**3,51%**	27	38,57%	0	0,00%	9	12,86%	2	2,86%	32	45,71%	**70**
Barclays Capital	**3,15%**	74	37,95%	10	5,13%	7	3,59%	6	3,08%	98	50,26%	**195**

Table 5.5 shows a very interesting aspects about analysts' reports. As a matter of fact, most reports are based on the market ratio method followed by cash flows-based methods. Despite the fact that financial methods are the most suggested ones, on average, a very low percentage of reports use DCF and the others related approaches (this aspect will be deeper analysed in the next sections). The reasons behind this phenomenon can be broadly different. However, an interesting interpretation is given by Epstein et al. This phenomenon can be justified by a certain fear of several analysts to expose themselves too much in their evaluation analysis. Sell-side financial analysts are in fact valued in relation to their performances. Their performances actually are directly related to their credibility. In uncertain situations (for example during a financial crisis) it is easier to follow the general consensus rather than exposing themselves too much with ventured valuations. However, this could not be the only one reason. As it was examined in the Chapter 3, cash flows-based methods are very complex. In addition, it can be very difficult to find the proper data (i.e. cash flows) required from the models. At this purpose, a different interpretation can concern analysts' team composition.

5.4.2 Focus on valuation methods

In the last paragraph it was noted that the first ten brokers tend to prefer other approaches, especially market ratios, than financial ones. Nonetheless, this is a general trend. In fact, as the table exhibits, even the remaining reports (101) show the same trend.

Table 5.6 - Distribution of valuation methods

Primary Method		
Metodi	**N°**	**%**
Cash flows-based Methods	1.689	36,65%
Earnings-based methods	153	3,32%
Net assets based methods	243	5,27%
Hybrid Methods	129	2,80%
Market ratios Methods	2.395	51,96%
TOTALE	**4.609**	**100%**

More in detail, within the different categories there are reports that employ a primary method and others that do not[28]. Moreover, there are even reports that disclose more than one primary method:

Table 5.7 - Primary and No primary methods

	N°	%	Primary Many	% of the total
Primary	1.974	64,26%	679	22,10%
No Primary	1.098	35,74%		
TOTAL	**3.072**	**100%**		

As table 5.7 shows most of the reports show a primary method employed. However, this descriptive statistic was made considering the reports in which it was objectively possible to identify primary and no primary methods. Thus, the sample for this analysis was reduced to 3.072 items.

Considering the total number of reports that disclose the methods used (4.609), table 5.6 confirms the trend. Financial-based methods are not the favourite ones from analysts. Even though cash flow-based methods are considered as the most reliable, they are only in part employed. In addition, there are several reports included in the 36,65% of cash flow-base methods, from the previous analysis conducted by professors Cavezzali et al. (2015), that only report low-significant financial information. They only state the main ones that are required for a DCF analysis. While they do not state the main ones (i.e. discounting rates, cash-flows). Supporting DCF reliability, it was noted that analyses set on DCF methods report a higher degree of informativeness concerning the research undertaken Demirakos & Walker (2010); Tan and Yu (2019). Moreover, Mohanram (2014) shows that cash-flows supply helpful data to the market and that analysts who report and use cash-flows have a more organised methodology for determining assignments.

Table 5.8 provides key highlights about valuation methods used for each sector. In almost all sectors, there seems to be a preference for market ratios. Followed by financial

[28] For the specific report of DCF and Multiples for each broker refer to appendix A3.

methods. A narrow percentage is occupied by earnings-based, net asset-based and hybrid methods. However, there are some differences concerning some sectors. In Banking and Insurance sectors, for example, market ratios seem to be very widespread in comparison to cash flows-based methods. In other sectors, such as the Electrical Equipment and Automotive sectors, the hierarchy of methods remains similar. Nonetheless, market ratios occupy a particularly substantial percentage. As reported in table 5.8, there is no doubt that methods used by analysts do not respect the theory suggestions about valuation methods. The hypothesis underlying this thesis argues that the analyst chooses the method efficiently and rationally, also taking into account the sector of the company he is evaluating; however, the sector is only one of the characterizations and factors that the analyst will consider, but it is certainly not the only element to consider when choosing the evaluation method.

Table 5.8 – Incidence of valuation methods

Sector	Financial	%	Earnings based	%	Net Asset	%	Hybrid	%	Market ratios	%	**TOTAL**
Banking	145	21,23%	59	8,64%	49	7,17%	41	6,00%	389	56,95%	683
Utilities	257	44,08%	15	2,57%	6	1,03%	52	8,92%	253	43,40%	583
Insurance	83	15,51%	25	4,67%	138	25,79%	10	1,87%	279	52,15%	535
Consumer Products	184	47,79%	10	2,60%	1	0,26%	5	1,30%	185	48,05%	385
Chemicals	170	47,75%	9	2,53%	1	0,28%	4	1,12%	172	48,31%	356
Telecommun.	144	57,60%	4	1,60%	1	0,40%	3	1,20%	98	39,20%	250
Medical Equip. & Devices	85	39,72%	3	1,40%	0	0,00%	2	0,93%	124	57,94%	214
Automotive	36	17,56%	5	2,44%	0	0,00%	5	2,44%	159	77,56%	205
Retail	97	48,02%	10	4,95%	3	1,49%	0	0,00%	92	45,54%	202
Biotech & Pharma	79	39,70%	2	1,01%	9	4,52%	2	1,01%	107	53,77%	199
Oil, Gas & Coal	89	45,88%	2	1,03%	16	8,25%	2	1,03%	85	43,81%	194
Aerospace & Defence	69	41,07%	1	0,60%	1	0,60%	1	0,60%	96	57,14%	168
Apparel & Textile Products	54	47,79%	2	1,77%	1	0,88%	0	0,00%	56	49,56%	113
Hardware	46	42,59%	3	2,78%	1	0,93%	1	0,93%	57	52,78%	108
Transportations & Logistics	42	42,00%	1	1,00%	1	1,00%	0	0,00%	56	56,00%	100
Semiconductors	31	33,33%	2	2,15%	0	0,00%	1	1,08%	59	63,44%	93
Software	33	41,25%	0	0,00%	0	0,00%	0	0,00%	47	58,75%	80
Construction Materials	25	39,06%	0	0,00%	3	4,69%	0	0,00%	36	56,25%	64
Electrical Equip.	6	17,65%	0	0,00%	0	0,00%	0	0,00%	28	82,35%	34
Media	10	38,46%	0	0,00%	1	3,85%	0	0,00%	15	57,69%	26
Real Estate	5	26,32%	0	0,00%	11	57,89%	0	0,00%	3	15,79%	19
TOTAL	**1690**	**36,65%**	**153**	**3,32%**	**243**	**5,27%**	**129**	**2,80%**	**2396**	**51,96%**	**4611**

However, despite this apparent predominance of market ratios exhibited in table 5.8, it would be interesting to go deeper in the analysis examining which is the distribution of valuation methods along different parameters. Firstly, table 5.9 resumes which ones of the sample reports are issued by analyst teams or single analysts.

Underneath a different point of view, it should be interesting to investigate how brokers employ valuation methods. Considering that financial and market ratios methods are the most employed in analyst reports table 5.9 exhibits primary methods usage frequency. Since not every report discloses the primary method adopted only reports that do it were considered in the analysis (42,31%). The next table only exhibits the first 15 brokers in terms of number of reports issued. For the complete table see appendix A3.

Table 5.9 – DCF and market ratios as primary approaches

Broker	Reports disclose primary approaches	Market ratios	DCF
Societe Generale	207	44,44%	46,86%
UBS	191	28,80%	61,26%
Deutsche Bank	182	56,04%	40,11%
Credit Suisse	169	47,93%	39,05%
J.P. Morgan	160	55,00%	35,00%
Morgan Stanley	149	53,69%	41,61%
Barclays Capital	109	48,62%	40,37%
Macquarie	77	27,27%	71,43%
HSBC	71	42,25%	49,30%
RBC Capital Markets	53	67,92%	20,75%
Jefferies International	50	40,00%	52,00%
RBS	48	14,58%	72,92%
Unicredit Equity Research	47	80,85%	10,64%
Natixis Securities	42	35,71%	61,90%
Kepler Capital Markets (KCM)	39	53,85%	41,03%

As the table shows, there are some brokers (especially UBS and Macquarie) that employ DCFs more than other brokers. Other brokers (especially UniCredit equity research and RBC Capital Markets). Crossing primary methods and evaluated sectors it appears that UBS employed mostly DCF for valuing banking companies, consumer products and telecommunication. Macquarie tends to adopt financial methods for utilities and

automotive companies. The other analysts, on average, employ DCF for consumer product, Oil, Gas and Coal sectors that can be considered as more stable in comparison to technological, insurance sectors which are much more volatile. On the other hand, UniCredit Equity Research and RBC Capital Markets have adopted mostly market ratios for valuing insurance, aerospace and defence sectors. Highly complex sectors, especially insurance, where analysts seem to prefer market ratios approach. The rest of the brokers seem to prefer market ratios for banking and insurance companies, while financial based methods for consumer products, utilities, oil, gas and coal sectors.

As literature demonstrates (i.e., Fang & Hope (2018)) reasonable probabilities of a relation between analyst and valuation methods exist. In particular, between analyst teams and DCF. The following descriptive statistics underlines very important characteristics concerning reports that can facilitate the econometric analyses.

Starting from the sample composition, table 5.10 displays how many reports are issued by analyst teams and single analysts.

Table 5.10 - Reports issued by analyst teams and single analyst

Sector	N. reports issued by analyst teams	%	N. reports issued by a single analyst	%
Banking	451	55,61%	360	44,39%
Insurance	272	55,40%	219	44,60%
Utilities	253	54,76%	209	45,24%
Consumer Products	247	73,29%	90	26,71%
Biotech & Pharma	197	79,12%	52	20,88%
Telecommunications	179	53,43%	156	46,57%
Automotive	164	62,60%	98	37,40%
Medical Equipment & Devices	152	65,80%	79	34,20%
Chemicals	147	56,54%	113	43,46%
Retail	134	71,28%	54	28,72%
Oil, Gas & Coal	120	61,54%	75	38,46%
Aerospace & Defence	87	65,91%	45	34,09%
Hardware	84	60,87%	54	39,13%
Apparel & Textile Products	79	79,00%	21	21,00%
Software	62	57,94%	45	42,06%
Semiconductors	56	71,79%	22	28,21%
Transportations & Logistics	55	72,37%	21	27,63%
Construction Materials	50	72,46%	19	27,54%

Media	47	75,81%	15	24,19%
Electrical Equipment	31	46,27%	36	53,73%
Real Estate	14	70,00%	6	30,00%
Total	**2881**	**61,69%**	**1789**	**38,31%**

Table 5.10 provides a very useful highlight: a good part of analysts' reports are issued by teams. The teams consist of two to eight team members. However, most of the teams are composed of two and three members (app. 80%).

