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Fundamental Analysis on Iberian Stock Market

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Master Dissertation in Finance

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Biographic Note

João da Cunha has born in 1990 in France, but lived almost his entire life in Portugal.

He has concluded its degree in Management by University of Minho in 2011. In 2013, he has enrolled in a Postgraduate Course in Porto Business School in the field of Management Control and Evaluation Measures.

His professional life has started in September of 2011 as an Indirect Tax Assistant for Deloitte SROC. Two years after he signed to Linolito, Lda (a company dedicated to retail of clothes and accessories) to assume all the tasks related to finance, control and human resources of the company. In 2014, he decided to move to Kirchhoff Automotive Portugal, an industrial company which produces metal components for the biggest car producers, and there, he is being developing his role as management control, assuming responsibilities not only for plants in Portugal, but also for Spain.

In 2014, he decides to enrol the Master in Finance in School of Economics and Management of the University of Porto.

Abstract

The fundamental analysis is one of the basis of value investment strategy as it develops efforts in achieve an accurate value creation model. Its contributions enhance the identification of investment opportunities.

In this sense, this master dissertation studies the relevance of a fundamental analysis in a successful investment strategy for the Iberian Stock Market.

For that, it is developed a model that combines the contributions of two worldwide models – the F-SCORE by J. Piotroski and the G-SCORE by P. Mohanram. The combination of these two models enable a better coverage of all the important key drivers of value creation of the Iberian companies.

Therefore, this research aims to evaluate how a fundamental model, based on the principles of international fundamental models, can be applied to Iberian Stock Market in order to identify investment opportunities.

Key-words: Fundamental Analysis, Investment Strategy, Value Creation, Investment Opportunities, Iberian Companies

JEL-Codes: G11, M41

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1. Introduction

The aim of this master dissertation is to study the relevance of a fundamental analysis in a successful investment strategy. The premise behind the fundamental analysis is to evaluate the intrinsic value of the company through the identification of key factors from economic and financial fields and their value measurement, in order to understand their impact on the value creation.

A fundamental analysis can be seen as the basic step of value investing strategy, as it seeks to understand how the company operates and generates value in order to better achieve its market value and, if possible, identify investment opportunities. In this sense, this master dissertation pretends to identify the main key factors that has impact on value creation of an Iberian company and evaluate their relevance against the return of the companies selected.

The intuition behind the fundamental analysis is a highly important topic of strategic investment, which is studied worldwide. Nonetheless, the structure and the scope of a fundamental analysis can not be a fixed formula applied for all companies and markets all the time. In fact, this is a dynamic analysis which needs to be updated and adapt to specific conditions (e.g., to a specific market). In this sense, and following the contributions of several studies and models, as the J. Piotroski F-SCORE (2000) and P. Mohanram G-SCORE (2005), it is relevant to analyse the impact of a specific model for Iberian Market.

Considering the above, this master dissertation pretends to construct a model, based on the combination of the factors used on the F-SCORE and G-SCORE. With this model, I pretend to give answer to two major questions: i) it is feasible a fundamental analysis to Iberian Stock Market; and, ii) is it possible to obtain relevant information from fundamental analysis to be applied to investment strategy. By giving answer to these two questions, I will be able to determine if fundamental analysis is creating value for the investor.

To achieve answer to these research question, my master dissertation will propose the definition of a model to persecute a fundamental analysis on Iberian companies. This model will be composed by a combination of the factors identified on the F-SCORE and G-SCORE. These factors will be included on the model using a binary code, i.e., if they

contribute positively to value creation they will be valued as "1", if not, they would score "0". After the model is defined, I will compare the scores obtained against their return creation.

This document, besides this section, will be mainly structured as follows: in Section 2, a literature review of the topic is made. In section 3, it will be explained the research methodology, namely how the model was developed, the sample selection and how the model was constructed. In section 4, it will be presented the empirical results obtained. In section 5, I will present the major conclusions from this master dissertation and I will identify some major limitations and possible ideas for future researches.

2. Literature Review

In this section I will present a literature review related to fundamental analysis, highlighting its main relevant definitions, models and similar studies. In the end of this section I will critical discuss the main aspects.

2.1 Relevant definitions

2.1.1 The origin

Fundamental analysis can be described as a method of determining the value of corporate securities by examine key value-drivers (Lev and Thiagarajan, 1993). Therefore, it is possible to infer that its relevance is considerably higher when related to value creation and investments strategies.

In fact, this is one of the pillars of investment strategy and its intuition can be tracked till 1934, when Benjamin Graham and David Dodd in their book Security Analysis have approach the importance of the value approach to fundamental analysis. Moreover, in 1949, Benjamin Graham has written the book The Intelligent Investor, where he highlighted the importance of the intrinsic value of the stock and tries to explain the concept of investment as "an investment operation in one which, upon thorough analysis, promises safety of principal and an adequate return". These principles have been followed by several well-known investors (as Warrant Buffet) and served as

inspirations for many researchers to develop studies on these subjects (intrinsic value and investment strategy).

