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PERFORMANCE OF POST-MERGERS AND ACQUISITIONS COMPANIES MEASURED BY GRAHAM FILTERS

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ABSTRACT

The objective of this study was to verify the performance of the companies that performed mergers and acquisitions by evaluating performance with the use of Graham Filters. The research, characterized as descriptive, documentary and quantitative, was based on the accounting, financial and market data of 42 Brazilian companies listed on the BM&FBovespa, which conducted mergers and acquisitions with exchange of control between 2006 and 2010. Data on mergers and acquisitions were collected from the CVM (Securities and Exchange Commission) website, and performance information was collected from the Economática® database. The performance of the 42 companies was calculated for the seven Graham Filters, and transformed into a ranking by the application of TOPSIS. From the results, it can be verified that in the five years of analysis the companies had positive variations of performance in the ranking. As a contribution to the company performance calculation, Graham Filters allowed us to identify the increase in net income, reduction of indebtedness and increase in assets. With these results, it can be seen that companies that have gone through mergers and acquisitions have good financial health and low risk. As a conclusion, these results of Graham Filters' performance in mergers and acquisitions, carried out in the Brazilian environment, show reasonable shareholder safety and a good level of Corporate Governance.

Keywords: Mergers and acquisitions. Performance. Graham Filters.

1 INTRODUCTION

Literature suggests several reasons to conduct companies into investment decisions. One of the main growth for the company. The internal growth process (through own profit) can be longer and more cautious than the purchase of the already established business (fusion and acquisition) (Singh & Montgomery,1987). The decision of fusion and acquisitions, according to Gitman (1997), aims to predominantly maximize the richness of the owners, which will be reflected on the stocks of the purchaser company.

In the Brazilian corporate environment, the fusions and acquisitions also started to occur with a higher intensity, mainly through the 80's and 90's, which were marked by the reduction of

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the restrictions to the international commerce, by the government privatization program, for the financial release and by the absence of a strict antitrust law in Brazil (Marion & Vieria, 2010).

The investments decisions in fusions and acquisitions can be used by the manager for own benefit and contrary to the shareholders interests, inducting them to apply resources in business that are destined to fail. These operations to acquire assets (fusions and acquisitions) generate dependence of the company in relation to its management (Shleifer & Vishny, 1989). This way, the manager perceives the fertile field for the deliberations, which not always serve to the investors' interests.

To evaluate this conflict of interests, there were researches about the fusions and acquisitions and the abnormal returns that have been focused mainly on the creation of value for the company, evaluated by the assets' abnormal returns. In face of this scenery, it was not observed a specific way that would carefully evaluate such returns superior to the market using the analysis of value (*valuation*). This analysis of value is the theme of interest of the Fundamentalist Analysis, in the extent that the search for the identification of companies with good accounting and financial foundations.

Among the ways to make this analyze, something that stands out is the approach made by the valuation creators, Benjamin Graham and David Dodd in 1934, who developed a mathematical-statistical that evaluate compost by 10 filters, which consider the stock market indicators and economic-financial indicators of the companies (Graham, 2007). The main objective of the 10 filters of Graham is to identify companies with good indexes of the capital market, good financial health and profit stability that present good long-term income (Oppenheimer, 1984; Zargham & Hu, 1996; Damodaran, 2006). Lowe (1997, p. 100) states that "a good company that has 7 out of the 10 criteria can be considered evaluated with a proper safety margin".

In Brazil, there are few applications from the methodology. In a recent research, three studies were found from 1994 to 2016. Passos (2006) discussed Graham's theory and applied it to the market of Brazilian capital, based on the data from 1994 to 2000. It was constructed a portfolio and it evaluated the next five years. The return of the actions from the portfolio that was approved by Graham's filters was of 566% against 219% from Ibovespa. However, it was not mentioned the performance of significant statistic tests.

Artuso and Chaves (2010) intended to advance into the knowledge about the Brazilian stock market and into effective analysis for the small investor. For this, they proposed the application of Graham's filters for the definition of assets at BM&FBovespa in the period from 1998 to 2009. With analysis of quartile results for each filter, they identified investments with returns superior to the average of return from the Ibovespa index for all of the analyzed periods.

For last and more recently, Artuso (2012) performed a study on the period from 1999 to 2009 based on the Hypothesis of Efficient Market (HME). It was found contrary indexes to the domestic market reference. The selected longitudinal portfolio return was of 39,78% against 12,37% of Ibovespa. The differential from Artuso's study (2012) in face of the previously ones was the realization of tests with significant statistics. The results showed a success on the application of Graham's filter on the recognition of standards. it is possible to explain a good part of the data variability through the liquidity factors, pricing of the books values, profitability and indebtedness degree.

In the post-fusion and acquisitions period it was not found any kind of study in Brazil that would be capable to measure the performance of companies through Graham's filters. Such filters represent a mathematical method composed by 10 filters that are from the market, financial or economic from the companies. In face of what is exposed, the research question arises: what is the performance of the companies that passed through fusions and acquisitions measured by Graham's filters? Resulting from the research question, the study aims the verification of performance from the companies that passed through fusions and acquisitions through the measurement of Graham's filters.

One of the factors that justify the study is the board of changes provided by the increase of fusions and acquisitions on the Brazilian capital markets over the last 20 years, which were of 176 operations in 1993 and passed to 796 annual operations in 2013 (KPMG, 2013). Such operations consist in simple acquisition of actions, above 10% of fusions or incorporations with or without the exchange of the equity control. These economic alterations provoked by the

representative volume of fusion and acquisitions operations, allied to the financial scandals in 2001 and to the sub-prime crisis in 2008 had been demanding a more solid corporate and management environment from the emerging capital markets, including the Brazilian. Thus, the transparency from the executive actions and the search for the maximization of richness of the owner with the greatest performance from the company turns into one of the orienting principles of the executive actions in the organizations.