Arranging in a different way the table (ordering in a decreasing manner the sectors where the impact of analyst teams is higher, refer to appendix A4) it is possible to note that Biotech & Pharma, Apparel & Textile Products and Media are the first three sectors in which reports are issued mostly by analyst teams.

Considering the first 15 brokers (that issued most of the reports) it is evident that, in absolute terms, UBS, Credit Suisse and Société Générale performed an important part of cash flow-based analysis (app. 37%). However, in relative terms, the broker whose analyst teams employed oftentimes financial methods is Macquarie (app. 54%). Nonetheless, at first glance, it does not appear that any broker's teams employ significantly financial methods.

5.4.3 Focus on analysts' teams

At the beginning of the analysis it was noted that most of the brokers employ analyst teams to perform the analysis. In the last section it was also noticed that there do not appear a significant use of financial methods. However, going deeper in the analysis about analyst teams, it seems that a relevant percentage of analyst teams use DCF as the primary method. In fact, considering the reports issued by a team of analysts who disclose the primary methods used, it was seen that about 45% of them employ financial methods. On the other hand, it is interesting to note that reports issued by single analysts use DCF as the primary method slightly less (42%).

Table 5.11

Primary Method		
Methods	**N°**	**%**
Cash flows-based Methods	254	42,12%
Earnings-based methods	12	1,99%
Net assets based methods	9	1,49%
Hybrid Methods	35	5,80%
Market ratios Methods	293	48,59%
TOTAL	**1360**	**100%**

Table 5.12

Primary Method		
Methods	**N°**	**%**
Cash flows-based Methods	617	45,37%
Earnings-based methods	32	2,35%
Net assets based methods	40	2,94%
Hybrid Methods	34	2,50%
Market ratios Methods	637	46,84%
TOTAL	**1360**	**100%**

Tables 5.11 and 5.12 summarise the methods differences between reports issued by single analysts and analyst teams. As it was already reported, analyst teams slightly employ more often cash flows-based methods than single analysts. On the other hand, analysts seem to use more often hybrid, net asset and earnings methods in comparison to single analysts.

5.4.4 Focus on TP accuracy

According to the last chapter a key objective while examining analyst reports is considering the forecast accuracy. At this purpose in this analysis it was considered which is the average forecast accuracy of the reports. As paragraph 5.3.3 highlights, in the dataset there were employed several accuracy measures according to the literature. In the following sections there will be examined TP accuracy which is one of the main standards that outlines the forecast accuracy.

Concerning the TP accuracy, the descriptive statistics start with considering the third measure of forecast accuracy (TP_ACC3rd). It was firstly employed this formula as it is more complete in comparison to the other benchmarks of TP accuracy. Table 5.13 reports an average of the absolute value of forecast error (FE3) for each of the 21 sectors. In addition, in the fourth column, it is indicated a delta which is determined by the difference between FE3 of analyst teams and FE3 of single analysts.

Table 5.13 - Median FE3 per sector

Sector	Median forecast error (Abs FE3) analyst teams	Median forecast error (Abs FE3) single analysts	Δ
Electrical Equipment	0,11	0,37	-0,26
Real Estate	0,11	0,17	-0,06
Consumer Products	0,12	0,12	0,00
Oil, Gas & Coal	0,13	0,16	-0,03
Biotech & Pharma	0,15	0,19	-0,04
Semiconductors	0,16	0,16	0,00
Apparel & Textile Products	0,19	0,25	-0,07
Aerospace & Defence	0,20	0,32	-0,12
Software	0,20	0,30	-0,10
Automotive	0,21	0,36	-0,15
Transportations & Logistics	0,21	0,16	0,05
Telecommunications	0,22	0,33	-0,12
Insurance	0,22	0,25	-0,04
Chemicals	0,23	0,33	-0,10
Utilities	0,23	0,30	-0,08
Medical Equipment & Devices	0,23	0,34	-0,11
Construction Materials	0,23	0,31	-0,08
Media	0,27	0,37	-0,10
Hardware	0,32	0,35	-0,03
Banking	0,32	0,37	-0,05
Retail	0,59	0,50	0,09

As table 5.13 displays, on average TP accuracy seems to be higher in analyst teams' reports. The table also shows which are, at first impact, the "simplest" sectors to analyse. It does not astonish that for real estate and consumer products the forecast error is much lower than insurance and hardware sectors. It was considered the absolute value of the forecast error so as to remove the algebraic component to consider the total extent of the error (which is therefore due to an overestimation or underestimation of the target price). Delta indicates the difference between teams and single analysts in terms of forecast accuracy. The results seem to indicate a greater accuracy concerning teams forecasts. On the other hand, several deltas do not seem relevant and so they may not indicate a higher forecast accuracy. Therefore, it could be interesting to compare the results using different forecast accuracy measures. For the further analysis it is possible to see appendixes A5 and A6.

Despite the previous results shown, there can be several elements that affect the forecast error. These elements can have a macroeconomic (such as stock market fluctuations, political risk, monetary politics) or microeconomic matrix (such as management politics or other company-level factors). Therefore, there are multiple factors that can influence TP forecasts and that can be difficult to estimate. An econometric regression using panel data could help to consider the different variables that are involved in TP forecasts. Following the results, for better examining the target price accuracy it can be useful to consider the forecast error related to each broker.

The next table resumes the absolute value of FE3 of the first 15 brokers (who issued more than 90% of the team's reports). It was considered the median, in place of the average, as it is not influenced by abnormal values. In fact, in some reports, there are several abnormal values thousands of times higher than the average and the median that affect the calculation. As it can be noted, the items are presented in decreasing order based on the number of reports issued by analyst teams.

Table 5.14 – Analysts' teams and single analysts forecast error compared

Broker name	Median Abs FE3 - Analyst teams	N. report teams	Median Abs FE3 - Single analyst	N. reports single analysts
Societe Generale	0,24	278	0,31	168
UBS	0,19	252	0,32	35

Credit Suisse	0,18	225	0,35	39
Morgan Stanley	0,21	207	0,17	29
J.P. Morgan	0,2	183	0,23	27
Deutsche Bank	0,21	170	0,33	227
Natixis Securities	0,26	169	0,19	34
Barclays Capital	0,23	127	0,11	11
HSBC	0,23	95	0,27	18
Raymond James Euro Equities	0,19	82	0,46	24
Jefferies International	0,2	65	0,19	8
RBS	0,15	58	0,14	11
Macquarie	0,22	58	0,29	35
RBC Capital Markets	0,16	57	0,12	11
Unicredit Equity Research	0,33	35	0,48	151

Generally, as table 5.14 indicates, the largest analysts (such as UBS, Credit Suisse) seem to perform better than the others, even considering the number of reports issued. Moreover, as concerning sector accuracy, analyst teams seem to perform better than single analysts in terms of forecast quality. On the other hand, where single analysts seem to perform better than teams, the delta is quite marginal. Moreover, it is important to consider the results even in function of the number of reports distributions. In fact, chiefly regarding Morgan Stanley and Barclays Capital, the number of reports issued by the teams is considerably higher than that issued by single analysts.

A narrow part of the literature considers boldness[29] as a variable for understanding forecast accuracy. Considering Kadous et al. (2009) empirical evidence, it emerges that analysts, through bold forecasts, have the chance to raise influence and enlarge their capability to sell reports faster. At the same time, bold forecasts are a double-edged sword. Actually, it was noted that bold forecasts amplify both the favourable outcomes of right forecasts analysis and the unfavourable outcomes of inaccurate forecasts analysis. Bold forecasts are, as a matter of fact, risky. Considering table 5.15, three key variables are reported: number of reports issued per broker, median of boldness and median of absolute value of forecast error (FE3). Table's structure is aimed to facilitate a comparison between e analyst teams and individual analysts results. As in the previous analysis, in the

[29] Boldness stands for how distant the analyst's forecast is from the majority analyst forecast (Kadous et al., 2009).

table are reported those brokers who issued most of the reports and who use both analyst teams and individual analysts.

Table 5.15 – Forecast error and boldness analysis for the first 15 brokers

Broker name	Median Abs FE3 Analyst teams	N. report teams	Median Boldness Analyst teams	Median Abs FE3 - Single analyst	N. reports teams	Median Boldness Single analysts
UBS	0,19	252	0,09	0,32	35	0,15
Deutsche Bank	0,21	170	0,12	0,33	227	0,26
Barclays Capital	0,23	127	0,13	0,11	11	0,08
Macquarie	0,22	58	0,13	0,29	35	0,15
Credit Suisse	0,18	225	0,14	0,35	39	0,21
Morgan Stanley	0,21	207	0,14	0,17	29	0,21
HSBC	0,23	95	0,14	0,27	18	0,24
RBS	0,15	58	0,14	0,14	11	0,26
Jefferies International	0,20	65	0,15	0,19	8	0,14
Societe Generale	0,24	278	0,16	0,31	168	0,2
J.P. Morgan	0,20	183	0,17	0,23	27	0,22
RBC Capital Markets	0,16	57	0,17	0,12	11	0,19
Unicredit Equity Research	0,33	35	0,17	0,48	151	0,17
Natixis Securities	0,26	169	0,19	0,19	34	0,12
Raymond James Euro Equities	0,19	82	0,2	0,46	24	0,18

Generally, table 5.15 exhibits that team's reports are less bold than those of single analysts. This fact seems to be correlated to the forecast error. In fact, consistently with the previous literature (Bonini et al., (2010) and Cavezzali et al., (2015)) in reports with a lower degree of boldness the forecast error appears to be minor. Concerning the largest broker (i.e. Société Générale, UBS, Credit Suisse, Morgan Stanley, and J. P. Morgan) boldness levels are quite similar to the others. In practice, it emerges that their analyst teams are less bold than single analysts.

Turning towards sectors it would be interesting to consider boldness in the analysis, as it was made for brokers. As it was previously seen, apparently retail, insurance and hardware are some of the sectors which have a higher level of forecast error (FE3).