2.1.2 Challenging EMH

One of the most important theories on the finance literature, it is the Efficient Market Hypothesis. Fama, in his paper 'Efficient Capital Markets: A Review of Theory and Empirical Work' (1970) have stated that efficient markets imply that "prices at any point in time "fully reflect" available information". To prove this hypothesis, Fama has developed some tests divided in three categories: i) Weak-form: tests the information subset for historical price or return sequences; ii) Semi-strong-form: tests the information subset of interest includes all obviously publicly available information; and, iii) Strong-form: tests if individual investors or groups have monopolistic access to any information relevant for price formation.

For the first two forms, there are strong evidence that corroborate the EMH (with higher evidence for the weak-form). Regarding the strong-form, the first test seemed not to reject this hypothesis.

Thus, if we follow the intuition behind the EMH, we could say that all information is instantaneously reflected in market prices, and by that, any attempt of getting advantage by developing a fundamental analysis would be worthless. If that was true, there would be no difference between market price and intrinsic price, which should not be state as the only true (the gap between market and intrinsic price has been identified and exploit by researches and investors, as it will be presented in the next sub-section).

Therefore, fundamental analysis is a way of interpreting the financial information available, which might lead to different investment decisions among the investors. In this sense, and as mentioned by Leopold A. Bernstein in his paper 'In Defense of Fundamental Analysis' (1975), "its [the market mechanism] very complexity will offer, in the future as it has in the past, great opportunities to those who go beyond obtaining the required information to interpreting it with talent, knowledge and preparation. For those investors, the fruits of fundamental analysis and research, long before being converted to a "public good," will provide adequate rewards. These rewards will not be discernible, however, in the performance of investors aggregated to comprise major

market segments. Instead they will remain as individual as the efforts needed to bring them about".

2.1.3 The evolution and its importance

From the last two sub-sections, I have showed the relevance of fundamental analysis on finance literature. In this sense, it is also worthy to understand the impact of fundamental analysis on investment strategy. For that, some studies have been developed in order to contribute with evidence to this subject. That was the case of Ou and Penman (1989), who have showed that the information contained in prices, which leads to future earnings, can be understood through the analyse of financial statements.

The use of accounting historical information was also studied by Lev and Thiagarajan (1993), Abarbanell and Bushee (1998), Piotroski (2000, 2012) and Mohanram (2005) [these studies will be better explained in further sections].

Nonetheless, the value of a fundamental analysis is not only relied on the importance of historical accounting information, but also in the identification of market anomalies that could result in achieve better earnings. Having this intuition, Frankel and Lee (1998), Dechow and Sloan (1997) and LaPorta (1996) have developed studies to identify firm's intrinsic value and/or systematic errors in market expectations by requiring investors to purchase stocks whose prices appear to be lagging fundamental values.

However, not only the market can have systematic errors (has it is being suggested), as it allows abnormal returns. In this sense, DeBondt and Thaler (1995), Daniel et al. (1998) and Hirshleifer et al. (2004) have studied some possible explanations for those abnormal returns, and they attribute the possible explanation to behavioural biases as over-confidence and limited attention. Through their achievements, the fundamental analysis can also be complemented by behavioural factors, as they can contribute to better analyse the intrinsic value of a company.

Moreover, studies as Yanfeng Xue and May H. Zhang (2011), have contributed to corroborate the idea of abnormal returns opportunities (which might reinforce the importance of a fundamental analysis). In fact, through their studies, they have shown that transient institutional investors trade to exploit the fundamental-driven abnormal

returns, which is in line with market under-reaction to financial statement information (to which they have contribute with supporting evidence).

As presented, the fundamental analysis is a way to create value to the investors by understanding the value creation process of a company, in order to achieve future increase earnings. However, this type of analysis can be undervalued in times of more easy access to (accounting) information and better resources of analyses. Considering this, Richardson, Tuna and Wysocki (2010) have reviewed the literature regarding accounting anomalies and fundamental analysis, by performing a citation analysis and a survey to both academics and practitioners. They suggest that the study of fundamental analysis is still relevant and not fully understand (as it can not fully explain the return variation).

From this section, we can understand that the fundamental analysis is an important subject in the value investment strategy, which has collected evidence of its usefulness and it is still relevant in actual times.

2.2 Main models

As discussed, a fundamental analysis can be very important in a value creation strategy. In this sense, the search for the magic formula has been driven many researchers. Among them are two important men that have developed two models which are worldwide references.

One of them is Joseph Piotroski, who explained how its F-SCORE can identify investment strategies. In his paper "Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers" (2000), he tried to examine whether a simple accounting-based fundamental analysis strategy, when applied to a broad portfolio of high book-to-market firms, can shift the distributions of earned by an investor. For that, it was developed the F_SCORE, composed by nine variables, mainly related to: i) Profitability (Net Income before extraordinary items [ROA], Cash-Flow from Operations [CFO], ΔROA and Accrual [ROA-CFO]); ii) Leverage, liquidity and source of funds (ΔLever [change in the firm's long term debt], ΔLiquid [measures the historical change in the firm's current ratio] and Eq_Offer [positive if the firm did not

issue common equity in the year preceding portfolio formation]); and, iii) Operating efficiency (ΔMargin [gross margin ratio] and ΔTurn [year asset turnover ratio]).

In this paper, Joseph Piotroski has concluded that High F_SCORE firms significantly outperform low F_SCORE firms in the year following portfolio formation.