Another factor that justify the current research is its amplitude and depth when compared with the other researches made on the Brazilian capital market. The existing researches did not perform the temporal clipping of five years as it was made by this study, observing the post-fusions and acquisitions period in four years, as the sensibility analysis. Additionally, this study contemplates the improvement of instruments to measure the companies' performance, because, until then, national and international studies performed an evaluation of the performance with the return of actions. As the proposal of this study is to evaluate the performance of companies with the application of Graham's filters, the evaluation is being made with the application of accounting and financial indicators which indicate the market standards, financial health and profit stability of the companies after the fusions and acquisitions. This way, it is possible to provide a detailed analysis about the performance of the companies that passed through fusions and acquisitions, enabling another method of evaluation to the investor, besides the simple abnormal return of stocks.

2 THEORETICAL FRAMEWORK

2.1 Mergers and acquisitions

The research focus was to study the fusions, acquisitions and incorporations with an exchange of the equity control. However, Silva, Gallo, Pereira and Lima (2004) explain that the incorporation meaning used in Brazil differs from the North-American and European concepts, which considers this operation as a special type of fusion. Due the international literature deals about fusion and incorporations as a corporate restructuring, following up will be approached only the concepts about fusions and acquisitions.

The transference of propriety and control of a company might occur in two ways: the company is acquired by a group of people or by another company; or the company merges itself with another, occurring the combination of business. Both situations will be denominated as takeover. it is common to denominate a company that assumes the control as an acquiring company as *acquirer* or *bidder,* while the sold company is called as target company or acquired company (Berk & Demarzo, 2009).

The fusions and acquisitions are often classified about their payment method and the commercial relation between the acquiring company and the target company. In what concerns the payment method, the fusions and acquisitions can occur with a cash payment, stock exchange (stocks from the acquiring and target companies) or as the combination of both ways (Berk & Demarzo, 2009).

The fusions and acquisitions operations aren't completely assimilated and broken down in a general theory that serves them as a support. For Kloechner (1994), what happens is a group of explanations that propose to assure some legitimacy, derivative from some aspects from the company's theories. Referring to the question about efficiency and gains (synergy), Weston (1994) presents five different hypothesis that explain the fusion and acquisitions activity, according to table 1.

Table 1
Hypotheses about the efficiency and gains in mergers and acquisitions

Hypotheses	Theoretical arguments
Efficiency	A fusion and acquisition can improve the as much as the company's performance as to produce a more efficient company, due the obtainment of some kind of synergy.
Information	Short-term effect caused by the quotation of the companies' stocks involved on the market that tries to incorporate the result into the price or to the union's unfolding.
Bank branch	The fusions and acquisitions can be a mechanism to minimize the agency's problems and costs.

Continue

Table 1 (continued)

Hypotheses	Theoretical arguments
Market power.	If the economies expected by the fusions and acquisitions do not occur, the increase of concentration was motivated by gain of monopoly.
Taxes	Fusions and acquisitions are motivated by tax gains.

Note. Source: Weston, J. F. (1994). The payoff in mergers and acquisitions. In M. Rock, R. H. Rock & M. Stroka (editors). *The mergers and acquisitions handbook* (2a ed.). New York: McGraw-Hill.

Besides these hypothesis or explanations for the activity of fusions or acquisitions, Kloechner (1994) and Camargo and Barbosa (2003) present the hypothesis of: maximization of richness, maximization of management utility, operational gains (synergy), new information, market efficiency, gain efficiency, diversification.

The fusions and acquisitions occur when the acquiring company believes into add economic value through the acquisition, something the ordinary investor wouldn't be able to do (Nardi, 2012). Berk and Damarzo (2009) describe that the fusions and acquisitions generate an increase of value, which is a result from the synergy created by the combination of two companies. This is the most used reason to justify the performed business, even if there's the need to pay the additional prize to the market value.

For Berk and Damarzo (2009), the synergy and its consequent creation of value has its origin from two sources: a) the increase of revenue generated by the union of two companies promote the opportunity of acting in new markets, with new products and an extension of the number of clients and consumers; b) the synergy generated through the reduction of costs is usually obtained by the elimination of duplicated areas and by the optimization of the remaining resources.

2.2 Performance of the companies

The focus of this study does not refer to the evaluation of the corporate performance measured just by the return of stocks for the decision making, but to the evaluation of performance considering, besides the return of actions, the financial health and the profit stability from the companies, points contemplated by the 7 filters of Graham,

it is comprehended that several factors have influence over the stock's prices, the internal stocks as with the ones related to the performance of the companies that issue stocks, as the external ones, related to the country's economy. For Mellagi and Ishikawa (2003, p. 274): "... To handle the innumerable factors, it is more then necessary the comprehension about the statistical methods for the evaluation of the investments' risks". In face of the pricing models, which are essentially mathematical and statistical, this understanding is comprehended at the extent that the return evaluation only makes sense if it is estimated with the risk involved on the investment. This way, to put a price on an asset or to put a price in an expected return over a risky investment, statistical knowledges are needed.

The selection of assets based in a series of filters, that might be determined by multiples of market and other economic-financial indicators, is known as the passive filtration, idealized by Graham e Dodd (1951). The authors identified certain characteristics on the companies, such as good management, low risk and good profits as determining to allow the stock of these companies to perform above the market and translated these qualitative characteristics into quantitative characteristics that might be used to identity promising investments.

The idea of what really represents an investment is singular for these authors that concepts it as "an operation that, after a deep analysis, promise the safety of the main thing and a proper return" (Graham & Dodd, 1951, p. 43).

Artuso (2012) address that on the first edition of *Security Analysis* from 1934, Dodd and Graham presented the ten filters to identify the assets with a promising return. On the posterior editions, the filters suffered minor adjustments. In 2003, the Graham's filters returned into discussion with the publication of the novel "*The Intelligent Investor*", from Benjamin Graham.

For Artuso (2012), Graham's filters performed a valuation. The themes are from the interest of the fundamentalist analysis, on the extent that it searches for the identification of

companies with good accounting/financial foundations and undervalued by the market. Thus, Benjamin Graham was considered the creator of valuation. Such foundations compose a new form of evaluation that value the financial health of the company and the lower cost for investments. To clarify better the situation of these ten filters, it fits a discussion a bigger depth about each one of them.