Table 5.16 - Single analysts

Sector	Boldness median	DCF as main method	Market ratios as main method	N. reports discloses main approach
Media	0,34	0,00%	0,00%	1
Construction Materials	0,27	57,14%	28,57%	7
Banking	0,25	25,17%	61,90%	147
Automotive	0,23	24,32%	62,16%	37
Telecommunications	0,23	95,00%	0,00%	20
Oil, Gas & Coal	0,22	75,00%	25,00%	28
Insurance	0,21	11,69%	55,84%	77
Software	0,21	60,00%	40,00%	10
Utilities	0,18	51,16%	41,86%	43
Aerospace & Defence	0,15	45,83%	54,17%	24
Transportations & Logistics	0,15	40,00%	60,00%	10
Apparel & Textile Products	0,14	83,33%	16,67%	6
Chemicals	0,14	60,71%	39,29%	28
Electrical Equipment	0,14	0,00%	100,00%	5
Hardware	0,14	52,63%	47,37%	19
Biotech & Pharma	0,13	33,33%	66,67%	15
Consumer Products	0,13	73,33%	24,44%	45
Medical Equipment & Devices	0,12	50,00%	50,00%	42
Semiconductors	0,11	25,00%	66,67%	12
Retail	0,08	62,96%	33,33%	27
Real Estate	0,03	0,00%	0,00%	2

Table 5.16 and 5.17 provide an overview about boldness for each sector and usage frequency of DCF and market ratios.

Table 5.17 – Analysts' teams' boldness and valuation methods

Sector	Boldness median	DCF as main method	Market ratios as main method	N. reports discloses main approach
Media	0,26	25,00%	25,00%	4
Banking	0,20	26,29%	46,29%	175
Insurance	0,20	16,81%	54,62%	119
Aerospace & Defence	0,19	37,50%	58,93%	56
Transportations & Logistics	0,19	55,88%	44,12%	34
Construction Materials	0,18	20,00%	75,00%	20
Automotive	0,16	12,12%	87,88%	99
Electrical Equipment	0,16	19,05%	80,95%	21
Semiconductors	0,16	37,50%	62,50%	40
Software	0,16	60,00%	40,00%	25
Apparel & Textile	0,15	64,29%	35,71%	42
Biotech & Pharma	0,15	29,23%	56,92%	65
Telecommunications	0,15	90,36%	8,43%	83

Oil, Gas & Coal	0,12	57,41%	40,74%	54
Retail	0,12	65,98%	32,99%	97
Utilities	0,12	60,47%	37,21%	86
Consumer Products	0,11	59,24%	38,22%	157
Hardware	0,11	52,50%	47,50%	40
Medical Equipment & Devices	0,11	36,84%	63,16%	76
Chemicals	0,10	74,19%	20,97%	62
Real Estate	0,07	20,00%	0,00%	5

In line with previous descriptive statistics, analysts' teams seem to be less bold than single ones. Sectors with higher degree of boldness are approximately the same for single analysts and analyst teams. Considering boldness frequency, the banking sector is characterised by a higher degree of boldness in comparison to the others. For both banking and insurance sectors, as previously shown in table 5.8, analysts seem to prefer market ratios. At the same time these sectors are characterised by a high level of boldness. Certainly, there are multiple factors that intervene. Mainly, it is important to consider the higher complexity of the financial sector. On the other hand, for both teams and single analysts, lower degrees of boldness seem to be related to a higher employment of DCF methods. For DCF analysis, in fact, it is important to state assumptions and justification about used values. Not surprisingly, it is academically considered one of the most complete and precise methods.

5.4.5 Rating of the best performing brokers

Once generally analysed brokers' and sector's target price accuracy the focus will be placed on the best performing broker houses and sectors in terms of forecast quality. In the following lists are considered a total number of reports of 3.946 in which it was feasible to calculate forecast error, using the absolute value of second (FE2) and the third (FE3) TP accuracy formulas. Concerning sectors, table 5.18 and 5.19 exhibit, in increasing order, two measures of forecast error (FE2 ad FE3) for each sector. In detail, table 5.18 exhibits the results concerning single analysts, while table 5.19 those of analysts' teams.

Table 5.18 – Single analysts forecast error

Sector	Median of Abs FE2	Median of Abs FE3
Consumer Products	0,10	0,12
Oil, Gas & Coal	0,15	0,16
Semiconductors	0,13	0,16
Transportations & Logistics	0,15	0,16
Real Estate	0,25	0,17
Biotech & Pharma	0,21	0,19
Apparel & Textile Products	0,20	0,25
Insurance	0,14	0,25
Software	0,23	0,3
Utilities	0,18	0,3
Construction Materials	0,20	0,31
Aerospace & Defence	0,17	0,32
Chemicals	0,29	0,33
Telecommunications	0,19	0,33
Medical Equipment & Devices	0,19	0,34
Hardware	0,18	0,35
Automotive	0,25	0,36
Banking	0,24	0,37
Electrical Equipment	0,22	0,37
Media	0,25	0,37
Retail	0,22	0,5

Table 5.19 – Analysts teams forecast error

Sector	Median of Abs FE2 Analyst teams	Median of Abs FE3 Analyst teams
Electrical Equipment	0,10	0,11
Real Estate	0,20	0,11
Consumer Products	0,09	0,12
Oil, Gas & Coal	0,10	0,13
Biotech & Pharma	0,12	0,15
Semiconductors	0,08	0,16
Apparel & Textile Products	0,15	0,19
Aerospace & Defence	0,21	0,20
Software	0,16	0,20
Automotive	0,20	0,21
Telecommunications	0,12	0,21
Transportations & Logistics	0,16	0,21
Insurance	0,11	0,22
Chemicals	0,22	0,23
Construction Materials	0,18	0,23
Medical Equipment & Devices	0,15	0,23
Utilities	0,16	0,23
Media	0,21	0,27
Banking	0,20	0,32

Hardware	0,23	0,32
Retail	0,39	0,59

In line with other descriptive statistics, there are some sectors in which analysts perform better forecasts. Especially analysts' teams issued better target price forecasts in more consolidated sectors such as oil, gas and coal, real estate and electrical equipment. However, these tables only represent a general estimation on how analysts perform in each sector. Nevertheless, for a more precise analysis it could be interesting to consider how single brokers perform in each sector. In fact, considering analysts teams, it was noted that there are some analysts that better perform in specific sectors. In the sample there are 57 RBC Capital Markets' team reports. An important part of them (30) concern Banking and insurance sectors in which median forecast error is between 0,11 and 0,13, it seems that there exists a specialisation effect. UBS analysts' teams, who employ DCF as the main method in 61,26% of cases, seem to perform better in consumer products and telecommunications (in which FE3 is between 0,03 and 0,07). These statistics demonstrate that it could exist a team's specialisation effect concerning valuation methods and sectors analysed. Finally, for better investigating these shallow results, an accuracy rank was created. Analysts teams' reports were categorised by year and then organised for FE3. However, no significant results were found demonstrating greater TP accuracy in terms of year.

5.5 Methodology

From a methodological point of view, there were utilised several regressions in order to test the hypothesis identified at the beginning of the chapter five. Specifically, the regressions were performed through ordinary least squares (OLS), a typology of linear least squares method. The regressions were performed through SPSS software. For the OLS, the absolute value of the third measure of forecast error (Abs FE3) was employed as dependent variable. It was utilised the absolute value of the forecast error to verify the forecast deviation from the Target Price, regardless of whether it is in deficit or in excess.

Besides the hypothesis variables, some control variables were employed in the analysis. Substantially, they are correlated variables that control for an omitted factor from the regression. Therefore, if some significant variables are not considered in the model, the resulting distortion, from not considering them, can be mitigated by the use of these variables. In the analysis were considered:

- Time fixed effects, represented by d2007, d2008, d2009, d2010, d2011, d2012, d2013.
- BOLDNESS
- VOLATILITY
- SIZE2
- GROWTH
- FORAGE
- Naz

The regressions models are represented by:

$$FE_{cat} = \beta_0 + \beta_1 \text{HYPOTESYS\_VARIABLES}_{\text{cat}} + \beta_2 \text{CONTROL\_VARIABLES}_{\text{cat}} + \varepsilon_{\text{cat}}$$

Where:

FE_{cat}: target price forecast error for the company report *c*, from the analyst *a*, at the time *t*.

β_0: intercept

β_1: vector of the coefficients of the variables used to test the hypotheses

HYPOTESYS_VARIABLES: independent variables employed to test the hypothesis

β_2: coefficient vectors of control variables

CONTROL_VARIABLES: correlated variables that check for an omitted value in the regression

ε_{ijt}: error that captures all those factors that affect the dependent variable y other than the regressors x

5.6 Econometrics results

In this part econometrics results will be discussed. Firstly, for the analysis, variables whose p-value is equal or lower than 0,05 has been considered as significant (column "Sign."). Once hypothesised a significance level, the coefficients have been considered to understand variables' impact on forecast accuracy (column "BETA").

The first part of the econometric analysis focuses on analysts' teams' impact on forecast accuracy. Firstly, a regression has been performed to test if a relation exists between the reports issued by teams of analysts and target price accuracy. So, for the first regression, dichotomic variable "Analyst team" has been considered as independent variable.

Regression 1:

$$\text{Abs FE3rd}_{cat} = \beta_0 + \text{Analyst team}_{cat} + \beta_2 \text{CONTROL\_VARIABLES}_{cat} + \varepsilon_{cat}$$

Modello	R	R-quadrato	R-quadrato adattato	Errore std. della stima
1	,411[a]	,169	,166	,22422

Modello		Coefficienti non standardizzati		Coefficienti standardizzati		
		B	Errore standard	Beta	t	Sign.
1	(Constant)	,877	,071		12,286	,000
	Number of team members	-,005	,004	-,025	-1,211	,226
	d2007	,177	,022	,130	7,968	,000
	d2008	,079	,015	,116	5,294	,000
	d2009	,022	,013	,030	1,732	,083
	d2011	,084	,013	,120	6,437	,000
	d2012	,012	,011	,020	1,049	,294
	d2013	,010	,013	,013	,732	,464
	BOLDNESS	,361	,018	,300	19,884	,000
	VOLATILITY	,000	,000	,026	1,400	,162
	SIZE2	-,066	,006	-,152	-10,381	,000
	GROWTH	,014	,003	,075	4,848	,000
	FORAGE	-7,003E-5	,000	-,029	-1,482	,138
	Naz	-,006	,008	-,012	-,824	,410
	Analysts team	-,032	,011	-,062	-2,906	,004

As it can be noted, "Analyst team" variable negatively impact the forecast error. In other words, a positive relation seems to exist between reports issued by teams and target price accuracy. This result is in line with descriptive statistics in which it emerges a better forecast accuracy level where reports are issued by teams. In the regression both "Analyst team" and "N. of team members" were included. Nonetheless, only the dichotomic variable, "Analyst team", is significant while the one related to the number of team members is not. It would be possible that it is not significant as the informative content of both variables is quite the same, so indicating when an analysts' report is issued by a team. Therefore, it is expected that even just considering "N. of team members" results should display a positive relation between the number of team members and the TP accuracy.

Concerning the control variables, as expected, BOLDNESS, VOLATILITY, GROWTH positively impact of forecast error. As underlined by the literature (for example Bradshaw et al. (2013) and Bonini et al. (2010)) as they grow they generate an increasing difficulty in elaborating accurate forecasts. On the other hand, SIZE2, which is a measure of companies' market size, positively impact target price accuracy. Valuating higher companies can be, in fact, easier than smaller ones (Bonini et al. 2010).

