Dividend Yield and Interest on Own Capital versus Stock Return

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Abstract

The aim of this study is to investigate the relation between dividend yield and interest on own capital and stock return. Miller & Modigliani's (M&M, 1961) Dividend Irrelevance Theory and Gordon & Lintner's (1963) Bird-in-the-Hand Theory serve as the theoretical framework, besides Brazilian studies on the theme. In view of its objectives, this research is classified as descriptive and the empirical-analytic approach will be used to treat the data. Analysis data were collected from Economática software. The sample consisted of companies traded on the São Paulo Stock Exchange (Bovespa). The period between 1995 and 2008 was analyzed. Before regression analysis with panel data, the multivariate correspondence analysis (Anacor) technique was used for an exploratory analysis of the study variables. The results indicated that dividend yield and interest on own capital are related with stock return, so that the study hypothesis was not rejected. Based on the use of regression with fixed effects, applying the ordinary least squares method, with R^2 equal to approximately 47.55%, it was verified that dividend yield and interest on own capital are inversely related with stock return. Through this research, the intent is to provide and expand empirical evidence on the theme and offer support for future research.

Keywords: Dividends; Return; ANACOR; Regression; Panel Data.

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1. INTRODUCTION

In the last decades, various Corporate Finance studies have focused on dividend policies. Different theories and empirical studies exist on the possible effects of dividend policies on company value and stock returns. Among these theories, the classical thought lines stand out: Miller & Modigliani's (M&M, 1961) Dividend Irrelevance Theory and Gordon & Lintner's (1963) Bird-in-the-Hand Theory.

According to Brigham, Gapenski and Ehrhardt (2001), the dividend policy involves the decision to yield dividends or retain them for the sake of reinvestment in the company. Optimal dividend policies strike a balance between current dividends and future growth with a view to maximizing the firm's stock price. According to Brigham, Gapenski and Ehrhardt (2001, p. 662), the dividend policy

> involves three issues: (1) what average fraction of profits should be yielded over time?; (2) should the yield take the form of cash dividends or stock repurchase?; (3) should the company maintain a firm and stable growth rate?

The stock market plays an important role in the development process of societies and stock market participants aim to obtain capital gains in stock purchases and sales or dividends and interest on own capital (the latter restricted to Brazil).

In Brazilian law, dividend yield is mentioned in Law No. 11.638, issued on December 28th 2007, and Law No. 10.303, from October 31st 2001, which changes determinations in Law No. 6.404 and specific regulations by the Brazilian Securities and Exchange Commission (CVM). A minimum compulsory dividend of 25% is established on the adjusted net profit, except if the company bylaws establish another condition.

In Brazil, as from 1996, a new dividend payment mechanism was created in the form of interest on own capital, classified in accounting terms as an expense deductible from the tax base for legal entities' income tax, consequently producing a tax benefit for the paying firm. The amount paid in the form of interest on own capital can be attributed to dividends and both can be paid in cash. In this research, both stockholder remuneration forms are addressed, studying the amount of proceeds paid in cash.

According to Bruni et al. (2003), in the United States, with one of the main global stock exchanges, dividends are taxed, as well as capital gains. In Brazil, on the other hand, a 20% tax is charged on capital gains, dividends are tax-exempt and interest on own capital is taxed at the source. This fact suggests the relevance of the dividend policy.

Nossa, Nossa and Teixeira (2007, p.3) state that:

> The taxes charged on dividends and capital gains should also influence the determination of dividends. In a company, return on investments can take the form of dividend payments and increases in stocks' market value. For the stockholder, the most important is the alternative that yields better net profitability after taxes. Therefore, the dividend payment decision should take into account the form that maximizes stockholders' returns.

According to Assaf Neto (2003, p.429), in Brazil, companies strongly despise dividend policy aspects, investors in general hardly use them and few conclusive studies on the theme have been developed in the academy so far. In addition, current Brazilian legislation establishes the payment of minimum compulsory dividends, without permitting this decision to happen freely through board of directors and stockholders' decisions.

The theme dividend policy and its effects on company value and stock returns is very controversial. Many accounting and finance studies have focused on changes in organizations' dividend policies. Different perspectives are adopted and, generally, publications attempt to relate dividend yields with abnormal company profits and stock returns.

This theme is of interest to different users, in line with Bueno (2000, p.10):

> The possibility to invest in stocks based on dividend strategies is not only of academic, but also of professional interest. Besides constituting a research problem in Finance, Accountancy and Controllership, Economics and Law, it is of interest to professionals like portfolio managers, institutional investors, investment analysts, capital market regulators and supervisors, etc.

With a view to further clarity on the theme, the aim of this research is to seek empirical evidence for the relation between dividend yield and interest on own capital on the one hand and stock price valuation on the other. The intent is to contribute to empirical evidence on the subject, enhancing knowledge on the theme dividend policy and offering support for future research.

The main aim of this study is to investigate the relation between dividend yield and interest on own capital and stock returns of companies listed on the São Paulo Stock Exchange (Bovespa). In search of empirical evidence to answer the research problem, the following hypothesis is tested:

H_0: A relation exists between dividend yield and interest on own capital and stock returns.