Filter 1 (F1) – A profit/price index equal to the double of the income of a fixed income title classified as AAA (low risk) (Graham & Dodd, 1951). This filter identifies the relation of profit with the stock price and, if such relation overcame the double of the income of a AAA title, it is practically free from risks. Its goal is to identify stocks from the companies that produce an income higher than a title free from risks. The AAA classification is given by agencies such as Moody's and Standard & Poors, which evaluate the risk from the titles. In this study, it was used the annual average Selic rate, which renumber the public titles in Brazil for the five years of analysis, for a year before and four years after the researched event (fusions and acquisitions). The Selic rate in Brazil is high: in 2010, which was the last year of the study analysis, the rate was at 10,03%, while it stays in the range of 0,25% in the United States. This way, it is not common for the companies present a good evaluation in this Graham's filter (Artuso, 2012).

Filter 2 (F2) – Multiple price per Profit, P/L, from a stock lower than 40% of the average P/L of the market over the last five years (Graham & Dodd, 1951). This filter also relates the price of stocks and profit as the same filter number 1, but it compares the result of the same relation of existing titles on the market over the last five years. The filter aims the identification of stocks with the price below 40% of the profit on the average of the last five years, so such stocks can be undervalued (Artuso, 2012).

Filter 3 (F3) – Dividends ratings higher than two thirds of the income of a fixed income title classified as AAA (low risk) (Graham & Dodd, 1951). Besides the return with the liquidity of stocks, the investor receives a dividend yield, which is distributed to the shareholder in established dates. This filter aims the identification of investments that renumber, through dividends, two thirds of the income of a title free of risks and classified at the AAA level. In this study, the Selic rate was used to represent such titles free from risks (Artuso, 2012).

Filter 4 (F4) – Price inferior to two thirds of the Tangible Book Value, comprehended as Net Equity minus the Intangible Asset (Graham & Dodd, 1951). This filter makes a relation with the total price of stocks. it is inferior than two thirds of the company's Tangible Book Value. This filter searches the identification of understated stocks, granting them a good safety margin. Normally, the researchers use the net equity, but Graham is more conservative and removes the intangibles assets from the analysis, because they might present elevated distortions. Within the logic of this filter, it is possible to acquire companies at a value that reaches 33% of the net equity (Artuso, 2012). To exemplify, it is commented a hypothetical case where if a company had reached the market value, it would correspond to 33% of its net equity. This means that, in the event of a purchase, the investor would pay R$0,33 for each R$1,00 from the company's wealth, representing an interesting business to be acquired.

Filter 5 (F5) – Price inferior to two thirds of the net capital, comprehended as a circulating asset minus the total debt (Graham & Dodd, 1951). The total debt corresponds to the short and long terms debts. This filter is related with the stock price along with the net capital. It can be considered as the most restrictive of all. it is the most powerful criteria to identify if the company is being undervalued, because it deals about the comparison of the price market with the net assets of the company and to turn them into currency. When the filter is attended, it would be possible to acquire a company without paying the assets. it is rare to attend this Graham filter when the market is in abundance, but to find a company in these conditions is a relevant opportunity (Artuso, 2012).

Filter 6 – Total debt lower than the Tangible Accounting Value (Graham & Dodd, 1951). With this filter, the financial risk of the company is analyzed, corresponding to an indebtedness index, which indicates the company's capital structure. The filter aims the evaluation of the company's capacity to increase its tangible accounting value and to reduce the total debt, in other words, the filter evaluates the company's financial strength producing more financial resources than its financial need (Artuso, 2012). Graham (2007) describes that a representative business generates more money than it consumes, and that good managers use the money in a

productive way. On the long term, the companies that keep this standard will have extend their market value, regardless the growth of other companies.

Filter 7 (F7) – Circulating asset more than the double of the circulating asset (Graham & Dodd, 1951). This filter corresponds to the current liquidity index. There's always the search for companies that present a current liquidity higher than 1. It represents that the companies own resources to settle their short-term debts. This is a conservative criterion for Graham, who establishes an ideal index higher than 2 (Artuso, 2012). The author reveals that in 2010, the current liquidity of the open companies reached the level of 1,45%.

Filter 8 (F8) – Total debt twice lower than the Net Capital (Graham & Dodd, 1951). This filter identifies the modified liquidity index. A company conservatively financed would have at its disposal at least half of its debts value, which would concede a very low value of noncompliance (Artuso, 2012).

Filter 9 (F9) – Profit growth by an action higher than 7% during the last 10 years (Graham & Dodd, 1951). For Graham (2007), is the stocks' profits have a stably growth of at least 6% or 7% over the last ten years, the company that generates stable money and its growth perspectives are good. The biggest problem of the negotiated company are the market multiples, target of the first five filters and that have a low growth (Artuso, 2012).

Filter 10 (F10) – Not more than two years of cash profit in decline of 5% or more over the last ten years (Graham & Dodd, 1951). This last filter has the goal to identify the profit stability in a way that the objective is only that the companies that present low variation in their profit, indicating a sustainable growth, be able to become a part of the investor's portfolio (Artuso, 2012).

After the seminal work of Graham and Dodd (1951), new researchers arisen, disseminating and using Graham's filters principles. Lander, Orphanides and Douvogiannis (1997) formalized the observation made by Graham and Dodd, where the evaluations about stocks and titles are connected by a balance relationship between the income of the dividends previewed and the real income by the titles. Where the stocks' prices tend to move to restore deviations through this balance. With the econometric model, the researchers obtained provisions with one month in advance.

Bildersee, Chen and Zutshi (1993) reported that the investment strategy made by Benjamin Graham seemed to be working on the Japanese stock market. The authors found results that indicated that the return of the elaborated portfolio based on Graham's filters is positive and tends to overcome the return of other portfolio that does not apply to the filters referred on the Japanese stock market.