The other important paper was developed by Partha S. Mohanram, who have created the G_SCORE for his paper "Separating Winners from Losers among Low Book-to-Market Stocks using Financial Statement Analysis" (2005). The aim of his work was to examine if it is possible to earn excess returns on low book-to-market (BM) firms using financial analysis that combine traditional fundamentals with measures tailored for growth firms. In order to achieve this aim, the G_SCORE was created with eight variables grouped in three major sections, namely: i) Profitability (ROA, Cash-flow ROA and CFO); ii) Naïve extrapolation (Earning Variability and Sales Growth Variability); and, iii) Accounting conservatism (R&D, Capital Expenditure and Advertising Intensity). Within this paper we can understand that growth oriented fundamental analysis can create value for the investors as the high G_SCORE firms earn [according to this paper] substantially higher size-adjusted returns then firms with a low G_SCORE.

Moreover, it is worthy to highlight that in 2005, Joseph Piotroski has made a review of the conference of this paper, where he mentions that the F_SCORE and G_SCORE, together, "provide a mosaic of results suggesting that the return patterns observed across book-to-market portfolios are a manifestation of systematic, within-portfolio pricing errors" (Piotroski, 2005).

2.3 Similar studies

Although these two approaches, similar in its structure and goals, are very important and popular among academics and professionals, there are other studies with different ideologies that have also help in the improve of the fundamental analysis study. In fact, and even if their models differ from what my master dissertation pretends to develop, their contributions have helped in the formulation of the research questions, as well as the development of this study.

In this sense, some important contributions to this subject have come from Lev and Thiagarajan (1993), who have estimated the incremental value-reference of a set of financial variables over earnings. In fact, they have identified some fundamentals able to evaluate firm's performance and estimate future earnings. The twelve fundamental identified (Inventory, Accounts Receivable, Capital Expenditure, Research & Development, Gross Margin, Sales and Administrative Expenses, Provision for Doubtful Receivables, Effective Tax, Order Backlog and Labor Force) were able to demonstrate the link between their score and a subsequent earning growth. Moreover, this study contributes to the finance literature as they have found support for the incremental value-reference of most of the identified fundamentals. In addition, they have also pointed-out that returns-fundamentals relation is considerably strengthened when it is conditioned on macroeconomic variables.

Another important research was developed by Abarbanell and Bushee (1997). Their study was based on the variables identified by Lev and Thiagarajan (1993) (but only the ones included on the full sample). Thus, the aim of the paper was to investigate how detailed financial statement data enter the decisions of market participants by examining whether current changes in the signals are informative about subsequent earnings changes. From their studies, they have found support for link current accounting information to earnings changes, although they warn about the dangers of implement mechanical rules for fundamental analysis. Moreover, they also suggest that some of the variables identified helps the investors when assessing future firm performance. In addition, in this paper it is showed that the relation between the signals and future earnings can be compromised by some macroeconomic factors (as inflation and GDP) and by some firm-specific variables (as prior earnings news and expected earnings growth).

Other important contribution to the development and improvement of the fundamental analysis are the stock selection criteria ("screens") defined by some important investors. These screens contribute to this subject as they improve the investor intuition about how defining a fundamental analysis. In fact, some of these screens have been tested worldwide, has it was the example of Yangxiu Ye (2013) who applied the screens from Benjamin Graham (based on sufficient size enterprise, a good financial condition, earning stability, dividend record, earnings growth, moderate price-to-earnings ratio and

moderate price-to-book ratio), Peter Lynch (which consider the percentage of total sales, the formula of price-to-earning compared with growth ratio, cash position, ratio of debt to equity, dividends, hidden assets, cash flow, inventory and pension fund asset) and Joel Greenblatt (which use return on assets, return on equity and price-to-equity ratio) to the Shanghai Stock Exchange from 2006 to 2011. The results of this study had suggested that the returns obtained from the screens above are generally higher than the stock market.

In order to better visualize the contributions of these similar studies, I have created a table that summarizes these information's and enables the comparison among them (Appendix I).

2.4 Critical analysis

As presented on the previous section, the literature review on fundamental analysis is very rich and diverse. In fact, many studies have been developed in order to understand the contribution of the fundamental analysis on identify gains of earnings, and therefore, creating value for the investors. Moreover, the scope of the analysis is not restricted to this idea; in fact, the identification of market errors and biases has also been a topic of analyse.

Along the literature review presented above, it is possible to understand that the majority of the models are based on signals from variables, previously identified through historical accounting information. As showed, an accurate model is able to link these fundamentals to growth earnings, and therefore, to value creation.

However, the literature is lacking, in somehow, to give the perfect receipt. In fact, what it is suggested is that it shouldn't been applied any mechanical/rigid model of fundamental analysis. The intuition resulting from this idea is that a fundamental analysis can create value when certain conditions are satisfied, i.e., a fundamental analysis can differ if some outside factors aren't the same (as suggested by Abarbanell and Bushee, 1997).

Therefore, a good practice of implementing fundamental analysis would be to rely on accredited and successful models, who have suggested not only contributions to finance literature, but also were able to identify investment opportunities.

3. Methodological considerations

In this section I will start by presenting the main methodological considerations that are applied in the construction of the model and analyse of the returns. Next, I will present my research questions. I conclude this section by describing the data and sample used on this research.