Specific aims are:

- to analyze the relation among the variables stock returns and dividend yield and interest on own capital;
- to assess the evolution in stock returns and dividend yield and interest on own capital.
- to investigate the dependence between the stock return variable and the dividend yield and interest on own capital variable.

Next, a short literature review will be presented, addressing the main dividend policy theories and some important studies, based on a bibliographic survey. Then, the method and its application are described. Next, results are presented and analyzed. And, finally, the research conclusions are presented.

2. BIBLIOGRAPHIC REVIEW

Departing from the premise that financial managers should always keep in mind that the company goal is to maximize value for the stockholders. Consequently, a question emerges about investors' preference: do they prefer to get returns through dividend yields and interest on own capital, or through capital gains?

According to Brigham, Gapenski and Ehrhardt (2001, p. 640)

> Investors cannot be seen as evenly preferring higher or lower dividends. Individual investors do have strong preferences though. Some prefer high dividends, while others prefer everything in capital gains. These differences among individuals help to explain why it is hard to reach any definitive conclusions about optimal dividend yield.

To answer this question about whether investors prefer dividends and interest on own capital versus capital gains, it is important to understand the three preference theories that explain investors' preference: Dividend Irrelevance Theory, Bird-in-the-Hand Theory and Tax Preference Theory.

The main proponents of the Dividend Irrelevance Theory are Miller and Modigliani. According to Brigham, Gapenski and Ehrhardt (2001, p. 637),

They affirmed that company value is only determined by its income generation capacity and by the business risk. In other words, Merton Miller and Franco Modigliani defended that company value only depends on the income its assets produce, and not on how this income is divided between dividends and accumulated profits.

When developing their dividend theories, Miller and Modigliani developed different suppositions. According to Bueno (2000, p. 45),

> The basic hypotheses are:
> a) the market is perfect, i.e. no agent is capable of affecting quotes through purchases or sales;
> b) no taxes or brokerage exist;
> c) agents' behavior is rational and homogeneous (identical);
> d) investments are defined in advances and do no change because of dividend policy changes.

According to Bruni et al. (2003, p. 4), "when considering market imperfections, like information asymmetries, taxes, transaction costs and conflicts of interest between managers and stockholders for example, controversies appear".

Thus, the effect of dividends' information contents (signaling) and the client effect emerge. According to Santana (2006, p. 27),

> II) If dividends affect company value, this is only due to the Information Contents (Signaling) that reveal business managers' expectations. That is so because it is not current stockholders' preference that leads to increases in stock prices, but expected future gains, based on retained income.
> III) A Client Effect takes place, which makes stockholders receive the benefits they expect themselves. Investors who preferred stable and foreseeable investments as a source of income would hold stocks that paid the same amount of dividends each year. Investors who preferred capital gains, on the other hand, would preferably be attracted by growing companies, which would reinvest a large part of their profit and, therefore, would reveal an unstable pattern in dividend payments.

Thus, the dividend policy should take into account the dividends' information contents (signaling) and the client effect, according to Brigham, Gapenski and Ehrhardt (2001, p. 663):

> The effect of the information contents or signaling refers to the fact that investors relate an unexpected change in dividends with a signal that management is expecting future profits. The client effect suggests that a company will attract investors who agree with the company's dividend yield. Companies that are considering a change in dividend policies should consider both factors.

Thus, the financial market keeps a close eye on future cash flow expectations, besides investments companies play for the future. When a company announces changes in its dividend policy, it transmits information to the market, which assimilates it, influencing stock prices. According to Bruni et al. (2003), this information can refer to dividends as a positive signs and dividends as negative sign.

In line with Bruni et al. (2003, p. 5), dividends as a positive sign:

> indicates that companies with good projects need to take measures companies without good projects cannot easily imitate. Increasing dividends can be considered this kind of action. When increasing dividends, companies would be creating a cost for themselves,

increasing cash flow needs in the long term. The fact that they are willing to assume this commitment signals to investors that they believe they are able to generate these cash flows. The market assimilates this signal positively, leading to a reassessment of company values and an increase in stock prices.

According to Bruni et al. (2003, p. 6), dividends as a negative sign refers to:

> Increased dividends, in turn, can send a negative signal to the financial markets. When considering a company that never paid dividends in the past, but registered an extraordinary growth and high return on its projects. When this company starts to pay or substantially increase dividends, its stockholders may consider this a signal that company projects are not as useful as they used to be. In this case, stock prices will be reassessed downwards.

From the perspective of Miller and Modigliani's ideal world, the client effect is considered as follows: a company that pays the same amount of dividends attracts investors interested in stable cash flows. On the other hand, investors interested in capital gains are attracted by companies that reinvest their profits (BRUNI et al., 2003, p. 6).

One can also highlight a scenario in which investors have no dividend project, according to Nossa, Nossa and Teixeira (2007). Thus, investors will seek stocks of companies that reinvest their profits and generate even more resources for stockholders in the long term.

Against the Dividend Irrelevance Theory, Gordon and Lintner defended the relevance of dividends. According to Brigham, Gapenski and Ehrhardt (2001, p. 662), the "Bird-in-the-Hand Theory defends that company value will be maximized through a high dividend yield ratio, because cash dividends are less risky than potential capital gains".