Following the results of the first analysis, which indicates a positive relation between "Analyst team" variable and target price accuracy, it was investigated if a relation exists between variable "N. of team members" and target price accuracy, not considering "Analyst team" variable.

Regression 2

$$\text{Abs FE3rd}_{cat} = \beta_0 + \beta_1 \text{Number of team members}_{cat} + \beta_2 \text{CONTROL\_VARIABLES}_{cat} + \varepsilon_{cat}$$

Modello	R	R-quadrato	R-quadrato adattato	Errore std. della stima
1	,409[a]	,167	,165	,22441

Modello		Coefficienti non standardizzati B	Errore standard	Coefficienti standardizzati Beta	t	Sign.
1	(Constant)	,868	,071		12,154	,000
	Number of team members	-,015	,003	-,070	-4,956	,000
	d2007	,184	,022	,134	8,301	,000
	d2008	,081	,015	,119	5,426	,000
	d2009	,024	,013	,032	1,883	,060
	d2011	,083	,013	,119	6,345	,000
	d2012	,012	,011	,020	1,031	,303
	d2013	,008	,013	,011	,619	,536
	BOLDNESS	,361	,018	,299	19,829	,000
	VOLATILITY	,000	,000	,026	1,386	,166
	SIZE2	-,065	,006	-,150	-10,256	,000
	GROWTH	,013	,003	,073	4,715	,000
	FORAGE	-6,503E-5	,000	-,027	-1,376	,169
	Naz	-,003	,008	-,005	-,360	,719

Considering the performed analysis, the "N. of team members" variable is significant to explain the forecast accuracy. The negative coefficient indicates that target price accuracy increases with the number of analysts per team. One peculiarity of this analysis, as the previous one, is that BOLDNESS and GROWTH positively impact the forecast error. Meaning that bold target prices and higher companies' growth rate negatively affect the forecast quality. Hypothesis one (*H1*) is therefore confirmed.

Testing the second hypothesis, we wondered if forecast accuracy is influenced by the valuation methods adopted (*H2*). Specifically, if analysts that employ DCF are more accurate than the others. For the first analysis the entire dataset has been considered, not discerning between reports issued by single analysts and teams.

Regression 3

$$\text{Abs FE3rd}_{cat} = \beta_0 + \beta_1\, mm\_financial_{cat} + \beta_2\, sm\_financial_{cat} + \beta 3 m\_financial_{cat} + \beta_3 \text{CONTROL\_VARIABLES}_{cat} + \varepsilon_{cat}$$

Modello	R	R-quadrato	R-quadrato adattato	Errore std. della stima
1	,394[a]	,155	,150	,21743

Modello		Coefficienti non standardizzati B	Errore standard	Coefficienti standardizzati Beta	t	Sign.
1	(Constant)	,712	,092		7,740	,000
	mm_financial	-,045	,031	-,092	-1,466	,143
	sm_financial	-,080	,030	-,133	-2,626	,009
	m_financial	,071	,033	,150	2,143	,032
	d2007	,288	,045	,128	6,377	,000
	d2008	,028	,033	,022	,869	,385
	d2009	,009	,029	,008	,329	,742
	d2010	-,062	,015	-,105	-4,254	,000
	d2011	,082	,014	,128	5,681	,000
	d2013	-,023	,013	-,042	-1,743	,081
	BOLDNESS	,376	,032	,236	11,775	,000
	VOLATILITY	,003	,000	,161	6,141	,000
	SIZE2	-,059	,008	-,137	-6,944	,000
	GROWTH	,033	,004	,189	8,673	,000
	FORAGE	,000	,000	-,099	-4,397	,000
	Naz	,009	,011	,016	,846	,397

Considering the results, “mm_financial” is not significant. This indicates that the exclusive utilise of one main financial method is not significant to explain the forecast accuracy. However, “sm_financial” and “m_financial” are significant. Specifically, DCF are significant and positively related to forecast accuracy when they are employed as secondary method. This indicates a positive impact on target price accuracy when DCF are employed as secondary method, but a negative impact when they are, in general, employed. In line with the previous results, BOLDNESS, VOLATILITY and GROWTH have a negative impact on target price accuracy. On the other hand, it is possible to notice that SIZE2 positively impact forecast accuracy. Finally, FORAGE result is interesting. It represents the time span between the report issue date and the end of the companies’ financial year. In this analysis it is significant and positively related to target price accuracy. Meaning that a higher time span seem to lead to better TP accuracy.

In the second part of hypothesis 2 test, it was performed a regression using the same variables of regression 3 but considering as dataset only forecasts performs by analysts’ teams.

Regression 4

$$\text{Abs FE3rd}_{cat} = \beta_0 + \beta_1\, mm\_financial_{cat} + \beta_2\, sm\_financial_{cat} + \beta 3 m\_financial_{cat} + \quad \beta_3 \text{CONTROL\_VARIABLES}_{cat} + \varepsilon_{cat}$$

Modello	R	R-quadrato	R-quadrato adattato	Errore std. della stima
1	,381[a]	,145	,137	,21378

Modello		Coefficienti non standardizzati B	Errore standard	Coefficienti standardizzati Beta	t	Sign.
1	(Constant)	,775	,111		6,975	,000
	mm_financial	,001	,037	,001	,015	,988
	sm_financial	-,037	,037	-,063	-1,007	,314
	m_financial	,023	,040	,049	,565	,572
	d2007	,264	,109	,057	2,427	,015
	d2008	-,031	,040	-,025	-,784	,433
	d2009	-,017	,034	-,014	-,482	,630
	d2010	-,085	,018	-,143	-4,766	,000
	d2011	,066	,017	,106	3,852	,000
	d2013	-,002	,015	-,003	-,099	,921
	BOLDNESS	,256	,042	,153	6,163	,000
	VOLATILITY	,004	,001	,231	7,297	,000
	SIZE2	-,071	,010	-,169	-7,035	,000
	GROWTH	,040	,004	,239	9,093	,000
	FORAGE	,000	,000	-,075	-2,657	,008
	Naz	-,037	,017	-,051	-2,163	,031

Instead of regression 3 results, only considering reports issued by analyst's teams, variables that represents financial methods are not significant in the analysis. So, when considering only forecasts performed by teams, financial methods are not significant. Contrary to the previous analysis, Naz variable that indicates when brokers' nationality is equal to valuated companies' one, is positively related to forecast accuracy. In conclusion, given that in this analysis financial methods are not significant concerning teams, it is clear that DCFs do not impact target price accuracy.

Once considering DCF results, the attention has regarded the impact of market ratios. During the descriptive analysis, a relevant utilisation of market ratios, especially by single analysts, was noted. However, as it was discussed several times during the previous chapters, the employment of market ratios is often matter of debate. For these reasons, variables that represent market ratios methods in the sample has been utilised to test if

they impact forecast accuracy. As for hypothesis 2 (*H2*) two regression analysis were performed. In the first one the entire sample was considered, while in the second one only analysts' teams' reports were considered.

Regression 5

$$\text{Abs FE3rd}_{cat} = \beta_0 + \beta_1\, mm\_multiple_{cat} + \beta_2\, sm\_\text{multiple}_{cat} + \beta_3\, mm\_multiple_{cat} + \beta_3\, \text{CONTROL\_VARIABLES}_{cat} + \varepsilon_{cat}$$

Modello	R	R-quadrato	R-quadrato adattato	Errore std. della stima
1	,398[a]	,158	,153	,21699

Modello		Coefficienti non standardizzati		Coefficienti standardizzati		
		B	Errore standard	Beta	t	Sign.
1	(Constant)	,754	,092		8,179	,000
	d2007	,226	,048	,101	4,744	,000
	d2008	-,044	,031	-,034	-1,432	,152
	d2009	-,063	,027	-,054	-2,332	,020
	d2010	-,053	,015	-,090	-3,677	,000
	d2011	,089	,014	,138	6,252	,000
	d2013	-,030	,013	-,055	-2,290	,022
	BOLDNESS	,379	,032	,237	11,863	,000
	VOLATILITY	,003	,000	,163	6,275	,000
	SIZE2	-,060	,008	-,140	-7,104	,000
	GROWTH	,034	,004	,194	9,015	,000
	FORAGE	,000	,000	-,095	-4,211	,000
	Naz	,010	,011	,017	,872	,383
	mm_multiple	,071	,027	,147	2,613	,009
	sm_multiple	,079	,028	,159	2,845	,004
	m_multiple	-,116	,030	-,226	-3,823	,000

This regression shows very interesting aspects. Firstly, market ratios are significant to explain forecast accuracy. In fact, a negative relation exists between target price forecasts that utilise market ratios as primary or secondary approach and target price accuracy. So, it is presumed that when market ratios are employed as main method or secondary method, they can drive to worse a forecast quality. The result is different when market ratios are generally utilised in the forecasts, so without a specific clarification if multiples are employed as main or secondary approach. Therefore, when multiples are generally

employed, even in combination with other methods, they positively impact forecast accuracy. These results lead me to consider which are multiples effects for analysts' teams. Since I have noted that teams' impact on TP accuracy is positive, it would be interesting to run the same analysis only for teams. If it results that "m_multiple" is significant perhaps it is actually true that the employment of multiples as main and secondary approach is positive on TP accuracy.

Regression 6

$$\text{Abs FE3rd}_{cat} = \beta_0 + \beta_1\, mm\_multiple_{cat} + \beta_2\, sm\_\text{multiple}_{cat} + \beta_3\, mm\_multiple_{cat} + \beta_3\, \text{CONTROL\_VARIABLES}_{cat} + \varepsilon_{cat}$$

Modello	R	R-quadrato	R-quadrato adattato	Errore std. della stima
1	,388[a]	,150	,142	,21315

Modello		Coefficienti non standardizzati		Coefficienti standardizzati		
		B	Errore standard	Beta	t	Sign.
1	(Constant)	,821	,111		7,376	,000
	d2007	,239	,109	,052	2,194	,028
	d2008	-,068	,038	-,054	-1,796	,073
	d2009	-,054	,034	-,046	-1,603	,109
	d2010	-,075	,018	-,127	-4,243	,000
	d2011	,076	,017	,121	4,450	,000
	d2013	-,007	,015	-,015	-,487	,626
	BOLDNESS	,259	,042	,154	6,217	,000
	VOLATILITY	,004	,001	,234	7,476	,000
	SIZE2	-,072	,010	-,173	-7,217	,000
	GROWTH	,041	,004	,242	9,305	,000
	FORAGE	,000	,000	-,069	-2,460	,014
	Naz	-,038	,017	-,052	-2,238	,025
	mm_multiple	,039	,033	,082	1,167	,243
	sm_multiple	,050	,034	,103	1,482	,139
	m_multiple	-,089	,037	-,179	-2,428	,015

In contrast to the previous regression, "mm_multiple" and "sm_multiple" are not significant. While, only "m_multiple" is significant. So, given that "m_multiple" considers both "mm_multiple" and "sm_multiple" is it true, perhaps, that utilising multiples in the analysis can lead to better TP accuracy? It depends on the circumstances. Even if the effect

seems to be positive, it cannot be said that it is better to use multiples as main or secondary method. Even so, this effect may indicate that the valuation method may an impact on the target price accuracy.