Arnott, Hsu and Moore (2005) examined a series of thoughtful indexes from the stock market through fundamental metrics instead of the capitalization of market. They've concluded that these indexes provided consistent and significant benefits in relation to the standard market indexes. They showed annual returns that are, in average, 213 points above of the equivalent thoughtful capitalization indexes over the period of 42 years of the study.

Bogle (2008) mention that the principles of simple investments defended since 1951 by Benjamin Graham remain valid until 2008. Investments strategies became much more active. The financial sector has been performing a dominant role in the global economy. In other article, Bogle (2009) traces the causes of the 2009 financial crisis, indicating changes in the ethical values, quoting a list of violations from the fiduciaries duties by managers of mutual founds. Based on the wisdom of Harlan Fiske Stone, Benjamin Graham and John Maynard Keynes, Bogle defends a federal low of fiduciary duties for institutional managers.

Calandro (2009) studied how the high executives in a variety of economic sectors can find important lessons on the sixth edition of the recently published by Graham and Dodd (2008). This document includes an interview with the main editor of the book, the investor editor Seth Klarman, who explains key strategic lessons that the non-financial executives can learn with the concepts of investments and methodology

Cheung (2010) reported that Benjamin Graham, the father of value investments, argued that the stock market suffers from a humor disorder known as bipolar disorder. Warren Buffet and John Maynard Keynes also endorsed the idea that the market psychology has an influent role to play on the stock market. The author's explanation uses three market bubble as

illustration: Japanese bubble of 1990; Internet bubble of 2000 and the sub-prime mortgage crises of 2007.

Woods (2013) reported in his study that a British economist called John Keynes would've admitted, in 1938, that his approach to the investment portfolio management in ongoing stocks would've dramatically changed. Keynes would've abandoned the speculator profile in favor of an investor profile, a careful selection of some investments considering its low prices and potential of intrinsic value in the prior year of the acquisition; thus, he was applying the filters of Benjamin Graham.

Artuso and Chaves (2010) intended to comprehend the Brazilian stock market and, thus, they analyzed effective strategies for the small investor. They proposed the application of Graham's filters for the selection of companies to purchase stocks in the period from 1998 to 2009. The portfolio indicated by Graham's filters produces abnormal returns superior to Ibovespa; however, the portfolio presented a low diversification.

Kreuzberg, Beck, Gollo, & Rosa (2014) evaluated an investments portfolio from the companies listed at the corporate governance levels at BM&FBovespa, through the application of Graham's filters in accordance to the Brazilian context. Up next, they applied the analysis of the main components, searching the dimension of variables. The results indicated that the stability criteria on the profits presented a reduced quantity of adapted companies, followed by the sixth criterion. On the other hand, criteria 1 and 7 demonstrated a higher adequacy index. They verified that only 22 companies presented themselves in accordance with all seven criteria analyzed by Graham's filters.

Ferreira and Santos (2014) compared the performance efficient of a portfolio generated by the application of Graham's filters (portfolio A) and another one originated from employment to Elton-Gruber model (portfolio B), having as scope the ordinary stocks listed at BM&FBovespa during the period from 2008 to 2012. Portfolio B presented a higher return, but a higher risk than portfolio A. Portfolio B would be an investment more proper to the profile of an aggressive investor, while portfolio A would be better suited for the expectations of a conservative investor.

Zin and Tarso (2016) verified the efficiency of Graham's filters and the efficient frontier modal by Harry Markowitz to define the participation of each asset on the composition of portfolios. The period studied comprehend the years from 2006 to 2010, two years before and two years after the global crisis of 2008. The results showed that it is possible to minimize the risks and to obtain returns superior than Ibovespa's index, composing portfolios with a small number of assets.

Artuso (2012) aimed the comprehension of the Brazilian capital markets, proposing and analyzing strategies about the selection of portfolios. The best results were achieved by the filtration model made from Graham's filters, where the annual return was of 39,78% faced with the return of 12,37% from Ibovespa. Thus, the used techniques allowed a higher comprehension about the stock market and indicated a possibility to systematically identify sub-evaluated assets and to obtain the exceeding returns.

Passos (2006) explains that the fundamentalist analysis has been a strong ally from the capital market and has Benjamin Graham as one of its main exponents. The author explained Graham's concepts, adapting them to the Brazilian reality and considers the research an advance on the learning of variables that correlate with the capitalization marketing, contributing for future investors.

In short, Graham's filters were idealized by Benjamin Graham and David Dodd on the book *Security Analysis* from 1934 (first edition). After that, there was the publication of the book *The Investor Intelligent* in 2003 and, in the sequence, the number of articles' publication is considerable. With these facts, it is noticed that after 2005, the discussions around Graham's filters were intensified. This might be linked to a higher concern from the investors with their investments and the filters might be attending their evaluation needs.

3 METHODOLOGICAL ASPECTS

The research delineation consists on its planning and relates itself to the adopted methodology, considering the environment where the data are collected and to the ways of control from the variables involved (Gil, 2006). For Kerlinger (1980), the delineation of a study

relates itself to the way where the research problem is conceived and to the structure used for the experimentation, collect and analysis of data.

Hair, Babin, Money, & Samouel (2005, p. 86) described that “the descriptive research plans, in general, are structure and specifically created to measure the characteristics described in a question of a research”. In relation to the documental research, Gray (2012) states that the use of documents consists in one of the most used non-evasive ways, because it might be used documents that bring financial, political and legal registrations from organizations or institutions. Inserted in this context, the characteristics from this study allow to classify it as a descriptive research with a quantitative approach, performed through a documental research.

Martins and Theóphilo (2009) recognize as mains feature the typology of the data, information and evidences sources that are exclusive from the documents of primary sources, material compiled by the researchers that haven’t been an analysis study object or worked according with the research goals. I this research, the collection of data was from the documental type from the accounting, financial and market data, available a Economática® database and corporate data published in sites of BM&FBovespa S.A. e CVM - Commission of Furnishing Values, disclosed by the investigated companies, which evinced characteristics of secondary sources that did not received an analytical treatment.