According to Santana (2006 p. 27), the fundamental proposal of this theory:

> is the argument about "Bird-in-the-Hand", suggesting that investors are risk-averse and prefer cash dividends to future dividends or capital gains (one dividend in the hand is worth more than one uncertain capital gain). It is believed that cash dividend payments reduce investors' uncertainty, consequently increasing stock prices. In other words, if dividends were reduced or not paid, investors' uncertainty would increase, as well as required returns, entailing a drop in stock prices.

Another theory, involving dividend policy decisions, is the Tax Preference Theory, which Brigham, Gapenski and Ehrhardt (2001, p. 662) cite "due to the fact that long-term capital gains are subject to lower taxes than dividends, investors prefer that companies retain profits instead of yielding them as dividends".

This theory serves to explain the effect of different tax rates on the dividend policy. It is argued that, if different tax rates apply to capital gains and dividends, stockholders would tend to choose the option that entailed less tax charges. According to Bueno (2000, p. 49),

> even if rates were identical, the benefit of disbursement would exist as, while taxes on dividends are paid when they are received. On capital gains, these are only paid when profit is realized, that is, when the stocks are sold.

Taxes also influence the client effect. According to Nossa, Nossa and Teixeira (2007, p. 3),

> highly taxed investors would take no interest in dividend yield. Stockholders who pay relatively few taxes, in turn, would be induced to the "client" effect. Hence, to attend to investors with distinguished interests, the stock market would include companies that yield dividends and those that do not.

The following illustration represents the three alternative dividend policy theories: Dividend Irrelevance Theory, Bird-in-the-Hand Theory and Tax Preference Theory, supposing that higher tax rates are charged on dividends than on capital gains.
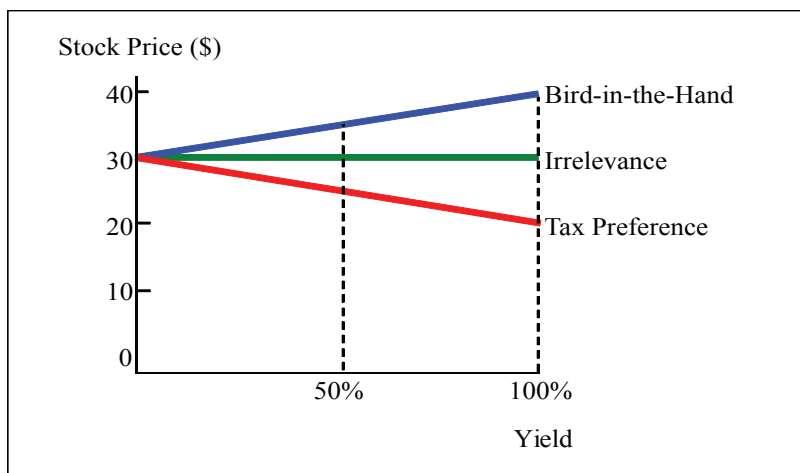
Graph 1: Illustration of Three Dividend Policies

Source: Adapted from Brigham, Gapenski and Ehrhardt (2001, p. 639)

In the last 50 years, in the United States, different studies have been performed, with several interesting conclusions. According to Bruni et al. (2003, p.2),

> dividends tend to accompany revenues; i.e., increased revenues are followed by increased dividends and drops in revenues by dividend cuts. Second, companies are characteristically reluctant to alter their dividend policy; this indecision increases when the time has come to cut dividends, leading to "bound" dividend policies. Third, dividends tend to follow a much more even course than income. Finally, dividend policies exist in a company's lifecycle that result from variations in growth rates, cash flows and project availability.

In Brazil, different authors have presented research on the relevance of dividends. Some of the main studies are presented next.

Paiva and Lima (2001) analyzed empirical evidence about the influence of taxes and interests on own capital on companies' dividend policy between 1995 and 1998, studying Brazilian companies dividend yield levels. The results indicated that companies did not increase the payout ratio after eliminating taxes on dividends. Many companies did not register interest on own capital, but its adoption has been growing throughout the years. Companies that paid interest on own capital showed a trend to increase the payout ratio and effectively raise dividends. Most companies, however, did not fully distribute tax benefits to their stockholders.

Bueno (2002) analyzed the relation between dividend yield and the return rates of Brazilian stocks, between June 1994 and December 1999, as well as the feasibility of a strategy based on dividend yield. The author constructed three different portfolios: high, low and zero dividend yield. Based on the obtained results, it could not be concluded that stocks with high dividend yields tend to be linked with higher or lower return rates than stocks with low or zero yield. Evidence also suggests that, using the applied empirical method, a clear association between dividend yield and the stock return rate cannot be demonstrated.

Amaral and Correia (2002) analyzed whether Brazilian companies' income distribution policy affects the market value of their stocks, that is, whether stock returns can be explained not only by the systematic risk factor, as the Capital Assets Pricing Models *(*CAPM) presuppose, but also by the dividend yield variable. The results showed that both the systematic risk and dividend yields are factors that explain stock

market profitability. Consequently, the dividend policy of the Brazilian companies analyzed in this study, whose stocks were traded on Bovespa between 1994 and 2000, influences their market value.