Focusing on the control variables, as noted in regression 4, Naz is significant and positively related to forecast accuracy. BOLDNESS, VOLATILITY, GROWTH, SIZE2 confirm the previous observations in which it was highlighted a negative impact on target price accuracy of the first three of them and a positive impact of SIZE2.

6. Conclusions

The research conducted has revealed very interesting key issues about financial analysts' teams and target price accuracy. The database support has allowed to give a scientific imprint to the analysis, allowing to outline which are the main aspects to heed. At the begging, the focus was about the specialisation effect that may exists between analysts and valuation methods adopted. However, it was noted that an important part of sample's reports were issued by teams of analysts (61,7%). Considering the employed sample, analysts' teams consist of two to eight team members; nonetheless most of the teams are composed by two, three or four members. This first aspect is interesting because it can indicate an analyst's propensity to work in teams. Especially, the broker attitude to make use of teams of analysts. From a first preparatory analysis it was noted that in some sectors analysts' teams issued most of the reports, especially in sectors such as Consumers Products, Biotech & Pharma, Retail. On the other hand, in strategic sectors such as Banking and Insurance ones, team's employment is about 55% of the total number of reports issued for those sectors. It was noted that generally, the largest analysts such as Société Générale, Deutsche Bank, UBS, frequently employ market ratios more than the quintessential suggested method: DCF. This key aspect was strongly important because it highlights a reality in which heuristic methods are very widespread. Giving that, some keys features of market ratios were outlined in the behavioural chapter in which it is explained how heuristic methods are characterised and how they can bias some valuations. Mary Meeker's example is thought-provoking about how some analyst's valuations are performed. Moreover, it was noticed that in several sectors, such as Banking, Insurance, Automotive, market ratios are employed in more than the 50% of analysis, demonstrating their massive employment in specific sectors. In order to give a better understanding of the results, valuation methods main features were analysed; specially to perceive which are they differences and similarities and why some of them are considered more accurate than others.

At the beginning of the descriptive analysis, an interesting aspect was observed: it apparently seems analysts' teams perform better than single analysts, in terms of target price accuracy. One of the most important reports' outputs is, in fact, the target price which consist of an estimation of a share's future price. In general, target prices and EPS forecasts represents the main results of the reports. Based on these forecasts, analysts can

state investment recommendations to public. So, the starting point has regarded this probable relation between analysts' teamwork and the forecasts' quality. For doing so, from literature it was selected a measure of forecast error to understand how target price are accurate for each single report. Therefore, the first hypothesis *H1* has regarded analysts' teams and their better performances in comparison to single analysts. A first regression analysis indicated that team's TP forecasts are more accurate. In addition, TP accuracy increases with the number of team member. This first result is extremely important considering that in literature there are no particular studies about analysts' teams. Therefore, the evidence about teams are in line with Fang et al. (2020) research: analysts' teams produce more accurate forecasts. At this stage, there were identified hypothesis *H2* and *H3* to examine if financial and multiple methods influence target price accuracy. Generally, it was seen that when DCF are employed as secondary method, so in combination with others, its effect is positive on target price accuracy. Concerning market ratios, they negatively impact the TP accuracy when they are employed as primary or secondary method. While, not distinguishing between primary or secondary method, the impact on TP accuracy is positive. To better investigate this peculiarity, I therefore tried to understand if only considering team's forecasts, DCF and multiples were still significant. Or rather, in both cases they were not significant, except for market ratios whose impact is positive on TP accuracy when they are generally employed in the analysis (without distinguishing between primary or secondary approach). As Fang et al. (2020) suggest, there are other elements that can explain analysts' teams forecast accuracy. They in fact noted that team diversity, educational background and gender diversity can influence forecasts' quality. Specifically, for complex firm valuations, teams' effect seems to be stronger than in other cases.

Beyond the main independent variable some other control variables were considered in each analysis trying to capture other effects. Indeed, several other elements emerged that can explain forecast accuracy. It was found that especially BOLDNESS and GROWTH negatively affect forecast accuracy. Their increase, in fact, makes more difficult to forecast the target price. On the other hand, it was observed that companies' market size positively impacts target price accuracy; as it is less complicated to valuate a larger company. Especially in terms of quantity and quality of information and data available. As control variables time fixed effect were also considered. An interesting "food for thought" is given by the variable that represents 2011. Indeed, instead of other dummies, d2011 is

significant in almost all regressions analysis, in which it is negative related to forecast accuracy. A first reasoning about this result can be given by the outbreak of the European sovereign debt crisis which occurred in 2010 – 2011, which had a negative impact on worldwide market.

The findings indicate a broker inclination to employ analysts' teams for the analysis. Especially, there are several brokers that utilise more frequently analysts' teams to perform the analysis. The empirical evidence has also indicated that the macroeconomic scenario can affect analysts' forecasts, especially in very particular circumstances such as the 2007-2008 financial crisis and the 2010-2011 European sovereign debt crisis. Another relevant aspect is that time fixed effects seem to have a lower impact on teams. While broker's nationality, is significant and positive related to target price accuracy where are only considered analysts' teams.

The results pave the way for further reflection about the importance of analysts' teamwork and the better performances reached by them. Moreover, it would be also interesting to consider the increasingly dynamic macroeconomic scenario in which companies, and so analysts, operates. In the analysis, in fact, there were not directly considers macroeconomic variables (such as GDP growth rate, inflation rate) whose "noise" (Oxelheim, 2003) could in some ways affect companies' performances. And which could therefore affect analysts' estimations. At this purpose, the macroeconomic impact on analysts' performances can be interesting to better understand how much analysed companies are exposed to macroeconomic fluctuations. Especially, if a relation exists between these fluctuations and the TP accuracy. Moreover, as Oxelheim (2003) and (2019) suggests, very often companies do not disclaim how and how much business' profits are affected by the macroeconomic scenario. Yet, this information asymmetry may drive analysts to perform biased forecasts that do not consider the macroeconomic affection which, nowadays in a highly interconnected world, impact companies' performances.

References

Allen, A., Youn, J., Jung, K. (1997). "Earnings forecast errors : Comparative evidence from the Pacific-Basin capital markets." *Pacific-Basin Financial Journal*, vol. *5*, pp. 115–129.

Asquith, P., Mikhail, M. B., Au, A. S. (2005). *"Information content of equity analyst reports."* vol. *75*, pp. 245–282.

Balducci, D. (2001). *"La valutazione dell'azienda*. Fag edition, Milan.

Baldwin, C. Y. (2016). "Return on Invested Capital (ROIC)." *The Palgrave Encyclopedia of Strategic Management*, pp. 1–4.

Bernard, V.L. (1994). "Accounting-Based Valuation methods, Determinants of Market-to-Book Ratios, and Implications for Financial Statements Analysis". *University of Michigan*.

Bilinski, P., Liu, W., Strong, N. (2012). Does liquidity risk explain low firm performance following seasoned equity offerings? *Journal of Banking and Finance*, vol. *36,* No. 10, pp. 2770–2785.

Bonini, S., Zanetti, L., Bianchini, R., Salvi, A. (2010). Target Price Accuracy in Equity Research. *Journal of Business Finance and Accounting*, vol. *37,* No. 9-10, pp. 1177–1217.

Bradshaw, M. T., Brown, L. D., Huang, K. (2013). "Do sell-side analysts exhibit differential target price forecasting ability?" *Review of Accounting Studies*, vol. *18,* No. 4, pp. 930–955.

Brightbill, K. (2018). *"Do analyst teams issue higher quality forecasts? Evidence from analyst reports."*

Brown, Lawrence D., Call, A. C., Clement, M. B., Sharp, N. Y. (2013). "Inside the "Black Box" of Sell-Side Financial Analysts". *SSRN Electronic Journal*.

Brown, Lorence D, Hugon, A. (2008). *"Team Earnings Forecasting."*

Cassia, L., Vismara, S. (2009). "Valuation Accuracy and Infinity Horizon Forecast : Empirical Evidence from Europe." In *Journal of International Financial Management and Accounting*, Vol. 20, No. 2.

Causse P. E. (2011). "Performance of Danish Banks during the Financial Crisis: A study of European banks market and operational performance drivers from the bust of the subprime crisis to the end of 2009."

Cavezzali, E., Rigoni, U., Nathan, S. (2015). *"Valuation Methods Used by Financial Analysts and Target Price Accuracy "*.

Chang, J., Khanna, T., K., P. (2000). "Analyst Activity Around the World." *Harvard Business School Strategy Working Paper Series*, pp. 0–46.

Chang, M., Ng, J., Yu, K. (2008). "The Influence of Analyst and Management Forecasts on Investor Decision Making: An Experimental Approach." *Australian Journal of Management*, vol. *33,* No. 1, pp. 47–67.

Clement, M. B., Tse, S. Y. (2003). "Do Investors Respond to Analysts ' Forecast Revisions as If Forecast Accuracy Is All That Matters ?" *American Accounting Association*, vol. *78, No.* 1, pp. 227–249.

Damodaran, A. (2015). *"Applied Corporate Finance."* Wiley.

Damodaran, Aswath. (2006). *"Valuation Approaches and Metrics : A Survey of the Theory and Evidence"*.

De Vincentiis, P. (2010). *"Accuracy and Bias of Equity Analysts in an Environment Characterised by Higher Disclosure: Empirical Evidence from the Italian Market." July*.

Demirakos, E. G., & Walker, M. (2010). "Does Valuation Model Choice Affect Target Price Accuracy ?" *European Accounting Review*.

Easton, P. D., Christie, A., Bouwens, J., Chen, K., Choi, T. H., Durtschi, C., Elgers, P., Hill, C., Kanodia, C., Karolyi, A., Kemsley, D., Miller, G., Monahan, S., Penman, S., Pfieffer, R., Philipich, K., Shevlin, T., Sommers, G., Taylor, G. (2004). "Equity Capital two anonymous referees, and workshop participants at the Big-10 Doctoral Consortium." *The Accounting Review*, vol. *79,* No. 1, pp. 73–95.

Fang, B., & Hope, O. (2020). "Analyst Teams." *SSRN Electronic Journal*.