The composition of the research population was defined considering the open capital companies listed at BM&FBovespa S.A. The choice of open capital companies occurred due the fact they widely disclose their accounting, financial, market and corporate information. With the definition of the population, it was performed a consulting by date along with the Commission of Furnishing Values (CVM) in “relevant facts” and it is being granted access to all important communicates that the companies disclosed to their shareholders. Searching only notifications about fusions, incorporations and acquisitions, it was reached the final sample of forty-two companies, according to table 2.

Table 2
Composition of the sample

Year	Listed companies	(-) Financial and insurance companies	(=) Population	(=) Number of mergers and acquisitions
2006	394	(90)	304	2
2007	449	(96)	353	13
2008	439	(111)	328	7
2009	434	(115)	319	11
2010	471	(114)	357	9
Total	**2,187**	**(526)**	**1,661**	**42**

Note. Source: Research data.

Based on the notifications disclosed by CVM, it was constructed the international sample, obeying some criteria according with Wang and Xie (2009), such as: a) business established between 2006 and 2010; b) fusions, incorporations and acquisitions with an exchange on the equity control; c) operations with value above U$1 million and 1% of the market value; d) in situations where the purchaser company performed several acquisitions, it was only considered the one with the higher value. As a result, from the application of these criteria, it was constituted the final sample, that aims to represent, with the highest reliability possible, all of the corporate and structural transformations suffered by the companies that perform fusions and acquisitions, attending better the study goals. On table 2, it is observed the number of companies listed at BM&FBovespa between 2006 and 2010. It was extracted the financial institutions and insurance companies due the peculiarity from the SFN – National Financial System.

The target year to perform the analysis of fusions and acquisitions was 2010, due the post-event evaluation of a four years of performance from the companies. Thus, the event that occurred in 2012 had its post-fusions and acquisitions analysis performed in 2011, 2012, 2013 and 2014. This way, it is considered as a recent period of analysis within the availability of the data disclosed by the companies. It was established this recent clipping due the fact it is within the growth cut of the fusions and acquisitions indicated by KPMG (2013).

After the identification of fusions and acquisitions, it was performed the calculation of performance using Graham's filters. For this, it was made the collection of data along with Economática®. It was extracted economic, financial and corporate data from the forty-two companies listed for the construction of the seven Graham's filters. For each company, it was collected information of one year before and four years after the fusions and acquisitions, totalizing five years of information for the calculation of 1.470 operations.

The second preparation stage for the companies' performance data was the elaboration of an aggregated ranking of the information obtained over the seven resulting indexes from the application of Graham's filters; To compute the aggregated measure, it was applied the multi-criteria method, known as Technique *for Order Preference by Similarity to Ideal Solution* (TOPSIS), developed by Hwang and Yoon (1981). The TOPSIS technique is fundamental on the alternatives ranking to obtain the best solution among them, which is near the ideal solution, considering the distance from the ideal and anti-ideal solutions (Bulgurcu, 2012). According to this technique, the best alternative should be the one that's near the ideal solution and far from the negative ideal solution (Benitez, Martin, & Roman, 2007). For the calculation of the TOPSIS method, the coefficient variance concept was additionally applied.

4 PRESENTATION AND ANALYSIS OF RESULTS

In this section, it is explained about the mathematical and statistical procedures adopted to calculate the companies' performance, which used seven Graham's filters a which were turned into a ranking by TOPSIS. For this, it was collected economic, financial and corporate data from Economática® database from the forty-two companies listed on the sample.

Up next, about the collected data, the following mathematical formula was applied for the filters: F1, F3, F4, F5, F6, F7 e F8. Filters F2, F9 and F10 weren't applied in this study, because they need data with the average of 5 to 10 years posterior to 2010, which weren't available until the performed collection. Artuso and Chaves (2010) described that the first five filters refers to the market multiples and the filters from 6 to 8 are related to the financial health. Differently from the research performed by Artuso (2012), which considered just the companies that attended 100% of Graham's filters, this study considered the levels of achievement from the filters and made a ranking of the companies through TOPSIS. The seven Graham's filters were applied on the forty-two companies in five years, a year before the event (t-1) and four years later (t+1), (t+2), (t+3) and (t+4). It was found seven indexes of the filters per year in five years, referring to forty-two companies, totalizing 1.470 results from Graham's filters. TOPSIS was used to group seven indexes of the years and to provide a position in the ranking for the company.

The TOPSIS method is a technique to evaluate the performance of alternatives through the similarity with the ideal solution (Hwang & Yoon, 1981). According to the same author, accordingly with this technique, the best alternative would be the one near the ideal solution, composed by all achievable values of the benefits criteria. However, the ideal negative solution consists in all of the worst achievable values from the criteria of the goal proposed in this study.

Furthermore, as a complementary procedure, it was applied the variation coefficient technique along with TOPSIS, which identified the results from the filters that had a higher variation, giving them a higher weight on the formula, as presented on table 3. The variation coefficient is used to identify the filters with higher relevance for the companies and to consider them on the TOPSIS ranking.

Table 3
Weight of Graham filters

	F1	F3	F4	F5	F6	F7	F8
T – 1	6.03%	4.87%	4.21%	71.71%	3.29%	2.03%	7.87%
T + 1	30.80%	2.15%	1.90%	16.04%	1.45%	0.75%	46.90%
T + 2	3.85%	0.84%	0.93%	2.90%	0.70%	0.39%	90.39%
T + 3	86.06%	1.38%	0.98%	3.36%	1.06%	0.52%	6.64%
T + 4	32.69%	9.37%	10.43%	17.25%	6.71%	2.66%	20.89%

Note. Source: Research data.

Based on table 3, it is verified on the period pre-fusions and acquisitions (t-1) that filter 5 (F5) concentrated the heaviest weight, 71,71% from the TOPSIS ranking index. On the period post-fusions and acquisitions specifically one year later (t-1), we have filter one (F1), with 30,80%, and filter eight (F8) with 46,90%, sharing the heaviest weights of the generated ranking. Two years later (t+2), filter eight (F8) presented to surprising weight of 90,39%. On the third year after the fusion and acquisition, filter one (F1) presented a higher weight, with 86,06%. Lastly, the weight became better distributed on the fourth year. However, it is verified that the filters one (F!) and eight (F*) had higher weights, filter one with 32,69% and filter eight with 20,89%. These differences occur because the filters that produced a higher weight had a higher variation of used data. Thus, higher the difference of results in a certain filter, higher its weight by the variation coefficient.