3.1 Methodological aspects of similar studies

In order to develop the methodology for my Master Dissertation, I have studied some similar studies to understand how fundamental analysis can and/or should be succerfully approached. Therefore, I have identified five important studies, namely: i) Value Investing: The Use of Historical Financial Statement Information to Separate Winners from Losers (J. Piotroski, 2000); ii) Separating Winners from Losers among Low Book-to-Market Stocks using Financial Statement Analysis (Mohanram, 2005); iii) Fundamental Information Analysis (Lev and Thiagarajan, 1993); iv) Fundamental Analysis, Future Earnings, and Stock Prices (Abarbanell and Bushee, 1997); and, v) Application of the Stock Selection Criteria of Three Value Investors, Benjamin Graham, Peter Lynch, and Joel Greenblatt: A Case of Shanghai Stock Exchange from 2006 and 2011 (Yangxiu Ye, 2013).

The main methodological considerations are summarized in the table below:

Author	Country of study	Sample Size	Unit of Sample	Period of Analysis	Data Collection	Statistical Analysis
J. D. Piotroski	Not specified	14 043	High BM firms	1976-1996	Financial Data Base (Compustat and CRSP)	Correlation
P. S. Mohanram	Not specified	21 724	Low BM firms	1978-2001	Financial Data Base (Compustat and CRSP)	Correlation
Lev and Thiagarajan	Not specified	140-180 per year	Firms	1974-1988	Financial Data Base (Compustat and CRSP)	Cross-sectional regressions
Abarbanell and Bushee	Not specified	4 180	Firms	1983-1990	Financial Data Base (Compustat and CRSP)	Regression
Yangxiu Ye	Shanghai Stock Exchange	Depending of the screen (0 to 213)	Firms	2006-2011	Financial Data Base (Bloomberg Terminal and SSE)	t-test

Table 1. Methodological considerations from similar studies

From the table above, we can conclude that the studies from Piotroski and Mohanram have used similar approaches (the main difference are the target firms – high book-to-market firms and low book-to-market firms, respectively). Moreover, these two studies are the ones with largest sample and period of analyse (with Mohanram analysing the highest number of firms).

As previously mentioned, the studies from Lev and Thiagarajan and from Abarbanell and Bushee have followed very similar approaches.

The study performed by Yangxiu Ye represent a professional insight on these research, as it brings some screens developed by three successful investors and applies them to Shanghai Stock Exchange. The sample used is the lowest of the studies here identified and the main econometric technique used was the t-test.

3.2 Research Questions

As previously mentioned, the aim of this master dissertation is to apply two of the most important models of fundamental analysis to Iberian Stock Market in order to determine, on one side, if it is feasible to perform a fundamental analysis to this market, and on the other side, if it is possible to obtain relevant information from fundamental analysis that can be applied to investment strategy. Through the answers to these two research questions, I might be able to validate if fundamental analysis is creating value for the investor.

3.3 Data, Databases and Sample

This master dissertation will focus on the financial data of all the companies belonging to Iberian Market with sufficient data to perform the analysis. In fact, a tight selection of only the companies that are listed on PSI20 and IBEX35 at this moment would compromise the sample; therefore, and assuming that these companies have public information available, I consider reasonable their selection for the study, as actual or potential candidates for a stock investment opportunity on a public stock market.

Moreover, this study follows the evolution of the financial data and its impact on the company return for 10 years (from 2006 to 2010). During this period, some companies

have been delisted and other only surged in an intermediate year. In this sense, all the data that lead to a change of return equal to zero (which was not occurred by an extraordinary causality of equal returns to years in a row), were deselected from the sample. Considering this, I have collect 696 evidences, i.e., for the period of 10 years, I was able to compute the TOTAL_SCORE (join of FSCORE and GSCORE) and match it to a return change, 696 times. This number of evidences were based in a total of 96 companies (see Appendix I).

To collect the financial data, it was used the database Thomson Reuters Datastream, by searching all the companies associated to Lisbon Euronext and Madrid stock market.

To calculate the TOTAL_SCORE, first it was required to compute the individual scores of FSCORE and GSCORE. In this sense, I have analysed 13 indicators (which had led to compute the 17 variables), namely: i) capital expenditures; ii) earnings before earnings and interests; iii) marketing expenditures; iv) net income before extraordinary items; v) net sales or revenues; vi) research & development; vii) net cash flow from operating activities; viii) common shareholder's equity; ix) current ratio; x) gross profit margin; xi) long term debt; xii) net cash flow; and, xiii) total asset turnover. For some indicators, it wasn't possible to have financial data for all the companies; one example is the marketing expenditures (required to GSCORE) – for this cases, in order to not compromise the sample (which would be very small), it was scored 0 in all the indicators without information.