Feltam G. A., Ohlson J. A. (1995). " Valuation and Clean Surplus Accounting for Operating and Financial Activities". *Canadian Academic Accounting Association,* Vol. 11, No. 2, pp. 689-731.

Fernández, P. (2007). “Company Valuation Methods. The Most Common Errors in Valuations.” In *SSRN Electronic Journal*, Vol. 3, No. 449.

Gilovich T., Griffin D., Kahneman D. (2002). "heuristics and biases: The Psychology of Intuitive Judgment". *Cambridge university Press*.

Flavin B. (2019). " What Does a Financial Analyst Do? Beyond the Numbers", *Rasmussen College Business Blog*, 25 Mar. https://www.rasmussen.edu/degrees/business/blog/what-does-financial-analyst-do/

Fontaine, P., Roger, T. (2020). "A re-examination of analysts’ differential target price forecasting ability". *Finance 41*, vol. *41, issue* 1, pp. 53.

Fusa E., Guatri G (1999). "La valutazione del capitale economico dell'impresa : metodi tradizionali, innovativi ed empirici". *Il sole-24 ore*.

Hashim, N. A., & Strong, N. C. (2018). "Do Analysts’ Cash Flow Forecasts Improve Their Target Price Accuracy?". *Contemporary Accounting Research*, vol. *35, issue* 4, pp. 1816–1842.

Hirst, D. E., Koonce, L., & Simko, P. J. (1995). “Investor Reactions to Financial Analysts’’ Research Reports".” *Journal of Accounting Research*, vol. *33, No.* 2, pp. 335.

Hope, O. (2003). "Disclosure Practices, Enforcement of Accounting Standards, and Analysts’ Forecast Accuracy: An International Study". *Journal of Accounting Research*, vol. *41*, No. 2.

Hsu, C. Y., Yu, J., & Wen, S. Y. (2013). "The analysts’ forecast of IPO firms during the global financial crisis". *International Journal of Economics and Financial Issues*, vol. *3, No.* 3, pp. 673–682.

Kadous K., Mercer M., Thayer J. (2009). "Is There Safety in Numbers? The Effects of Forecasts Accuracy and Forecast Boldness on Financial Analysts' Credibility with Investors". *Contemporary Accounting Research,* Vol. 26, No. 3, pp. 933-968.

Kerl, A. G. (2011). “Target Price Accuracy.” *Business Research*, Vol. *4, No.* 1, pp. 74–96.

Keskek, S., Myers, L. A., Omer, T. C., Shelley, M. K. (2017). “The Effects of Disclosure and Analyst Regulations on the Relevance of Analyst Characteristics for Explaining

Analyst Forecast Accuracy." *Journal of Business Finance and Accounting*, Vol. *44, No.* 5–6, pp. 780–811.

Koller, T., Goedhart, M., Wessels, D. (2019). "Valuation: Measuring and Managing the Value of Companies." In *Mc Kinsey & Company*, Vol. 53, No. 9.

Merkley K., Michaley R., Pacelli J. (2013). "Does the size of sell-side analyst industry matter? An examination of bias, accuracy and information content of analysts reports". *SSRN*.

Mikhail, M. B., Walther, B. R., Willis, R. H. (1997). "Do Security Analysts Improve Their Performance with Experience ? Published by : Wiley on behalf of Accounting Research Center , Booth School of Do Security Analysts Improve Their Performance with Experience ?" *Journal of Accounting Research*, Vol. *35*, pp. 131–157.

Mishkin F. S., Eakins S. G., Forestieri G (2007). "Istituzioni e mercati finanziari". Pearson, Addison Wesley.

Mohanram P. S. (2014). " Analysts' Cash Flow Forecasts and the Decline of the Accruals Anomaly". *Contemporary accounting research.* Vol. 31, No. 4, pp. 1143-1170.

Muslu, V., Mutlu, S., Radhakrishnan, S., & Tsang, A. (2019). "Corporate Social Responsibility Report Narratives and Analyst Forecast Accuracy." *Journal of Business Ethics*, Vol. *154,* issue 4, pp. 1119–1142.

Ohlson J. A. (1995). " Earnings, Book Values, and Dividends in Equity Valuation". *Canadian Academic Accounting Association,* Vol. 11, No. 2, pp. 661-687.

Oxelheim, L., Wihlborg, C. G., Gardner, G. W. (1988). Macroeconomic Uncertainty: International Risks and Opportunities for the Corporation. *Journal of Money, Credit and Banking*, Vol. *20, No.* 3, pp. 425.

Oxelheim, L (2003). "Macroeconomic Variables and Corporate Performance", *Financial Analysts Journal,* Vol. 59, No. 4, pp. 36-50.

Oxelheim, L. (2019). Optimal vs satisfactory transparecy: The impact of global macroeconomic fluctuations on corporate competitiveness", *International Business review,* Vol. 28, No. 1, pp. 190-206.

Rutigliano, M. (2010). "Le analisi per la valutazione delle banche." *L'analisi del bilancio*

delle banche, pp. 467–512.

Rutigliano, M. (2018). "La valutazione delle banche e degli altri intermediari finanziari". *EGEA*.

Salvadego G. (2019). " Distortions in the process of evaluating companies and limits to nudges", Ca' Foscari University, Master thesis.

Schindler, S., & Pfattheicher, S. (2017). "The frame of the game: Loss-framing increases dishonest behavior." *Journal of Experimental Social Psychology*, Vol. *69* (July), pp. 172–177.

Sharma, A. K. (1994). "Economic Value Added (EVA) - Literature Review and Relevant Issues." *International Journal of Economics and Finance*, *pp.* 200–220.

Shefrin, H. (2007). "Finanza aziendale corpontamentale: decisioni per creare valore". *APOGEO*.

Shefrin H. (2010). "Behavioralizing Finance". *Foundations and Trends in Finance, Vol. 4, No. 1-2.*

Shefrin, H. (2014). "Free Cashflows, Valuation and Growth Opportunities Bias." *Journal of Investment Management*, Vol. *12,* No. 4, pp. 4–26.

Shefrin, H. (2019). "Valuation Bias and Limits to Nudges." *The Journal of Portfolio Management*, Vol. *45,* No. 5, pp. 112–124.

Sidhu, B., & Tan, H. C. (2011). "The Performance of Equity Analysts During the Global Financial Crisis." *Australian Accounting Review*, Vol. *21, No. 1*, pp. 32–43.

Simons, R. (2014). *"Performance Measurement and Control Systems for Implementing Strategy",* Pearson.

Tan H., Yu C. (2019). " Valuation Uncertainty and Analysts' Use of DCF Models", *SSRN*.

Town P. (2018). "The Important Differences Between Price And Value", *Forbes Finance Council,* 04 Jan.

Urietti D. (2020). " Zoom, il valore in Borsa supera quello di General Motors". *Corriere della Sera, Economia e Tech,* 26 May. https://www.corriere.it/tecnologia/20_maggio_26/zoom-valore-borsa-supera-

quello-general-motors-a2cee92e-9f36-11ea-bcda-1b088225c4d4.shtml

Vitasek, K (2017). "Richard Thaler And The 'Human Factor' In Economics", *Forbes, 10. Oct. https://www.forbes.com/sites/katevitasek/2017/10/10/richard-thaler-and-the-human-factor-in-economics/#1b956fef1b56*

Waymire, G. (1984). "Additional Evidence on the Information Content of Management Earnings Forecasts Author." *Journal of Accounting Research*, Vol. *22, No.* 2, pp. 703–718.

Appendix

Table A1 – Companies analysed

Company	COUNTRY	ISIN	Sector
Aegon	NETHERLANDS	NL0000303709	Insurance
Airbus Group	NETHERLANDS	NL0000235190	Aerospace & Defence
Air Liquide	FRANCE	FR0000120073	Chemicals
Alcatel-Lucent	FRANCE	FR0000130007	Hardware
Allianz	GERMANY	DE0008404005	Insurance
Allied Irish Banks	IRELAND	IE00BYSZ9G33	Banking
Anheuser-Busch InBev	BELGIUM	BE0974293251	Consumer Products
ASML Holding	NETHERLANDS	NL0010273215	Semiconductors
Assicurazioni GENERALI	ITALY	IT0000062072	Insurance
AXA	FRANCE	FR0000120628	Insurance
Banco Bilbao Vizcaya Argentaria	SPAIN	ES0113211835	Banking
Banco Santander	SPAIN	ES0113900J37	Banking
BASF	GERMANY	DE000BASF111	Chemicals
Bayer	GERMANY	DE000BAY0017	Biotech & Pharma
BMW	GERMANY	DE0005190003	Automotive
Bnp Paribas	FRANCE	FR0000131104	Banking
Carrefour	FRANCE	FR0000120172	Retail
Credit Agricole	FRANCE	FR0000045072	Banking
Daimler	GERMANY	DE0007100000	Automotive
Danone	FRANCE	FR0000120644	Consumer Products
Deutsche Bank AG	GERMANY	DE0005140008	Banking
Deutsche Post AG	GERMANY	DE0005552004	Transportation & Logistics
Deutsche Telekom AG	GERMANY	DE0005557508	Telecommunications
Endesa	SPAIN	ES0130670112	Utilities
Enel	ITALY	IT0003128367	Utilities
Engie	FRANCE	FR0010208488	Utilities
Eni Spa	ITALY	IT0003132476	Oil, Gas & Coal
Eon Electric Ltd.	GERMANY	DE000ENAG999	Utilities
Essilor	FRANCE	FR0000121667	Medical Equipment & Devices
Fresenius Se & Co Kgaa	GERMANY	DE0005785604	Medical Equipment & Devices
Iberdrola	SPAIN	ES0144580Y14	Utilities
Inditex	SPAIN	ES0148396007	Retail
ING	NETHERLANDS	NL0000303600	Banking
Intesa San Paolo	ITALY	IT0000072618	Banking
L'Oreal	FRANCE	FR0000120321	Consumer Products
Lvmh	FRANCE	FR0000121014	Apparel & Textile Products
Muenchener	GERMANY	DE0008430026	Insurance
Nokia	FINLAND	FI0009000681	Hardware

Orange	FRANCE	FR0000133308	Telecommunications
Philips	NETHERLANDS	NL0000009538	Medical Equipment & Devices
Renault	FRANCE	FR0000131906	Automotive
Repsol	SPAIN	ES0173516115	Oil, Gas & Coal
Rwe	GERMANY	DE0007037129	Utilities
Safran	FRANCE	FR0000073272	Aerospace & Defence
Saint-Gobain	FRANCE	FR0000125007	Construction Materials
Sanofi-Aventis	FRANCE	FR0000120578	Biotech & Pharma
Sap	GERMANY	DE0007164600	Software
Schneider Electric	FRANCE	FR0000121972	Utilities
Siemens	GERMANY	DE0007236101	Electrical Equipment
Societe Generale	FRANCE	FR0000130809	Banking
Telecom Italia	ITALY	IT0003497168	Telecommunications
Telefonica	SPAIN	ES0178430E18	Telecommunications
Total	FRANCE	FR0000120271	Oil, Gas & Coal
Unibail Rodamco	FRANCE	FR0000124711	Real Estate
UniCredit	ITALY	IT0004781412	Banking
Unilever	BRITAIN	NL0000009355	Consumer Products
Vinci	FRANCE	FR0000125486	Construction Materials
Vivendi	FRANCE	FR0000127771	Media
Volskwagen	GERMANY	DE0007664039	Automotive