After the TOPSIS application, with the variation coefficient over the seven Graham's filters, it was obtained the companies' performance, according to table 4. This analysis allows the identification of the companies that better attend the seven Graham's filters simultaneously, generating an innovative way to evaluate the performance post-fusions and acquisitions. It we generated five rankings, one for the period pre-fusions and acquisitions, and four for the post-fusions and acquisitions period.

Table 4
Companies' performance rank

NAMES	t - 1	RT	t + 1	RT	t + 2	RT	t + 3	RT	t + 4	RT
ANDRADE GUTIERREZ CONCESSOES S.A.	0.312	29	0.519	31	0.352	35	0.808	33	0.857	24
ALL AMERICA LATINA LOGISTICA S.A.	0.396	15	0.530	28	0.391	26	0.806	34	0.855	29
ARTERIS S.A.	0.291	36	0.460	39	0.261	42	0.818	29	0.831	39
BRASKEM S.A.	0.211	41	0.466	38	0.364	33	0.822	27	0.855	28
BRF S.A.	0.385	17	0.597	13	0.553	11	0.823	26	0.861	21
BROOKFIELD INCORPORAÇÕES S.A.	0.591	3	0.695	3	0.663	6	0.881	4	0.852	31
CCR S.A.	0.194	42	0.506	35	0.328	40	0.826	23	0.854	30
CIA ENERG. DE MINAS GERAIS - CEMIG	0.473	8	0.484	36	0.339	37	0.915	1	0.880	3
COSAN S.A. INDUSTRIA E COMERCIO	0.324	25	0.537	25	0.392	25	0.907	2	0.859	22
CPFL ENERGIA S.A.	0.270	38	0.516	32	0.370	30	0.840	16	0.856	26
DIAGNOSTICOS DA AMERICA S.A.	0.342	23	0.555	22	0.437	22	0.825	24	0.858	23
DURATEX S.A.	0.250	40	0.581	14	0.474	18	0.845	13	0.865	12
ECORODOVIAS INFRAEST. E LOGÍST. S.A.	0.298	34	0.538	24	0.351	36	0.833	20	0.868	10
FIBRIA CELULOSE S.A.	0.303	32	0.529	29	0.329	39	0.766	38	0.851	32
FLEURY S.A.	0.594	2	0.603	11	0.515	13	0.829	22	0.871	6
GAFISA S.A.	0.595	1	0.841	1	0.619	7	0.864	9	0.843	37
GENERAL SHOPPING BRASIL S.A.	0.305	30	0.562	18	0.475	17	0.800	36	0.848	34
METALURGICA GERDAU S.A.	0.337	24	0.555	21	0.421	24	0.861	11	0.864	13
GOL LINHAS AEREAS INTELIGENTES S.A.	0.483	7	0.422	40	0.606	8	0.823	25	0.840	38
HYPERMARCAS S.A.	0.350	21	0.641	6	0.581	10	0.804	35	0.856	27
INVEST. PART. EM INFRA S.A.-INVEPAR	0.387	16	0.508	34	0.330	38	0.789	37	0.843	36
JBS S.A.	0.416	12	0.528	30	0.445	20	0.832	21	0.857	25
LIGHT S.A.	0.415	13	0.531	27	0.360	34	0.874	7	0.863	14
LUPATECH S.A.	0.298	33	0.484	37	0.380	29	0.203	41	0.027	42
MARFRIG GLOBAL FOODS S.A.	0.342	22	0.556	20	0.368	31	0.753	39	0.817	41
OI S.A.	0.353	20	0.546	23	0.711	3	0.881	5	0.921	1
CIA BRASILEIRA DE DISTRIBUICAO	0.464	9	0.636	7	0.594	9	0.839	17	0.863	16
PDG REALTY S.A. EMPREEND E PARTIC.	0.421	10	0.778	2	0.803	1	0.862	10	0.873	5
PETROLEO BRASILEIRO S.A. PETROBRAS	0.513	5	0.600	12	0.423	23	0.877	6	0.866	11
RENAR MACAS S.A.	0.312	28	0.398	41	0.306	41	0.082	42	0.862	20
SANTOS BRASIL PARTICIPACOES S.A.	0.305	31	0.572	16	0.388	27	0.821	28	0.863	17
SCHULZ S.A.	0.278	37	0.604	10	0.504	16	0.868	8	0.871	7
CIA SIDERURGICA NACIONAL	0.269	39	0.644	5	0.453	19	0.845	14	0.870	8
TRANS. ALIANÇA ENERGIA ELÉTRICA S.A.	0.318	27	0.561	19	0.437	21	0.890	3	0.879	4
TRACTEBEL ENERGIA S.A.	0.320	26	0.531	26	0.380	28	0.837	19	0.862	18
CTEEP - CIA TRANS. ELÉTR. PAULISTA	0.418	11	0.570	17	0.505	15	0.855	12	0.884	2

Continue

Table 4 (continued)

NAMES	t - 1	RT	t + 1	RT	t + 2	RT	t + 3	RT	t + 4	RT
TPI - TRIUNFO PARTICIP. E INVEST. S.A.	0.296	35	0.165	42	0.367	32	0.810	31	0.850	33
ULTRAPAR PARTICIPACOES S.A.	0.358	19	0.579	15	0.513	14	0.810	32	0.863	15
VANGUARDA AGRO S.A.	0.491	6	0.514	33	0.667	4	0.686	40	0.847	35
VIA VAREJO S.A.	0.398	14	0.620	9	0.667	5	0.811	30	0.862	19
VULCABRAS/AZALEIA S.A.	0.372	18	0.631	8	0.553	12	0.844	15	0.826	40
WEG S.A.	0.563	4	0.681	4	0.735	2	0.839	18	0.868	9
Average	**0.372**		**0.556**		**0.469**		**0.800**		**0.839**	

Note. Source: Research data.
Legend: RT – *Ranking TOPSIS*

Graham's filters were a choice to perform the evaluation of performance considering the economic, financial and corporate data. This study did not evaluate if the company was approved or not by the filter, according to Artuso (2012) research, but by the percentage of achievements, in other words, nearest to 100%, the best.