The TOTAL_SCORE results from the join of the FSCORE and GSCORE and follows their score structure, i.e., it gives 1 if the variable contributes positively and 0 otherwise. Moreover, the TOTAL_SCORE is the sum of both individual scores, which means that if a variable is present in both individual scores it will have a two times weight in the TOTAL_SCORE (e.g. ROA). It is also worthy to highlight that this TOTAL_SCORE didn't use the book-to-market ratio to select the companies or even to weight the individual scores. In fact, the join of two different scores meant for high to book-to-market ratio (FSCORE) and other for low book-to-market ratio (GSCORE) was decided in order to verify if both scores could complement themselves and, in this sense, be applied to a smaller market, where a selection of only high/low book-to-market firms can be difficult. Nonetheless, in the next section it will be analysed the relation of the scores to the companies returns, not only for the TOTAL_SCORE, but also for the

individuals FSCORE and GSCORE – this might allow to verify if one model is more suitable to Iberian Market.

Regarding the GSCORE, in order to compute it, it is required to have other companies in the same industry has some of the variables are defined through the comparison of the company financial data against the one from the average of its industry (that are included on the analyse). This represents a big challenge (and a liability) to this study as the Iberian Market isn't large enough to specifically group companies within the same industry. In this sense, and basing on the Damodaran Database[1] and on the search of the company's website, I've defined some groups to be used in GSCORE calculations (see Appendix I).

As mentioned, the score obtained is afterwards compared against the change on the return (r) of the company (i.e., $[r_n - r_{n-1}]/r_{n-1}$). I've defined as return, the Datastream variable 'RI – Total Return Index'. This variable represents a theoretical growth in the value of a share holding over a specific period. This variable assumes that dividends are re-invested to purchase additional units of an equity or unit trust at the closing price applicable on the ex-dividend date). If, by some reason, the change on return wasn't possible (company delisted on impossible to achieve information from Datastream), those evidences were excluded from the sample.

In addition, I have aggregated the companies in three different groups (classified in accordance to their score), namely: i) high (if it scores equal of higher than 7 in individual scores [FSCORE and GSCORE] or 14 in TOTAL_SCORE); ii) Medium (if it scores between 4 to 6 in individual scores or 7 to 13 in TOTAL_SCORE), and, iii) Low (if it scores equal or lower than 3 in individual scores and 6 for TOTAL_SCORE).

The aim of this master dissertation is to see if FSCORE and GSCORE are possible to be used for Iberian Stock Market and understand if they can create value for the investor. In this sense, I have tested the correlation between the scores and their correspondent's returns. Moreover, I have computed the average return in each group (high, medium and low) to understand if the return is greater in high scored companies than in the other groups. To compute the correlation between scores and returns, I have used the

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[1] To define the industry group of each Iberian company used in this analysis, I have consulted the Damodaran DataBase – Industry Breakdown (http://pages.stern.nyu.edu/~adamodar/). Nonetheless, the industry there defined might not be the one selected for this analysis has it was required a larger coverage of activities to be able to include more companies.

statistical software EViews and for the average return per group of score, I have used calculation functionalities of Microsoft Excel.

4. Analysis of the Results

As mentioned in the previously section, in order to understand if the scores can help to explain, or even predict, the dimension of the change of the returns, one possible test is the correlation. With this, we can observe if a change in the score can lead to a change in return of the company.

In table no. 2, we can see the descriptive statistics of the variables defined to this analysis, namely the 3 scores and the returns. One interesting remark from that tables, is that the mean of the FSCORE is higher than the GSCORE, even though no company achieved the perfect score of 9, which happened in the GSCORE (please remember that the GSCORE is only composed by 8 variables). Moreover, other interesting observation is that the median in the TOTAL_SCORE and FSCORE is grouped under the Medium companies (considering the classification defined above) and GSCORE would be low. This might suggest that the GSCORE is, in average, scoring lower the companies than FSCORE.

	TOTAL_SCO	FSCORE	GSCORE	RETURNS
Mean	7.150862	4.285920	2.864943	0.747543
Median	7.000000	4.000000	3.000000	-0.155000
Maximum	15.00000	8.000000	8.000000	66.17000
Minimum	1.000000	1.000000	0.000000	-9.240000
Std. Dev.	2.604136	1.555728	1.799802	6.456714
Skewness	0.037954	-0.128529	0.487006	3.925089
Kurtosis	2.590891	2.496644	2.516106	30.53314
Jarque-Bera	5.020836	9.263932	34.30268	23771.28
Probability	0.081234	0.009736	0.000000	0.000000
Sum	4977.000	2983.000	1994.000	520.2900
Sum Sq. Dev.	4713.159	1682.102	2251.305	28973.96
Observations	696	696	696	696

Table 2. Statistical overview of the variables

Regarding the correlation, the table no. 3 summarizes all the correlations between the scores and returns. In addition, it also presents the correlation among the three scores. These last correlations can indicate if the scores are valuing the companies in a similar way (i.e., with a similar potential for investment strategies) or if they categorize the companies in a different way (which can be possible due to the different variables used and principles behind them – remember that they differ on the book-to-market ratio).

	TOTAL_SCO	FSCORE	GSCORE	RETURNS
TOTAL_SCO	1.000000	0.735873	0.810821	0.027562
FSCORE	0.735873	1.000000	0.200347	0.068915
GSCORE	0.810821	0.200347	1.000000	-0.019689
RETURNS	0.027562	0.068915	-0.019689	1.000000

Table 3. Correlation Analysis

By comparing the correlation between the TOTAL_SCORE and the Returns, the table no. 3 suggest that there is a low correlation between them, which can suggest that the TOTAL_SCORE can't help in the identification of companies of high returns by simply compute this score. Nonetheless, this result does not mean that a fundamental analysis should not be applied, but only that this score seems not suitable for it. In order to conclude for the impossibility or unimportance of the fundamental analysis, other scores and mixes or different weighted scores should be tested (remember that I simply added FSCORE and GSCORE, without using any weights of distribution).