Novis Neto and Saito (2002) empirically analyzed stock price behavior after dividend announcements concerning stocks traded on Bovespa between 1998 and 2000. They found a direct relation between dividend yield and abnormal accumulated returns in the post-dividend payment period, dividing the sample in three subsamples in function of the dividend yield. They found an abnormal accumulated return of 21.97% within 90 days after the event for companies that paid higher dividends and 5.16% for companies that paid intermediary dividends, against 15.50% for companies that paid lower dividends. This demonstrates the persistence of abnormal returns in the post-event period.

Bruni et al. (2003) analyzed the effect of dividend yield on interest on own capital announcements on prices in a stock sample traded on Bovespa. The results did not permit evidencing any significant result. It can be established that either the market anticipates information on dividend announcements or this information is not relevant. On the other hand, the results evidenced the presence of systematically positive abnormal returns in the total sample. Thus, it is deduced that stocks with above-median dividend yields show higher values, indicating that investors prefer stocks with more aggressive dividend yield policies.

Heineberg and Procianoy (2003) aimed to test the influence of theoretical aspects, which could play a determinant role in establishing the value of dividends in the policies of Brazilian companies traded on Bovespa between 1994 and 2000. In this research, it can be observed that, although some expected theoretical relations were not found with statistical significance, the dividend yield policy in publicly-traded companies reveals consistency and good stability with regard to the constancy and foreseeability of the amounts paid to stockholders. Thus, the research manages to present a consistent behavioral pattern in Brazilian companies cash dividend yield policies.

Lima and Freire (2003) attempted to evidence the relation between dividend yields and abnormal profits. It was verified, however, that no relation existed between dividend yield and abnormal profits, thus rejecting the null hypothesis (H_0).

Santana (2006) verified the determinant factors of dividend policies, considering the company's growth and investment opportunity, the activity sector and income generation ability. Only the latter, represented by the ROA (return on assets) ratio, is related to dividends. Various contexts influence the dividend policy decision, reflecting the companies' characteristics, situation and financial strategies. And, in the present study, profitability would be an important factor to consider for this decision. The result of the regression between stock returns and dividend yield is only found in the activity sector characteristic. The sectorial nature of companies in non-cyclical consumption sectors can be explained, as this company segment tends to be less affected by variations in the economic cycle. And, consequently, these sectors more strongly tend towards dividend yields when compared with companies in cyclical consumption sectors.

Nossa, Nossa and Teixeira (2007) analyzed companies listed on Bovespa to check whether companies that distributed dividends between 1995 and 2004 are more efficient than companies that did not. The observed result indicates that companies that yield dividends are more efficient than companies that do not during the study period. Also, dividend yields are positively related with return on assets.

3. METHOD

To answer the research problem, about whether dividend yield and interest on own capital are related with valuations in stock prices, the empirical-analytic approach will be used. According to Martins (2000, p. 26), empirical-analytic studies

> are approaches that share the use of clearly quantitative data collection, treatment and analysis techniques. They privilege practical studies. Their proposals are technical, restoring and incremental. They are strongly concerned with the causal relation among variables. They aim for the validation of scientific evidence through instrument tests, significance levels and the systemization of operational definitions.

Considering its goals, the research can be called descriptive, as the study is aimed at verifying the relation between the variables dividend yield and interest on own capital and stock returns.

With a view to investigating the relation between dividend yield and interest on own capital and stock returns, this research will be treated in the positive paradigm. Lopes and Martins (2005, p. 4) affirm that

> many models have been developed and econometric and statistical techniques have been used in the positivist paradigm of establishing hypotheses, deriving from theory, followed by empirical tests for the sake of verification and how reality adapts to what theory established (WATTS and ZIMMERMAN, 1986). Most of these studies have been accomplished to study the impact of financial information disclosure on assets behavior in financial markets (Brown, 1996).

To elaborate this research, stocks will be selected from publicly traded stocks on Bovespa and the analysis period ranges from 1995 to 2008. This period was chosen due to the relative economic stability after the creation of the Real Plan. This resulted in the analysis of 1,119 stocks. It should be highlighted that stocks were not always traded, so that prices were not established in certain years and, also, dividend yields did not always take place.

Stock price quotes and dividend yield and interest on own capital data were obtained from the database of the stock investment analysis software Económatica. This software adjusts the quotes used so that effects like stock breakdowns and groupings do not provoke stock price discontinuity. Hence, stock returns can be calculated correctly, as follows:

$$Return = \left(\frac{Final\ Closing\ Price\ in\ Year\ X}{Final\ Closing\ Price\ in\ Year\ X\ -\ 1} - 1 \right) x\ 100\%$$

To analyze the stocks' dividend yield and interest on own capital, the software's variable *Dividend Yield* was used, which can be expressed as follows:

$$Dividend\ Yield = \frac{Proceeds\ Paid\ during\ the\ Year}{Final\ Closing\ Price\ in\ Year}$$

In this expression, Proceeds Paid during the Year equals the amount of dividends and interest on own capital paid during the year, also adjusted by the software to avoid discrepancies.

Besides the return and dividend yield variables, some control variables were selected, also obtained from the Económatica database, as observed next:

$$a)\ ROA\ (Return\ On\ Assets) = \frac{Net\ Income}{Assets}$$

$$b)\ Price\ /\ Book\ Value\ per\ Share\ ratio = \frac{Final\ Closing\ Price\ in\ Year\ X}{\frac{Net\ Equity}{Number\ of\ Stocks}}$$

$$c)\ Debt\ /\ Net\ Equity\ ratio = \frac{Gross\ Total\ Debt}{Net\ Equity}$$

All data were organized and arranged in a Microsoft Office Excel 2003 worksheet, which served as a database for the application of data analysis techniques.