The ranking of the seven Graham's filters by TOPSIS contributed significantly to measure the performance of corporations in the middle of the sub-prime crisis that occurred in 2007, due the fact it related the performance indicators of the company with other companies. This might have contributed for the realization of an exempt performance evaluation in face of the crisis' reflexes.

The application of the TOPSIS contributed to transform the results of the seven Graham's filters in a single indicator, the ranking, exposed on table 4. Through TOPSIS is possible to verify which company is on the top of the ranking or in a lower position. Higher the position on the ranking, better the jointly achievement level of the seven Graham's filters in relation to the other companies in the sample group.

On table 4 it is possible to verify that the performance of the companies by Graham's filters have a growth over the analysis pre-and post-fusions and acquisitions. This was determined based on the average during the period (t-1), which was of (0.372) in comparison with the post-fusions and acquisitions period. They are: period (t + 1) with (0,556); period (t + 2) with (0,469); period (t + 3) with (0,800) and period (t + 4) with (0,839). This average increase is statistically different, confirmed by the test *t of student*. it is believed that the evolution of performance might be linked to the event of fusions and acquisitions, which consists in provide a higher safety to the investor that bet in the acquisition of companies' stocks that wen through fusions and acquisitions. And it is still noticed that, over the fiver years analyzed, several companies had positive and negative modifications in their positions on the ranking, evincing a position pre-fusion and acquisition on the ranking that was not kept static during the four subsequently years to the post-fusion and acquisitions period.

These modifications on the ranking can be explained by the behavior of the data used on the basis of each one of Graham's filters. In this temporal clipping of the periods (t-1) to (t+4), occurred several modifications on the stock prices, market value and on the dividend rates used n filters F1, F3, F4 and F5. It also occurred modifications on the economic-financial indicators of the companies, such as: accounting indicator of the liquid capital, total debt, tangible accounting value, total of circulating assets and from the circulating passive used on filters F6, F7 and F8.

Several works analyzed the applicability of Graham's filters assumptions on the Brazilian and international capital markets (Lander, Orphanides & Douvogiannis, 1997; Bildersee, Chen & Zutshi, 1993; Arnott, Hsu, & Moore, 2005; Passos, 2006; Passos & Pinheiro, 2009; Artuso & Chaves, 2010; Artuso, 2012; Silva, Silveira, Del Corso, & Stadler, 2011; Woods, 2013; Kreuzberg *et al.* 2014; Ferreira & Santos, 2014; Zin & Tarso, 2016)

In face of the results showed on table 4, it is inferred that the companies that improved their ranking in relation to the other companies are worried with the return of investments by the shareholders. Thus, the act on the alignment of interests between managers and shareholders. In relation to the companies that fell down in the raking, it is possible that their managers weren't able to keep their superior performance or weren't able to overcome the performance of

the group of purchaser companies. Thus, the problems with shareholders became livelier due the lower return occurred on the post-fusion and acquisition period.

As a complementary procedure, it was made the replacement of the companies' development by Graham's filters via TOPSIS by the simple return of stocks. This represents the withdrawal of economic and financial indicators of the performance evaluation. However, the return of stocks is a metric frequently used on the studies about corporate performance.

For this, it is initially presented the performance of the forty-two companies, calculated by the return of stocks on the periods (t – 1), (t + 1), (t + 2), (t + 3) and (t + 4), according to table 5. The calculation over the return of actions was obtained with the division of the stock's price from the year of analysis with the price of stock previous year, always using the quotation of actions from the last day of cry in the year.