Moreover, the correlation between the FSCORE and Returns, although slightly higher, continues low and also suggest some randomness on the return results (in terms of its score). The result for the GSCORE suggest an inverse correlation, i.e., a lower GSCORE lead to a higher return. This result shows in the opposite direction of what fundamental researchers and specially Mohanram have being advocated (that fundamental analysis can help to identify investment opportunities). Nonetheless, and considering the adjustments that were made in order to implement this score for Iberian Companies (namely the group industry), this can represent that the model isn't perfectly constructed or it can't be applied to this companies and/or market.

Regarding the correlation among the scores, we can observe that both FSCORE and GSCORE are highly correlated to TOTAL_SCORE (which was expected as they are the

components from this last score). However, the FSCORE and GSCORE present a low correlation between them. This value might suggest that the companies are being evaluated in a different way and the investment strategy based on these scores would be different. This correlation is reasonable as these scores were meant to target different companies; FSCORE is searching for high book-to-market firms with good investment opportunities; for the other side, the GSCORE tries to identify firms with low book-to-market ratios that can create value to the investors. In this sense, this correlation might mean that there are some companies with high book-to-market firms (scoring high FSCORE and not high GSCORE) and others with low book-to-market ratio (scoring high GSCORE and not high FSCORE).

Other important test that was implemented was the comparison of the average return per group of ranking scores, i.e., understand if companies with higher scores are also having higher returns. This analysis is presented in the table no. 4.

Classification	TOTAL_SCORE	F_SCORE	G_SCORE
High	-10,1%	14,3%	11,4%
Medium	9,7%	9,2%	8,3%
Low	4,5%	2,5%	6,9%

Table 4. Average Return per Group of Score Classification

On the table above, the average change on return for high scored TOTAL_SCORE is negative, which, *per si*, would suggest that this model does not stand to what was proposed to. In fact, this negative average return suggests that a good company (that rated well in the variables defined) is not giving value to its investor. However, this result is consequence of an outlier company – Estoril Sol, S.A. – which ranked well in both scores, but presents a high decrease on its returns. If this company was excluded from the analysis, the average return would increase to 7.4%. This outlier effect isn't so significant in the individuals scores has it was diluted by other high score companies.

Regarding the individual scores, the table above suggest an increment of the returns in the same direction has the group score classification. This represent that higher FSCORE and GSCORE firms are performing better than lower FSCORE and GSCORE firms. This deduction is aligned with the conclusion obtained by both Joseph Piotroski

and Partha Mohanram. Moreover, we can infer that this effect of return differentiation among score groups is more evident in the FSCORE than the GSCORE (the range of return between high and low companies scores is 11.8% and 4.5%, respectively).

Other possible interpretation of the data above is that a score that mixes both FSCORE and GSCORE does not seem to obtain satisfactory results and jeopardizes the benefits of the individual scores that composes it. As we can see, the individual scores are achieving the expected results and empower the idea that a fundamental analysis can help the investor in the creating of value; however, when both are mixed, this contribution disappear and makes the fundamental analysis not possible.

5. Conclusions

5.1 General Overview

Is fundamental analysis able to create value for the investor? This is question that had raised the curiosity and the wish to understand how fundamental analysis is built, applied and which returns it gives back. On this master dissertation I have focus my analysis on the study of the fundamental factors that composed two of the most well-known models in this field – the FSCORE by J. Piotroksi and the GSCORE by P. Mohanram – and applied them for the Iberian companies. The aim of the analysis was to understand if it is feasible to perform a fundamental analysis, based on this two international models, on Iberian Stock market and to use this analysis to develop a successful investment strategy.

To achieve these goals, I've replicated the two models mentioned above to all Iberian companies with public information available that has actual or potential stock market interest. After computed the individual scores, I've summed up them and create a third score (TOTAL_SCORE) that would be used to evaluate the fundamental analysis applicability to Iberian Market. The decision to join both scores in just one suggest that the differentiation made through book-to-market ratio might not be applied to Iberian Market due lack of sufficient sample. Moreover, it also can suggest that the return given by the companies might not have a direct and intrinsic link to this ratio. Therefore, this

TOTAL_SCORE would comprise more relevant information that could empower my fundamental analysis, no matter the ratio of book-to-market firms I would obtain.

Still regarding the methodology, this study replicates the binary code performed by J. Piotroski and P. Mohanram, where a variable obtained 1 if contributes positively and 0 otherwise.