First, to explore the relation of dividend yield and interest on own capital with stock price valuations, as well as the variables' evolution, the multivariate correspondence analysis (Anacor) technique was applied, using SPSS 15 statistical software.

According to Fávero et al. (2009), correspondence analysis is an exploratory technique that looks at frequency distributions resulting from two or more qualitative variables and attempts to express the association between their categories through perceptual maps. This technique provides a powerful tool to identify relations among objects and attributes in a multidimensional space, but it is important to highlight, as it is an exploratory technique, its results cannot be generalized to observations beyond the research sample.

In this research, correspondence analysis in panel will be used which, according to Lima (2007, p.62), "is the combination of all cross-sections in all years, as if it were a single year. Very similar to regression pooling".

To use the correspondence analysis technique, data were divided in quartiles to define the companies' degrees of return and dividend yield, according to Table 1.

Table 1: Variable Quartiles

Quartile	Return	Dividend Yield
0	-0,9778	0,0000
1	-0,2601	0,0246
2	0,0454	0,0472
3	0,4953	0,0877
4	1.073,9554	2,3970

Thus, the companies received scores, ranging from 1 to 4, according to the data interval the quartiles divided. For stock returns, categories are established as follows: from -0.9778 to 0.2601, score 1; higher than 0.2601 and up to 0.0454, score 2; higher than 0.0454 and up to 0.4953, score 3; and, finally, from 0.4953 to 1073.9554, score 4. Thus, the levels of stock return are as follows: Level 1 – Very Low; Level 2 - Low; Level 3 - Medium; Level 4 - High.

As for stocks' dividend yield, then, categories are as follows: from 0.0000 to 0.0246, score 1; higher than 0.0246 and up to 0.0472, score 2; higher than 0.0472 and up to 0.0877, score 3; and, finally, from 0.0877 to 2.3970, score 4. Thus, the stocks' levels of dividend yield are as follows: Level 1 – Very Low; Level 2 - Low; Level 3 - Medium; Level 4 - High.

Besides the use of the return and dividend yield variables, the year variable was used in the correspondence analysis technique. For the sake of an easier analysis of the perceptual map, years were divided as follows: Group 1 - from 1995 to 1999; Group 2 - from 2000 to 2003; Group 3 - from 2004 to 2007; Group 4 – 2008 only. Group 4 only covers 2008, when the financial crisis started, so as to explore the effect of the crisis on the return and dividend yield variables.

After the correspondence analysis, the panel data analysis approach was used in Eviews 6, in which the Ordinary Least Squares (OLS) regression analysis method was applied to estimate the cause-and-effect relation between the variables established, with a view to determining the acceptance or rejection of the formulated hypothesis.

According to Fávero et al. (2009), panel data analysis elaborates a mix of the cross-section (cross-sectional data) and time series approaches, in which different observations are monitored not just at one moment, like a day, month or year (cross-section), but across various time periods. Thus, in the panel data analysis, the number of cross-sections is multiplied by the number of periods, which generates the intertemporal dynamics, representing the mix between the cross-sections and the time series.

In line with the same author (2009, p. 382),

There are three more common panel data analysis approaches: pooled independent cross-sections (or POLS – pooled ordinary least squares), fixed effects and random effects.

According to Fávero et al. (2009), a POLS model represents a regression in its most conventional form, i.e. it presents the intercept and variable parameters for all variables across the analysis period. In this model, it is presupposed that the angular coefficient of the explanatory variable is identical for all observations over time, i.e. it does not take into account the nature of each cross-section studied. The fixed effect model, on the other hand, considers these changes in the cross-sections over time. These changes, in which the intercept varies among observations, can simply be accomplished by including dummy variables in the differential intercept. As the inclusion of representative variables may mean that some lack of knowledge exists about the model under analysis. It is natural that the disorder term represents this lack of information. Thus, the error terms may be correlated over time and across observations. The random effects model aims to capture this phenomenon.

4. RESULTS AND ANALYSES

After categorizing the variables, in line with the methods section, correspondence analysis was applied.