Table 5
Companies' performance by returning shares

NAMES OF COMPANIES	t – 1	t + 1	t + 2	t + 3	t + 4
ANDRADE GUTIERREZ CONCESSOES S.A.	0.356	0.014	0.463	0.121	0.009
ALL AMERICA LATINA LOGISTICA S.A.	0.374	0.082	-0.534	0.938	-0.516
ARTERIS S.A.	0.356	-0.334	-0.434	1.777	0.791
BRASKEM S.A.	1.537	-0.348	0.045	0.641	-0.135
BRF S.A.	-0.317	0.219	0.364	0.163	0.184
BROOKFIELD INCORPORAÇÕES S.A.	-0.387	2.342	0.125	-0.410	-0.229
CCR S.A.	0.779	0.084	0.646	-0.048	-0.093
CIA ENERGETICA DE MINAS GERAIS - CEMIG	0.049	0.023	0.372	0.031	-0.002
COSAN S.A. INDÚSTRIA E COMERCIO	-0.528	1.278	0.100	-0.001	0.578
CPFL ENERGIA S.A.	0.160	-0.034	0.266	0.257	0.340
DIAGNOSTICOS DA AMERICA S.A.	1.555	-0.307	-0.147	0.110	-0.229
DURATEX S.A.	-0.675	0.120	-0.384	0.712	-0.004
ECORODOVIAS INFRAESTRUTURA E LOGÍSTICA S.A.	0.356	0.134	0.266	-0.101	-0.191
FIBRIA CELULOSE S.A.	0.356	-0.322	-0.464	0.627	0.225
FLEURY S.A.	0.356	-0.189	0.088	-0.179	-0.039
GAFISA S.A.	0.356	-0.682	1.721	-0.139	-0.649
GENERAL SHOPPING BRASIL S.A.	0.356	-0.869	2.767	0.531	-0.133
METALURGICA GERDAU S.A.	0.682	0.767	-0.217	-0.313	0.302
GOL LINHAS AEREAS INTELIGENTES S.A.	-0.026	-0.772	1.632	-0.006	-0.500
HYPERMARCAS S.A.	0.356	2.003	0.127	-0.621	0.955
INVESTIMENTOS E PARTICIP. EM INFRA S.A. - INVEPAR	0.356	0.014	0.463	0.121	0.009
JBS S.A.	-0.177	-0.228	-0.152	-0.013	0.476
LIGHT S.A.	0.336	0.248	-0.150	0.040	-0.153
LUPATECH S.A.	0.881	0.160	-0.290	-0.769	-0.560
MARFRIG GLOBAL FOODS S.A.	-0.508	-0.187	-0.445	-0.007	-0.528
OI S.A.	0.776	0.228	-0.246	-0.075	0.152
CIA BRASILEIRA DE DISTRIBUICAO	-0.085	0.077	-0.022	0.363	0.171
PDG REALTY S.A. EMPREEND E PARTICIPACOES	0.356	-0.547	2.112	0.187	-0.409
PETROLEO BRASILEIRO S.A. PETROBRAS	0.409	-0.461	0.659	-0.230	-0.183
RENAR MACAS S.A.	0.068	-0.353	-0.572	-0.444	0.467
SANTOS BRASIL PARTICIPACOES S.A.	0.356	-0.754	1.734	0.361	0.135
SCHULZ S.A.	-0.447	0.807	0.129	-0.173	0.332
CIA SIDERURGICA NACIONAL	0.447	-0.432	1.079	-0.016	-0.407
TRANSMISSORA ALIANÇA DE ENERGIA ELÉTRICA S.A.	0.868	0.567	0.939	-0.073	0.203
TRACTEBEL ENERGIA S.A.	0.299	-0.050	0.209	0.322	0.162
CTEEP - CIA TRANSMISSÃO ENERGIA ELÉTRICA PAULISTA	0.486	0.350	0.181	0.180	-0.397
TPI - TRIUNFO PARTICIP. E INVEST. S.A.	0.356	-0.855	4.713	0.759	-0.017
ULTRAPAR PARTICIPACOES S.A.	0.356	0.005	0.463	0.121	1.778
VANGUARDA AGRO S.A.	1.504	-0.680	0.357	-0.070	-0.685
VIA VAREJO S.A.	0.356	0.014	0.463	0.121	0.009
VULCABRAS/AZALEIA S.A.	1.077	-0.065	0.519	0.069	-0.723
WEG S.A.	0.828	-0.491	0.519	0.220	-0.113
MEDIUM	**0.356**	**0.014**	**0.463**	**0.121**	**0.009**

Note. Source: Research data.

Through the annual averages, it is verified that on the pre-fusions and acquisitions period, the average return was kept in (0,365). On the period (t+1), it is noted that the return had a significantly drop to (0,014). On the period (t+2), it occurred a return of (0,463), which is expressly and superior than the period (t-1). On the period (t+3), the return of stocks was kept in (0,121) and, finally, it was kept in (0,009) on the period (t+4).

It was applied the test t *Student* of an average difference between the periods (t-1) in relation to periods (t+1), (t+2), (t+3) and (t+4), and it was determined that the averages are statistically different, except for the comparison between the periods (t-1) and (t+2).

Based on the averages, it is verified that on the prior period to the event of the stocks' prices showed a growth, maybe explained by the good reputation of the company on the capital market or by the pre-visualization of a corporate recovery by the investors, that search a higher return with the new formed companies.

On the post-fusions and acquisitions period, it is possible to notice that the return of stocks was positive between the four years of analysis. The highest index was identified on the second period after the event. Due the fact there was not any kind of negative averages, it is stated that the average price of the stocks had a growth or was kept during the four years of analysis. The possible explanation for the return of actions might been the growing economic-financial development after the corporate restructure. The results on table 4 corroborate the data of table 4, also indicating growing results of performance of the post-fusions and acquisitions companies.

5 CONCLUSIONS

This study aimed the verification of performance from the companies that passed through fusions and acquisitions through the measurement of Graham's filters. Forty-two fusion and acquisition events were identified, which Graham's filters were applied over the four posterior years with the support of the TOPSIS method.

As results, it is being made the evaluation of development by Graham's filters that specifically produces the measurement of economic, financial and corporate performance, the last one also being denominated as market. By the application of Graham's filters, the economic and financial development is reasoned by the company's elevated net profit, by the reduction of the indebtedness and increase of availabilities provided by the increase of circulating asset in relation to the passive circulating. With these indicators, which are also accounting, we have the differential of application of this methodology, because its' evaluated the post-fusions and acquisitions companies by their financial health.

The application of Graham's filters also provided the evaluation through the corporate performance. This evaluation considered the price of stocks and rate of paid dividends. Differently from the other observed studies until the present, this technique considered, in its formulas of paid dividends, that it would indicate a relevant cash flow after the fusions and acquisitions.

By the evaluation of performance through Graham's filters, transforming the rankings by STOPSIS, it was determined that there's been a growth statistically distinct over the four years after the fusions and acquisitions. it is justified that the seven Graham's filters via TOPSIS compose a rigid form of evaluation of the company's development. It promises the safety of the main and the proper return for the performed investment. The rigid analysis is needed, because when an investor is acquiring a stock from a company that's been through a fusion and acquisition, he's becoming a partner of that enterprise. it is necessary to know your operations better, your performance, and to adequately evaluate the assets.

Analyzing the results found, it is concluded that the managers of the researched companies appreciated a group of indexes composed by Graham's filters after the fusions and acquisitions so the companies could have good market indicators and a proper financial health, this last one composed by the good structure of capital and low risk of insolvency. This way, they paid good dividends to their shareholders and gave a financial structure for the company, in other words, they took good financial decisions that were identified by Graham's filters. Thus,

it is inferred that the relevant performance of the companies, measured by Graham's filters, indicate that the shareholders and managers interests are aligned and contribute for the best corporate governance of the company.

Consequently, it is recommended, as a suggestion for new researches, analysis of performance applying different methodologies of evaluation for the companies, such as: abnormal return of stocks. Q of Tobin, sustainability indexes, among others. it is also recommended the realization of a performance evaluation by Graham's filters with the companies that perform public offers of stocks.

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