To test the relevance of this TOTAL_SCORE (and also the individuals scores – FSCORE and GSCORE), I've calculated the correlation between the scores obtained by 96 companies during 10 years (resulting in 696 evidences) and their change of returns. The correlations obtained between the scores and the returns were insignificantly and suggest a randomness of the returns and a unsatisfactory use of the fundamental analysis. Even more, the correlation between the GSCORE and the returns obtained was negative, which indicates an inverse correlation – which goes opposite to the literature review, and specially to the model developed by P. Mohanram. Moreover, through the correlations it was possible to confirm that the individual scores are positively correlated to the TOTAL_SCORE (with GSCORE obtaining a slightly higher correlation), but the correlation isn't strong between the two individual scores. This indicator can be reasonable has each score target a different type of company (the distinction is made through the book-to-market ratio). With that, the idea that this ratio wouldn't have such impact on the Iberian Market might be compromised – if the scores do not follow the same direction (and they evaluate the companies by different standards, because they see them [and they seem to be] different), a simple sum-up of both scores might not enhance greater information to be used in investment strategies.

In addition, it was evaluated which is the average return obtained per three different groups of companies, ranked by their scores: high, medium and low. The values obtained for the TOTAL_SCORE weren't the expected has the group with higher score obtained negative average return. After deeper analyse, it was identified that this result was caused by an outlier behaviour, that due to the small sample (and also small number of companies identified with high score) led to this miss-conclusion. Nonetheless, even if we took off that company, the average return of high score companies, although would be positive, it would also be smaller than the medium companies. This reinforce the idea that a join of FSCORE and GSCORE might not lead to greater information, at least for Iberian market. Nonetheless, the results obtained for the individual scores were

more satisfactory: both scores show that high scored companies obtain higher average returns (and the low scored companies have the lowest average returns). It is also worthy to mention that the FSCORE is the highest average return difference obtained among the three groups, i.e., the difference between the average return on high scored companies against low scored companies is higher than the one identified on GSCORE. In this sense, this study suggests that although it was not possible to obtain a high correlation between the scores and the returns, the average returns obtained by each group of scored companies (for the individual scores), suggest that there is room for improvement in the composition of the score and its implementation on the Iberian Stock market. In fact, the score and results presented suffers from some limitations (to be explained in the next section) that might compromises the conclusions obtained. In this sense, and given answer to the research questions of this master dissertation, a fundamental analysis based on two international models can be applied to Iberian Stock market, but it can be obtained better information from the individual scores than from the aggregated one. The low correlation should not be seen as stop in the analysis, but as an impulse for a development of a refined score and to obtain more accurate data.

5.2 Limitations identified

During the development of this master thesis, I have identified some limitations that might have led to a decrease in the information accuracy and, consequently, misleading conclusions. One of the major problem is related to the data obtained. I decided to use the Thomson Reuters Datastream to collect all the financial data that composed the scores. However, I don't have guarantee that the data obtained represent the most accurate situation of the companies. In fact, taken the example of the marketing expenditures (variables of the GSCORE), not all companies had that data available; and if I have decided to only select the companies that had it, the sample would be too small (therefore, I decided to score 0 to all companies to which I couldn't find this specific data).

Other relevant limitation, also related to GSCORE, was the definition of the industry group. This score implies, for almost all of its variables, a comparison of the company financial data against the average of the companies from the same industry. However, as

we are making the analysis for Iberian Market, and the scope of companies is limited, I needed to enlarge the coverage of the industry group, which might lead to not accurate scores (has it will be based in company's comparisons that, strictly based in the Mohanram study, would not be acceptable).

Even regarding the sample size, which was a really concern on this study, to assure that I had sufficient companies to study, I didn't pre-selected the companies (as J. Pioroski or P. Mohanram) or even excluded potential outliers or business sectors that could lead to miss-conclusions. Therefore, the information might be suffering from some biases (it not seems perfectly reasonable to evaluate, in the same manner, a bank, an hotel, a retail or a production industrial company). In this sense, a pre-selection of the companies, when applied to major markets, should be made in order to guarantee more accurate information and accuracy of the application of the model.

5.3 Suggestions for future researches

The study of fundamental variables applicable to an investment strategy is a finance field very interesting and challenging. The aim of the fundamental analysis is to forecast better returns for the investor, allowing them to improve their profitability and creation of value. Moreover, the study of fundamental analysis needs to be in constant update, as this field is truly dynamic and can be influenced by several external factors, as macroeconomics factors (e.g. crisis) or even micro factors (different management styles). Therefore, more fundamental analysis should be performed in the future – not only to see if the variables defined in actual models still create value for the investors, but also in the search of new variables better explanatory and with greater prediction power for market returns.

In this sense, I believe that they are several ways to keep studying fundamental analysis. Nonetheless, and considering what I have learned from my master dissertation, I would suggest the following three: i) test these models in a larger stock market: one of the major difficulties I have was with the sample selection. In some cases, I had insufficient information to build the accurate model (mostly for GSCORE that requires other companies from the same industry). Therefore, a possible aim of a future research would to check if these models are updated and which one generates more return to the