Table A2 – Number of reports per year

Broker Name	2007	2008	2009	2010	2011	2012	2013	TOTAL	%
Societe Generale	4	170	119	57	55	59	55	519	11,11%
Deutsche Bank	2	129	89	75	54	73	51	473	10,13%
Natixis Securities	0	173	146	15	16	53	18	421	9,01%
UBS	0	0	0	85	75	72	66	298	6,38%
Credit Suisse	2	21	31	62	44	61	55	276	5,91%
Morgan Stanley	0	0	0	70	47	82	52	251	5,37%
Unicredit Equity Research	121	54	0	23	20	0	0	218	4,67%
J.P. Morgan	0	0	0	76	42	59	36	213	4,56%
Raymond James Euro Equities	0	39	10	37	38	17	23	164	3,51%
Barclays Capital	0	0	0	35	29	46	37	147	3,15%
Commerzbank	0	38	35	1	17	27	16	134	2,87%
HSBC	0	2	13	12	5	36	50	118	2,53%
Macquarie	0	2	7	28	34	27	11	109	2,33%
Santander	4	14	19	6	14	25	24	106	2,27%
Ahorro Corporaci—n Financiera	0	40	29	21	6	1	0	97	2,08%
Jefferies International	0	3	10	12	18	34	13	90	1,93%
Kepler Capital Markets (KCM)	0	0	0	27	8	35	5	75	1,61%

RBC Capital Markets	0	0	0	0	6	27	38	71	1,52%
RBS	0	0	0	35	22	13	0	70	1,50%
ESN	0	0	0	0	0	59	1	60	1,28%
Ibersecurities (SP)	0	26	31	0	0	0	0	57	1,22%
ING	1	3	6	16	5	23	2	56	1,20%
Credit Agricole	0	0	0	0	0	48	0	48	1,03%
Collins Stewart	0	0	0	8	15	11	0	34	0,73%
Cheuvreux	0	7	3	13	8	0	0	31	0,66%
Oppenheim Research GmbH	0	0	1	27	1	0	0	29	0,62%
Sal. Oppenheim	0	2	26	0	0	0	0	28	0,60%
Equita Sim Spa	0	0	0	9	6	5	4	24	0,51%
EVO securities	0	0	0	14	10	0	0	24	0,51%
MedioBanca	0	0	6	3	4	11	0	24	0,51%
BPI	0	0	0	9	7	7	0	23	0,49%
Fairesearch	0	3	0	7	2	9	2	23	0,49%
Dexia	1	15	6	0	0	0	0	22	0,47%
Canaccord Genuity	0	1	2	0	1	8	4	16	0,34%
M.M.Warburg & CO	0	0	0	8	8	0	0	16	0,34%
Redburn Partners	0	0	0	4	1	8	3	16	0,34%
Abn Amro Bank	3	1	5	0	3	2	1	15	0,32%
Independent Int.l Inv. Research	14	0	0	1	0	0	0	15	0,32%
Kepler Cheuvreux	0	0	0	0	0	0	15	15	0,32%
Warburg Research	0	0	0	0	0	10	5	15	0,32%
Liberum Capital	0	0	0	0	5	4	3	12	0,26%
Banca IMI	0	0	2	6	0	2	0	10	0,21%
Fox-Pitt Kelton	0	1	9	0	0	0	0	10	0,21%
Zurcher (TED)	0	7	3	0	0	0	0	10	0,21%
Cowen	0	4	4	0	0	0	1	9	0,19%
Bear Stearns	4	4	0	0	0	0	0	8	0,17%
CM-CIC Securities	0	0	0	0	0	3	5	8	0,17%
Daiwa	0	0	1	6	1	0	0	8	0,17%
KBC Securities	0	0	0	2	3	3	0	8	0,17%
SNS Securities	0	0	2	4	1	0	0	7	0,15%
Fortis Bank	0	1	5	0	0	0	0	6	0,13%
MF Global UK	0	0	0	4	2	0	0	6	0,13%
AXIA Financial Research	0	0	0	0	0	5	0	5	0,11%
ICBPI S.p.A	0	0	0	0	0	0	5	5	0,11%
Investec Bank Plc	0	0	0	0	1	1	3	5	0,11%
Jyske Markets	0	0	0	1	1	3	0	5	0,11%
CentroBanca	0	0	0	1	0	3	0	4	0,09%
Goodbody	0	2	2	0	0	0	0	4	0,09%
Helvea	0	0	0	0	1	1	2	4	0,09%
Metzler Equity Research	0	0	4	0	0	0	0	4	0,09%
Piper Jaffray & Co.	0	0	0	3	0	1	0	4	0,09%

Wall Street Strategies	0	1	3	0	0	0	0	4	0,09%
landsbanken Group.	0	0	0	2	1	0	0	3	0,06%
ACF	0	0	0	0	0	3	0	3	0,06%
Aurel	0	0	2	0	1	0	0	3	0,06%
Banco Portugues de Investimento SA	0	0	0	0	0	0	3	3	0,06%
Davy	0	1	2	0	0	0	0	3	0,06%
FIM Bank Ltd.	0	0	0	1	1	1	0	3	0,06%
Gabelli	0	3	0	0	0	0	0	3	0,06%
Gilissen	0	2	1	0	0	0	0	3	0,06%
Morgan Keegan	0	0	3	0	0	0	0	3	0,06%
Petercam	0	0	0	1	0	2	0	3	0,06%
Renaissance Capital	0	0	0	0	0	2	1	3	0,06%
Baader	0	0	0	0	0	2	0	2	0,04%
Bancosabadell	0	0	0	1	1	0	0	2	0,04%
Bank Vontobel	0	2	0	0	0	0	0	2	0,04%
Caris & Company	0	0	0	1	0	1	0	2	0,04%
DnB NOR Markets	0	0	0	2	0	0	0	2	0,04%
Keijser Capital N.V.	0	0	0	2	0	0	0	2	0,04%
Millennium BCP	0	0	0	0	0	1	1	2	0,04%
MKM Partners	0	0	0	1	1	0	0	2	0,04%
MM Warburg	0	2	0	0	0	0	0	2	0,04%
SebEnskilda	0	0	0	0	0	1	1	2	0,04%
SES Research	0	0	0	2	0	0	0	2	0,04%
SRC	0	0	1	1	0	0	0	2	0,04%
Auerbach Grayson	0	0	0	0	0	1	0	1	0,02%
Buckingham	0	0	0	0	0	1	0	1	0,02%
Caboto	1	0	0	0	0	0	0	1	0,02%
Cantor Fitzgerald Europe	0	0	0	0	0	1	0	1	0,02%
Daewoo Securities	0	0	1	0	0	0	0	1	0,02%
DR. Kalliwoda	0	0	0	0	0	1	0	1	0,02%
Evercore ISI	0	0	0	0	0	1	0	1	0,02%
Exane BNP Paribas	0	0	0	1	0	0	0	1	0,02%
Inderes	0	0	0	0	0	1	0	1	0,02%
Intermonte SIM S.p.A.	0	0	0	1	0	0	0	1	0,02%
Intesa San Paolo	0	0	0	0	0	0	1	1	0,02%
Kempen	1	0	0	0	0	0	0	1	0,02%
Landsbanki Kepler	0	1	0	0	0	0	0	1	0,02%
Merrion	0	0	1	0	0	0	0	1	0,02%
NCB	0	1	0	0	0	0	0	1	0,02%
Numis	0	1	0	0	0	0	0	1	0,02%
Pareto Securities	0	0	0	0	0	1	0	1	0,02%
Sadif	0	1	0	0	0	0	0	1	0,02%
Susquehanna Financial Group	0	0	0	0	0	1	0	1	0,02%

Swedbank	0	0	0	0	0	1	0	1	0,02%
ThinkEquity LLC	0	0	0	0	0	1	0	1	0,02%
Vontobel Equity Research	0	0	0	1	0	0	0	1	0,02%
VTB Capital	0	0	0	0	0	0	1	1	0,02%
Wachovia	0	0	1	0	0	0	0	1	0,02%
William Blair&CO.	0	0	0	0	0	1	0	1	0,02%
Wunderlich Securities, Inc.	0	0	0	0	1	0	0	1	0,02%
TOTALE	**158**	**777**	**641**	**840**	**642**	**998**	**614**	**4670**	**100%**

Table A3 – DCF and Market ratios as primary method

Broker	Reports disclose primary approach	Market ratios	DCF
Société Generale	207	46,86%	44,44%
UBS	191	61,26%	28,80%
Deutsche Bank	182	40,11%	56,04%
Credit Suisse	169	39,05%	47,93%
J.P. Morgan	160	35,00%	55,00%
Morgan Stanley	149	41,61%	53,69%
Barclays Capital	109	40,37%	48,62%
Macquarie	72	73,61%	26,39%
HSBC	71	49,30%	42,25%
RBC Capital Markets	53	20,75%	67,92%
Jefferies International	50	52,00%	40,00%
RBS	48	72,92%	14,58%
Unicredit Equity Research	47	10,64%	80,85%
Natixis Securities	42	61,90%	35,71%
Kepler Capital Markets (KCM)	39	41,03%	53,85%
Santander	34	47,06%	35,29%
ING	30	50,00%	43,33%
Raymond James Euro Equities	27	44,44%	40,74%
ESN	26	26,92%	65,38%
Credit Agricole	20	35,00%	60,00%
CommerzBank	19	31,58%	68,42%
Equita Sim Spa	14	14,29%	57,14%
Collins Stewart	13	7,69%	69,23%
Warburg Research	12	75,00%	25,00%
Oppenheim Research GmbH	11	18,18%	54,55%
Cheuvreux	11	54,55%	27,27%
Abn Amro Bank	10	80,00%	10,00%
BPI	10	20,00%	70,00%
MedioBanca	9	11,11%	77,78%
Canaccord Genuity	9	22,22%	66,67%
Redburn Partners	7	42,86%	57,14%
Sal. Oppenheim	7	85,71%	14,29%
Kepler Cheuvreux	6	66,67%	33,33%