Before the correspondence analysis between return and dividend yield, the Chi-square test needs to be applied, aimed at checking whether the variables are associated, looking for signs to reject the null hypothesis of independence between these variables. As the Chi-square test results in a p-value of 0.0000, below the significance level of 0.05, correspondence analysis can be applied. Next, the perceptual map between return and dividend yield is presented:
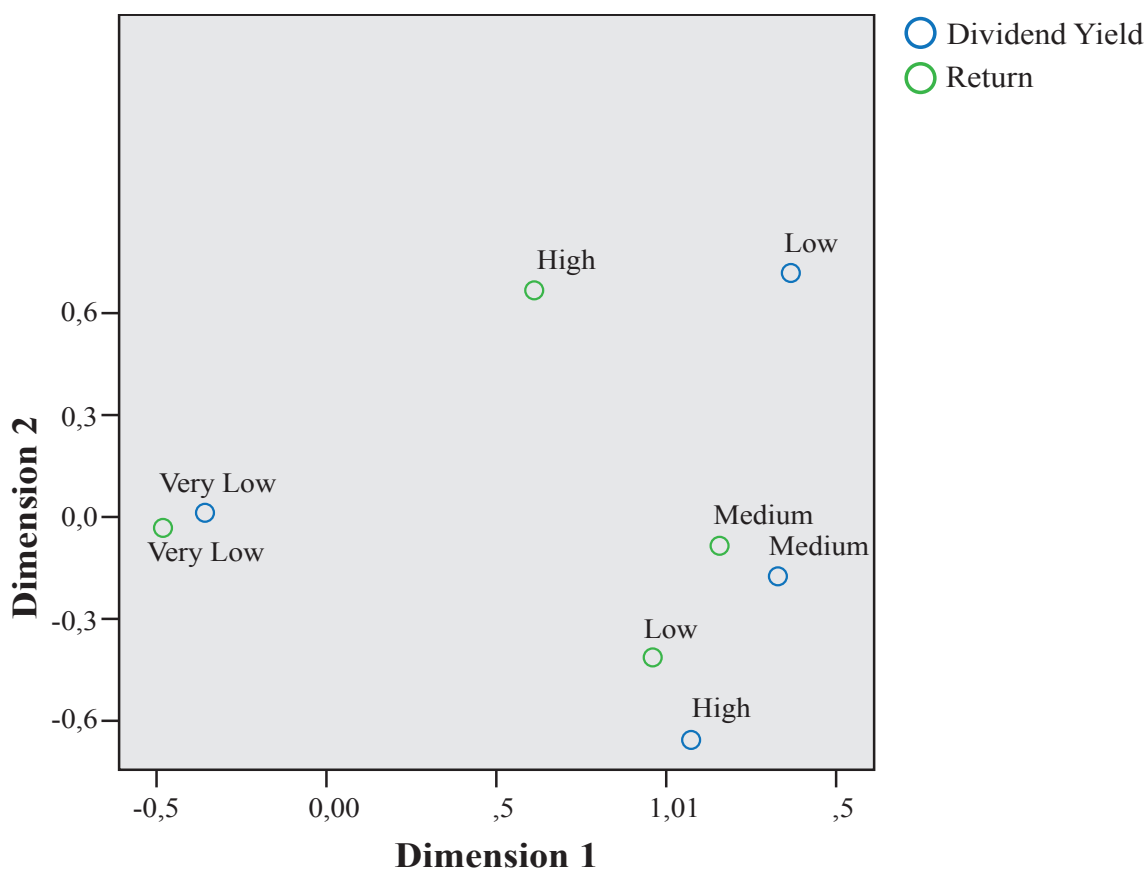

Illustration 1: Perceptual map between Return and Dividend Yield

Based on the perceptual map shown in Illustration 1, some associations exist between stock return and dividend yield. The map indicates that stocks with a very low dividend yield also present very low returns. Also, stocks with a medium divided yield present medium returns. Another association that can be established is between stocks with high dividend yields and stocks with low returns, as these are close to one another on the map. Stocks with low dividend yields, then, are closer to stocks with high returns.

In the attempt to analyze the evolution in returns over the years, correspondence analysis was elaborated between the return and year variables. According to the application of the Chi-square test, the p-value equaled 0.0000 with significance set at 0.05. Hence, the variables are associated, as presented on the perceptual map below:
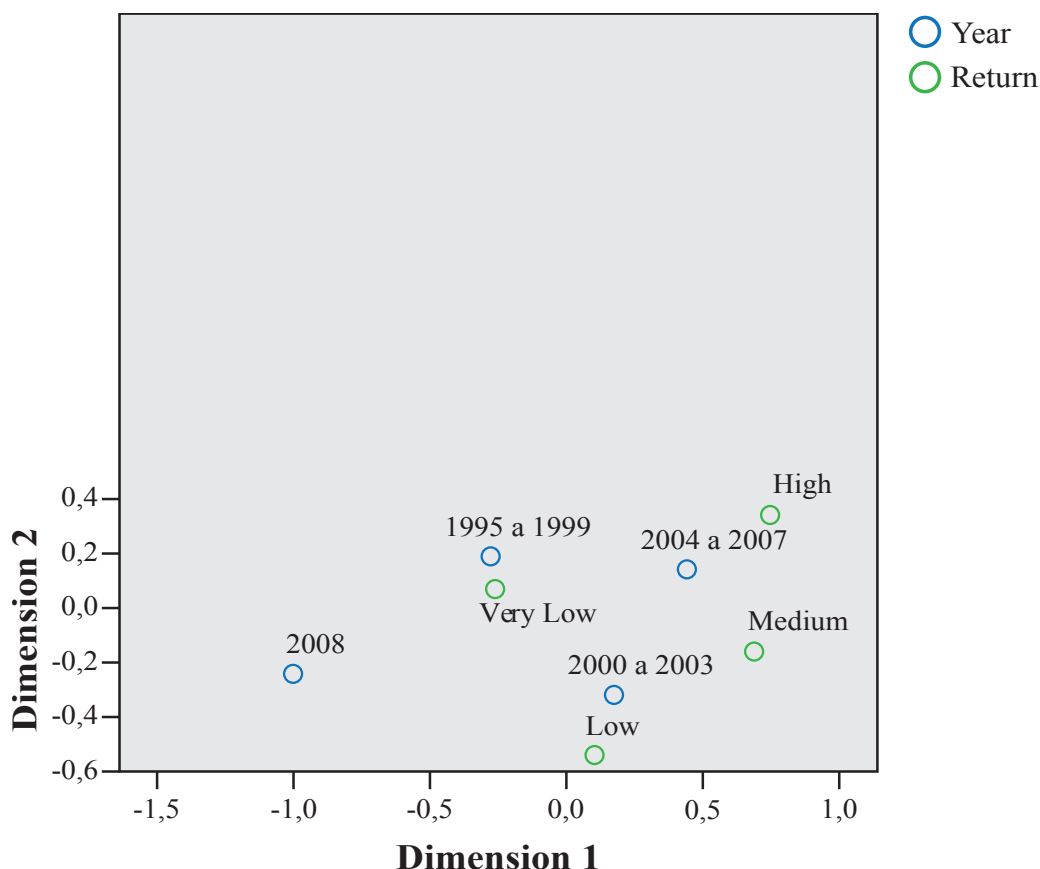