investor within a larger market; ii) apply the FSCORE to Portuguese Stock Market: if the aim of the research is to study the Portuguese market, I believe the FSCORE is the most suitable (as it does not require benchmarking). Nonetheless, as the sample would be smaller, the accuracy of the data should be higher. In this sense, it would be great to perform to all the companies selected (even if only the ones listed on PSI20) a corporate financial evaluation through their individual annual reports and from there, create a unique and differentiate database. In this way, we could better estimate the variables (e.g. the cash flow from operations). This approach would be time consuming, but would lead to an accurate analyse of the Portuguese Stock Market and its potential value; and, iii) use these models and simulate financial transactions to compute the impact (gain/loss) of adopting the results of these models: in my master dissertation, I have focused on the relation between the score and the returns and if the scores would be possible to be applied. However, I did not test in a simulated reality, i.e., I did not estimate the financial impact, or the potential value creation (or loss) that an investor would have if he had applied these models along the past years. Therefore, as a potential future research it would be very interesting to define a trading rule (e.g., take a long positon if the score is higher than 7 for FSCORE/GSCORE and a short position in case of a score lower than 3). This trading should be applied (thus, a new score had to be computed) every time the companies publish information (assuming a disclosure of information on a quarterly basis, it would have to be computed the score three times per year, which for a 10 years' horizon would lead to thirty trading times). For that, the use of a better database would be preferable (for example, Bloomberg) and a stock market with more companies would be recommended. Moreover, through this research idea it would also be possible to compare the FSCORE against the GSCORE and even try to replicate the TOTAL_SCORE and comparatively analyse their results.

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Appendices

I. List of companies analysed and their industry group

Company Name	Industry Group
AHORRO FAMILIAR S.A.	Financial Services
ALTRI SGPS S.A.	Paper/Forest Products
AXA PORTUGAL SEGUROS	Insurance (General)
AYCO GRUPO INMOBIL	Engineering/Construction
BANCO BPI, S.A.	Financial Services
BANCO COMERCIAL PORT	Financial Services
BANCO ESPIRITO SANTO	Financial Services
BANCO SANTANDER SA	Financial Services
BODEGAS	Beverage/Food
BRISA-AUTO ESTRADAS	Infrastructures
CARTERA INDUSTRIAL	Financial Services
CEMENTOS LEMONA S.A.	General
CEMENTOS MOLINS SA	General
CIMENTOS DE PORTUGAL	General
CIPAN-ANTIBIOTICOS	Healthcare/Chemical Products
COFACO-FABRIL SA	Beverage/Food
COFINA SGPS, SA	Press
COMPTA-EQUIPAMENTOS	General
CONSTRUTORA DURIENCE	Engineering/Construction
COPAM-PORTUGUESA SA	Production Industry
CORTICEIRA AMORIM	Paper/Forest Products
DAMM S.A.	Beverage/Food
EFACEC CAPITAL SGYS	Engineering/Construction
ESPIRITO SANTO FINAN	Financial Services
ESTORIL-SOL, SA	Hotel/Gaming/Restaurant
EUROPEA DE INVERSION	Financial Services
FENALU-INV. PART. SA	General
FINIBANCO HOLDING	Financial Services
FISIPE-FIBRAS PORTUG	Production Industry
FITOR-CIA TEXTEIS SA	Production Industry
FLETAMENTOS MARITIMO	Transportation

Company Name	Industry Group
FUTEBOL CLUBE DO PORTO	Entertainment
GESCARTAO SGPS S.A.	Packaging & Container
GLINTT GLOBAL	Computer Services
GRUPO MEDIA CAPITAL	Press
IBERSOL SGPS SA	Hotel/Gaming/Restaurant
IMOBILIARIA GRAO, SA	Hotel/Gaming/Restaurant
IMPRESA SGPS SA	Press
INAPA-INVESTIMENTOS	Retail
INMOFIBAN	Engineering/Construction
INMOLEVANTE SA	Real Estate
INVERFIATC	Hospitals/Healthcare Facilities
JERONIMO MARTINS SA	Retail
LISGRAFICA - ARTES	General
LITHO FORMAS SA	General
LIWE ESPANOLA SA	Retail
MOTA-ENGIL SGPS SA	Engineering/Construction
NAVIGATOR COMPANY	Oil/Gas
NOS SGPS SA	Telecommunication
NOVABASE SGPS SA	Computer Services
PAPELARIA FERNANDES	General
PHAROL SGPS SA	Telecommunication
POPULARINSA SA	Real Estate
REDITUS-GESTORA SA	Computer Services
SA HULLERA VASCO-LEO	Metals & Mining
SACYR SA	Engineering/Construction
SAG GEST - SOLUCOES	Retail
SDC INVESTIMENTOS	Engineering/Construction
SEMAPA-INVESTIMENTOS	Paper/Forest Products
SOC. AMIEIROS VERDES	Production Industry
SOLVERDE-INVESTIMENT	Hotel/Gaming/Restaurant
SONAE INDUSTRIA	Paper/Forest Products
SONAE SGPS SA	Retail
SONAECOM SGPS SA	Telecommunication
SONAGI SGPS SA	Real Estate
SOPOL-SOC. GERAL	General
SPORTING CLUBE DE PORTUGAL	Entertainment

Company Name	Industry Group
SUMOL COMPAL SA	Beverage/Food
TEIXEIRA DUARTE ENGE	Engineering/Construction
TERTIR TERMINAIS, SA	Engineering/Construction
TOYOTA CAETANO POR	General
UNION CATALANA DE VA	Insurance (General)
URBAR INGENIEROS SA	Real Estate
VAA-VISTA ALEGRE	General
EDP - ENERGIAS DE PORTUGAL	Energy