M.M.Warburg & CO	5	20,00%	80,00%
Liberum Capital	5	40,00%	40,00%
Daiwa	5	60,00%	0,00%
Macquarie	5	40,00%	40,00%
KBC Securities	4	0,00%	25,00%
Piper Jaffray & Co.	4	0,00%	100,00%
SNS Securities	4	25,00%	75,00%
EVO securities	4	25,00%	50,00%
Bear Stearns	4	25,00%	0,00%
Investec Bank Plc	4	25,00%	50,00%
Ahorro Corporaci—n Financiera	4	75,00%	25,00%
Fox-Pitt Kelton	3	0,00%	100,00%
Fairesearch	3	66,67%	33,33%
ICBPI S.p.A	3	100,00%	0,00%
Commerzbank	3	0,00%	100,00%
FIM Bank Ltd.	3	0,00%	100,00%
CentroBanca	3	33,33%	66,67%
landsbanken Group.	3	33,33%	66,67%
Jyske Markets	3	33,33%	66,67%
Banca IMI	2	50,00%	0,00%
CM-CIC Securities	2	100,00%	0,00%
SES Research	2	100,00%	0,00%
Baader	2	0,00%	100,00%
MF Global UK	2	0,00%	100,00%
Renaissance Capital	1	100,00%	0,00%
Wachovia	1	0,00%	100,00%
Landsbanki Kepler	1	0,00%	100,00%
ACF	1	100,00%	0,00%
Wunderlich Securities, Inc.	1	0,00%	100,00%
Fortis Bank	1	100,00%	0,00%
Aurel	1	100,00%	0,00%
Keijser Capital N.V.	1	0,00%	100,00%
Buckingham	1	0,00%	100,00%
Dexia	1	100,00%	0,00%
William Blair&CO.	1	100,00%	0,00%
Goodbody	1	0,00%	100,00%
DR. Kalliwoda	1	100,00%	0,00%
Caris & Company	1	0,00%	100,00%
Cowen	1	0,00%	100,00%
AXIA Financial Research	1	0,00%	100,00%
SebEnskilda	1	100,00%	0,00%
SRC	1	0,00%	100,00%
Swedbank	1	0,00%	100,00%
Cantor Fitzgerald Europe	1	100,00%	0,00%
MKM Partners	1	0,00%	100,00%
Susquehanna Financial Group	1	0,00%	100,00%
Banco Portugues de Investimento SA	1	100,00%	0,00%

ThinkEquity LLC	1	100,00%	0,00%
Helvea	1	0,00%	100,00%
VTB Capital	1	100,00%	0,00%
Petercam	1	0,00%	0,00%
Evercore ISI	1	0,00%	100,00%
DnB NOR Markets	1	0,00%	100,00%
Kempen	1	0,00%	100,00%
Total	**1976**		

Table A4 – Reports issued by single analysts and teams compared

Sector	N. reports issued by analyst teams	%	N. reports issued by a single analyst	%
Biotech & Pharma	197	79,12%	52	20,88%
Apparel & Textile Products	79	79,00%	21	21,00%
Media	47	75,81%	15	24,19%
Consumer Products	247	73,29%	90	26,71%
Construction Materials	50	72,46%	19	27,54%
Transportations & Logistics	55	72,37%	21	27,63%
Semiconductors	56	71,79%	22	28,21%
Retail	134	71,28%	54	28,72%
Real Estate	14	70,00%	6	30,00%
Aerospace & Defence	87	65,91%	45	34,09%
Medical Equipment & Devices	152	65,80%	79	34,20%
Automotive	164	62,60%	98	37,40%
Oil, Gas & Coal	120	61,54%	75	38,46%
Hardware	84	60,87%	54	39,13%
Software	62	57,94%	45	42,06%
Chemicals	147	56,54%	113	43,46%
Banking	451	55,61%	360	44,39%
Insurance	272	55,40%	219	44,60%
Utilities	253	54,76%	209	45,24%
Telecommunications	179	53,43%	156	46,57%
Electrical Equipment	31	46,27%	36	53,73%
Total	**2881**	**61,69%**	**1789**	**38,31%**

Table A5 – Single analysts FE2 and FE3 compared

Broker name	Median of Abs FE2 Single analysts	Median of Abs FE3 Single analysts	N. reports issued
landsbanken Group.	0,08	0,35	2
Abn Amro Bank	0,15	0,34	7
Ahorro Corporaci—n Financiera	0,21	0,32	28
Aurel	0,08	0,14	1
AXIA Financial Research	0,20	0,08	5
Baader	0,27	0,30	2
Banca IMI	0,24	0,25	8
Banco Portugues de Investimento SA	0,18	0,24	2
Bancosabadell	0,61	0,75	2
Barclays Capital	0,12	0,11	11
Bear Stearns	0,17	0,53	2
BPI	0,37	0,49	7
Canaccord Genuity	0,41	0,22	5
Cantor Fitzgerald Europe	0,41	0,41	1
Caris & Company	0,08	0,18	2
CentroBanca	0,08	0,40	4
Cheuvreux	0,17	0,37	27
CM-CIC Securities	0,21	0,25	7
Collins Stewart	0,15	0,27	19
CommerzBank	0,22	0,19	114
Commerzbank	0,25	0,41	4
Credit Agricole	0,16	0,20	36
Credit Suisse	0,25	0,35	39
Daiwa	0,12	0,19	7
Deutsche bank	0,19	0,33	227
Dexia	0,21	0,37	22
DnB NOR Markets	0,06	0,05	2
DR. Kalliwoda	0,08	0,16	1
Equita Sim Spa	0,23	0,34	21
ESN	0,16	0,25	56
Exane BNP Paribas	0,01	0,14	1
Fairesearch	0,15	0,25	23
FIM Bank Ltd.	0,26	0,33	3
Fortis Bank	0,21	0,33	6
Fox-Pitt Kelton	0,56	0,31	6
Gabelli	0,32	0,16	2
Gilissen	0,29	0,51	3
Goodbody	914,02	290,06	2
Helvea	0,09	0,18	4
HSBC	0,27	0,27	18
Ibersecurities (SP)	0,23	0,33	39
ICBPI S.p.A	0,13	0,29	5

Independent Int.al Investment Research	0,25	0,38	15
Inderes	0,05	0,29	1
ING	0,13	0,27	24
Intermonte SIM S.p.A.	0,22	0,28	1
Investec Bank Plc	0,30	0,17	2
J.P. Morgan	0,17	0,23	27
Jefferies International	0,09	0,19	8
Jyske Markets	0,20	0,27	4
KBC Securities	0,14	0,23	8
Keijser Capital N.V.	0,03	0,14	2
Kempen	0,27	1,00	1
Kepler Capital Markets (KCM)	0,16	0,20	74
Kepler Cheuvreux	0,11	0,16	14
Landsbanki Kepler	0,46	0,71	1
Liberum Capital	0,87	0,87	3
M.M.Warburg & CO	0,20	0,19	16
Macquarie	0,21	0,23	41
MedioBanca	0,16	0,28	12
Metzler Equity Research	0,19	0,40	4
Millennium BCP	0,20	0,27	2
MKM Partners	0,05	0,29	2
MM Warburg	0,36	0,45	2
Morgan Stanley	0,18	0,17	29
Natixis Securities	0,18	0,19	34
Oppenheim Research GmbH	0,10	0,21	24
Pareto Securities	0,46	0,70	1
Petercam	0,12	0,38	3
Raymond James Euro Equities	0,27	0,46	24
RBC Capital Markets	0,09	0,12	11
RBS	0,12	0,14	11
Redburn Partners	0,27	0,28	7
Renaissance Capital	0,13	0,24	3
Sal. Oppenheim	0,40	0,30	16
Santander	0,23	0,33	79
SebEnskilda	0,27	0,30	2
SES Research	0,10	0,13	2
SNS Securities	0,11	0,13	7
Societe Generale	0,22	0,31	168
SRC	0,13	0,43	2
Susquehanna Financial Group	0,06	0,10	1
Swedbank	0,43	0,66	1
ThinkEquity LLC	0,21	0,14	1
UBS	0,17	0,32	35
Unicredit Equity Research	0,23	0,48	151
Wall Street Strategies	0,12	0,71	4
Warburg Research	0,25	0,31	14

Wunderlich Securities, Inc.	0,08	0,62	1

Table A6 – Analysts' teams FE2 and FE3 compared

Broker name	Median of Abs FE2 Analyst teams	Median of Abs FE3 Analyst teams	N. reports issued
landsbanken Group.	0,14	0,7	1
Abn Amro Bank	0,23	0,65	7
ACF	0,17	0,32	1
Ahorro Corporaci—n Financiera	0,03	0,16	4
Aurel	0,13	0,36	1
Banca IMI	0,08	0,43	1
Banco Portugues de Investimento SA	0,84	0,87	1
Barclays Capital	0,14	0,23	127
Bear Stearns	0,1	0,58	3
BPI	0,25	0,52	14
Buckingham	0,34	0,28	1
Canaccord Genuity	0,15	0,15	10
CM-CIC Securities	0,1	0,1	1
Collins Stewart	0,16	0,13	11
Commerzbank	0,19	0,16	11
Cowen	0,03	0,11	1
Credit Agricole	0,11	0,23	6
Credit Suisse	0,13	0,18	225
Deutsche Bank	0,16	0,21	170
Equita Sim Spa	0,31	0,51	1
ESN	0,14	0,18	3
Evercore ISI	1,34	1,44	1
EVO securities	0,18	0,2	24
Goodbody	1070,02	308,91	2
HSBC	0,17	0,23	95
ING	0,12	0,27	26
Intesa San Paolo	0,14	0,09	1
Investec Bank Plc	0,09	0,03	3
J.P. Morgan	0,12	0,2	183
Jefferies International	0,12	0,2	65
Jyske Markets	0,45	0,98	1
Kepler Capital Markets (KCM)	0,05	0,13	1
Kepler Cheuvreux	0,18	0,37	1
Liberum Capital	0,2	0,35	7
Macquarie	0,17	0,25	63
Mediobanca	0,13	0,47	8
MF Global UK	0,14	0,42	4
Morgan Stanley	0,14	0,21	207

Natixis Securities	0,18	0,26	169
Numis	0,45	0,74	1
Oppenheim Research GmbH	0,16	0,35	4
Piper Jaffray & Co.	0,17	0,38	4
Raymond James Euro Equities	0,15	0,19	82
RBC Capital Markets	0,16	0,16	57
RBS	0,09	0,15	58
Redburn Partners	0,11	0,16	7
Sal. Oppenheim	0,24	0,22	4
Santander	0,2	0,32	21
Societe Generale	0,18	0,24	278
UBS	0,16	0,19	252
Unicredit Equity Research	0,16	0,33	35
Vontobel Equity Research	0,29	0,17	1
VTB Capital	0,11	0,02	1
Warburg Research	0,03	0,13	1
William Blair&CO.	0,39	0,37	1