Illustration 2: Perceptual Map between Return and Year

On the perceptual map, an increase in stock returns is perceived over the years, except in 2008, when the financial crisis started, with returns approaching the very low category in that year. As observed, between 1995 and 1999, stocks obtained very low returns; between 2000 and 2003, then, returns get closer to the low level and, between 2004 and 2007, stock returns are high, revealing the strong growth in the Brazilian capital market in that period.

In this study, the evolution in stocks' dividend yields over the years was also analyzed. Thus, correspondence analysis between dividend yield and year was applied, resulting in a p-value of 0.0000, with significance set at 0.05, on the Chi-square test. Hence, dividend yield is also associated with the year variable, as presented in the perceptual map below:
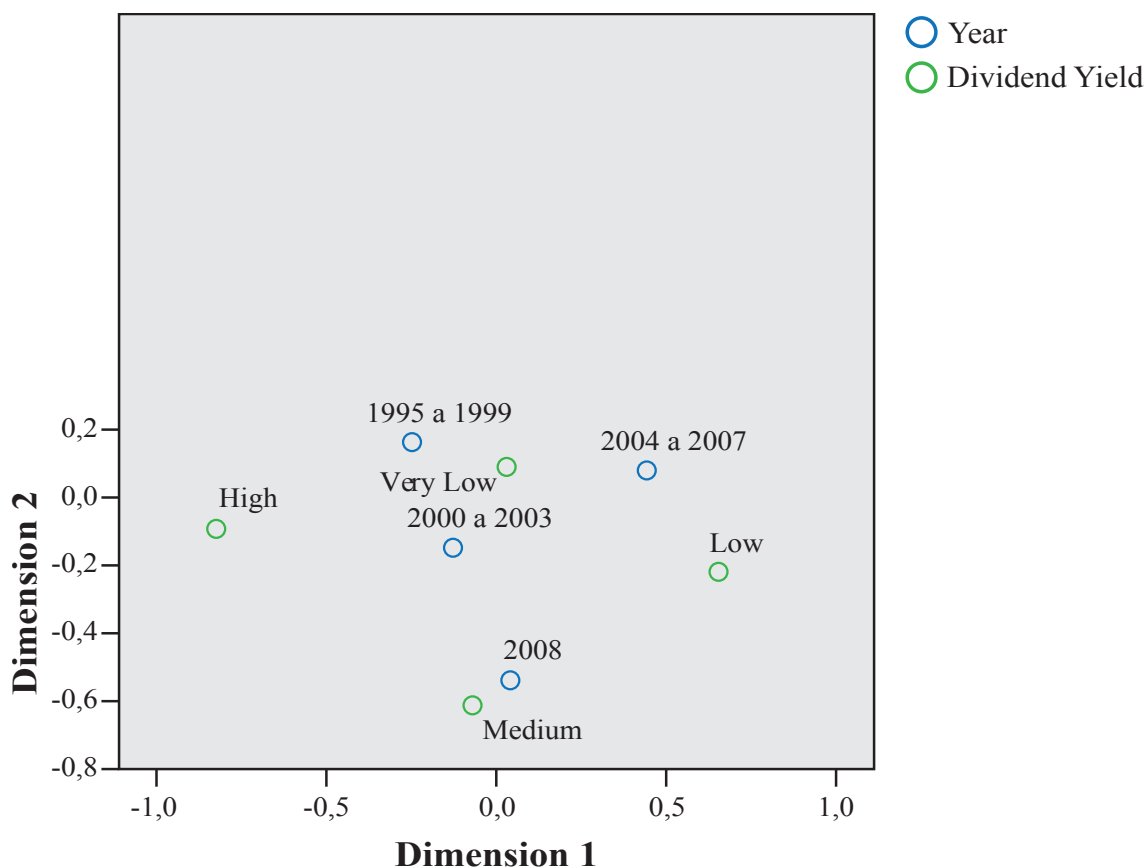
Illustration 3: Perceptual map between Dividend Yield and Year

Based on the perceived relation in the perceptual map, it can be concluded that, between 1995 and 2003, the stocks' dividend yield was very low and that, between 2004 and 2007, the stocks' dividend yield remained close to the very low and low levels. In 2008, then, the dividend yield closely approaches the medium level.

To confirm the correspondence analyses, regression analysis with panel data is suggested. Initially, some tests were used to define the best panel data model (POLS, fixed effects or random effects). According to Fávero et al. (2009), between the POLS and the fixed effect model, the Chow test (1960) is used, with the following hypotheses:

H₀: same intercepts for all cross-sections (POLS).
H₁: different intercepts for all cross-sections (fixed effects).

Through the result of Chow's test, the rejection of the null hypothesis was verified, concerning the adequacy of the POLS model for the regression. Therefore, the fixed effects model was chosen.

Next, Hausman's (1978) test was applied. According to Fávero et al. (2009), this permits choosing between the fixed effects and the random effects model, based on the following hypotheses:

H₀: error correction model is adequate (random effects).
H₁: error correction model is not adequate (fixed effects).

The results of the Hausman test shows that the null hypothesis was rejected for the regression and, hence, that the error correction model was rejected. The fixed effects model should be used.

After defining the best model (fixed effects), regression was processed through the ordinary least squares model. The main results are displayed in Table 4.1.

Table 2: Regression Results with Fixed Effects

	Coefficient	Standard Error	T statistics	Prob.
C	0,1690	0,0408	4,1384	0,0000
Dividend Yield	-0,7658	0,1649	-4,6440	0,0000
ROA	0,8801	0,2501	3,5192	0,0004
Price/Book Value per Share	0,0828	0,0237	3,4997	0,0005
Debt/Net Equity	-0,0003	0,0001	-2,8080	0,0050

R2	0,4755
Adjusted R2	0,3352
F statistics	3,3894
Prob. (Estatística F)	0,0000
Estatística Durbin-Watson	2,4532

F statistics presents results for the significance of the proposed model and, through Prob. (F statistics), equaling 0.0000, below 0.05, the null hypothesis about the non-significance of the regression can be rejected. In other words, the regression is significance at a 95% reliability level.

Through the analysis of each parameter's t statistics, it can be affirmed that the constant (C – intercept) and the variables Dividend Yield, ROA, Price/Book Value of Share and Debt/Net Equity are significant, as their p-value remains below the 0.05 significance level.

As for the premises of the regression model, the normality test for the residues did not reject the null hypothesis of normality, according to Jarque-Bera's test. Through the Durbin-Watson test, then, it can be observed that the model shows no autocorrelation problems of the residues, as its value (2.4532) borders on 2. Using White's correction (robust regression), possible heteroscedasticity problems were corrected, thus providing more consistent and unbiased estimators.

Through R^2, it can be verified that the importance of explanatory power of the model as a whole equals 47.55%. In other words, 47.55% of the variation in Returns is explained by the variation in Dividend Yields, ROA, Price/Book Value of Share and Debt/Net Equity.

The model equation is:

$$Return = 0,1690 - 0,7658 . \frac{Dividend}{Yield} + 0,8801.ROA + 0,828. \frac{Price}{BVS} - 0,0003. \frac{Debt}{NE} + erro$$

By interpreting the angular coefficient of the equation, it can be observed that the Return variable is inversely related with the Dividend Yield variable, which is extremely important for this study.

5. CONCLUSIONS

The general aim in this research was to analyze the relation between dividend yield and interest on own capital and stock returns, answering the following research question: "Does a relation exist between dividend yield and interest on own capital on the one hand and stock returns on the other?"

To answer the research problem, initially, the relation between stock returns and dividend yield and interest on own capital was analyzed. Using the multivariate correspondence analysis technique in panel, it could be observed that the variables are related, underlining that stocks with low dividend yield and interest on own capital show high return levels; stocks with high dividend yield and interest on own capital, then, show low returns.

In this study, the evolution in stock returns and dividend yield and interest on own capital was also assessed over the years. Using the multivariate correspondence analysis technique in panel, an increase in

stock returns was observed over the study period, except in 2008, when the financial crisis started. As for dividend yield and interest on own capital, these also increased over the years, in the period from 2004 to 2007, with high stock returns and low dividend yield and interest on own capital. In 2008, then, returns were very low, while dividend yield and interest on own capital were classified as medium.

To confirm the conclusions of the exploratory analysis, besides investigating the dependence between stock returns and dividend yield and interest on own capital, the econometric technique of panel regression analysis was used. Through regression with fixed effects, applying the ordinary least squares method, the hypothesis could be accepted that a relation exists between dividend yield and interest on own capital on the one hand and stock returns on the other, as the model is significant. Thus, the research question could be answered.

The regression's degree of explanation equaled approximately 47.55%, i.e. 47.55% of the variation in stock returns is explained by the variation in dividend yield and interest on own capital, as well as variations in the control variables ROA, Price/Book Value of Share Ratio and Debt/Net Equity Ratio.

One of the most important results of this study is the inverse relation between the dividend yield and interest on own capital and stock returns. Thus, in line with the exploratory analysis, stocks with higher dividend yield and interest on own capital present lower returns.

Although the presented conclusions are relevant, some research limitations should be taken into account. These conclusions are restricted to the sample, to the multivariate and econometric techniques used and to the models developed. As a suggestion for further research, other statistical techniques can be used, as well as other models and variables, also permitting comparisons with the present study.

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