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# PAYOUT INCREMENTAL AND FAMA & FRENCH THREE FACTOR MODEL

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## ABSTRACT

This article sought to investigate whether the model adapted from Fama and French with the inclusion of the Payout factor (F&F with Payout) would allow a better understanding of the returns of the portfolios of companies listed in Brazil, Bolsa, Balcão between 2004 and 2018 than the model of three factors from Fama and French. The Payout factor Award is obtained by calculating the difference in return between the companies that paid and those that did not pay Incremental Payout. Thus, this four-factor model is defined by the addition of this factor to the factors Award for market risk (RM-RF), Award for the size factor of the company (MbS), defined by the market value of equity, and the Premium by the Book-to-market factor ( HML), which is an index defined by the accounting value and market value ratio of equity. This 4-Factor model had its explanatory power tested by the return of 12 portfolios created from the orthogonalization of their risk factors and it was more efficient than the three-factor model in explaining the return of eight of the portfolios formulated, with emphasis on an explanatory capacity of more than 70% for the lower value (small) portfolios that do not pay dividends and pay incremental dividends, therefore assuming a relevant role for the investment decisions in portfolios that have extreme dividend distribution. In addition, the results show that the Payout factor was significant in nine of the twelve portfolios. In portfolios where there was no dividend payment, their impact was negative, implying that the higher the return of these portfolios, the lower the probability of a premium for the Payout factor. In turn, for the portfolios that paid minimum and incremental dividends, there is a direct relationship with the return of the cards. Thus, this study corroborates the theories concerning the relevance of dividends by Lintner (1956) and Gordon (1959).

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## 1 INTRODUCTION

Compensation through dividends is one of the most desired returns for which investors trust their resources in the acquisition of portions of the social capital of entities, according to Veiga, Imbrosio and Ferreira (2008), and therefore, when investing in companies, shareholders want them to make a profit and that part of that profit, in the form of dividends, be directed towards remunerating them. It should be noted that dividend remuneration has been exempt from income tax since 1996, which makes it even more attractive to investors. Furthermore, Almeida, Pereira and Tavares (2016) cite that the growing demand for investments and the development of the capital market is embodied in the dividend policy.

The payment of dividends is regulated by Brazilian corporate law, through Law No. 6,406/76, which presents, among the mandatory requirements of publicly traded Brazilian companies, the distribution of their profits to shareholders. The dividend policy includes decisions that seek to answer questions related to the allocation of the company's profits and is closely related to the investment and financing policies, for example, when indicating whether the company will reinvest capital or distribute dividends to shareholders. At the end of a fiscal year, managers decide what the percentage of profit retention and shareholder remuneration will be and when this should happen.

Considering the investors' perspective, it is clear that the relevance of the dividend policy lies in the fact that they analyze the dividend values distributed by the companies as one of the criteria for deciding which one to invest in. In the finance literature, there are several studies that address dividend policy and its ability to add value to the company, with emphasis on two opposite approaches: the relevance of dividends (Lintner, 1956; Gordon, 1959) and the irrelevance of dividends ( Miller & Modigliani, 1961). On the other hand, scientific research in finance is aimed at understanding the factors that explain the return on shares and, in this sense, formulate pricing models in order to discover which key factors explain the return on assets with greater precision.

For the study of dividends of publicly traded companies in the Brazilian market, we observe that the dividend policies are in accordance with Laws No. 6,404/1976 and No. 9,249/1995. The first, called the Brazilian Corporation Law, establishes, among other matters, the minimum payment of dividends and their periodicity. Between articles 201 and 205, there is an obligation to inform, in the bylaws, a minimum percentage of Adjusted Net Income (ANI) that shall be used to pay dividends and, if the bylaws do not present this information, the mandatory dividend shall not be less than 50% of the ANI.

In view of the dividend distribution context, Lintner (1956) and Gordon (1959) defended the existence of a relationship between the amount paid in the form of dividends and the value of the shares, so it is important to observe the policy for distribution of dividends in the stock market Brazilian, investigating whether it is possible for the “dividend payment” factor to be configured as a factor that explains the return on shares, considering the variation in *Payout* in relation to the minimum required in the bylaws.

Therefore, this work aims to investigate whether the model adapted from Fama and French with the inclusion of the *Payout* factor (F&F with *Payout*) would allow a better understanding of the returns of the portfolios of companies listed in B3 than the three-factor Fama and French model. In order to achieve this goal, the explanatory power of the four-factor model with *Payout* has been compared with the Fama and French three-factor model and the effect that each risk factor has on the return of formulated portfolios. This study shall be carried out with companies listed in Brasil, Bolsa, Balcão for the period from 2004 to 2018.

Thus, the opportunity to include *Payout* is seen as a new factor that could better represent an adjustment to the three-factor model of Fama and French. Additionally, we expect to make an important contribution to the expansion of the finance literature, especially with regard to the formation of investment portfolios; asset valuation models and mainly generate reflections on the theory of the relevance of dividends as this study offers empirical results and theoretical discussions on the subject. In view of the above, it should be noted that previous research, such as Neves and Leal (2003), Malaga and Securato (2004), Joode (2011), Santos, Famá and Mussa (2012), Xiao, Faff, Gharghri and Lee (2013) and Azevedo (2014), included the most diverse factors, but reinforce that there is still room for new factors.

## 2 THEORETICAL FRAMEWORK

### 2.1 Theory of relevance of the dividends

The theory of relevance of the dividends argues that the increase in dividends contributes to maximizing the company's value. In this sense, Gordon (1959) explained that high dividend payments reduce the cost of capital for third parties and, consequently, increase the value of shares. Therefore, investors who are risk averse, when they find themselves in an environment of uncertainty, prefer to receive dividends as soon as possible.

This theory holds that dividends represent certain gains in the present and that the appreciation of the stock is an uncertain event of the future. That said, paying dividends corroborates to reduce uncertainty, which in turn implies an increase in the company's share prices. Thus, a direct relationship between the dividend policy and the company's market value has been identified (Gordon, 1963).

Still according to the relevance of dividends, Lintner (1956) concluded that managers are reluctant to reduce dividend payment levels and that they only increase dividend payment when they are convinced that companies have sufficient cash flow to maintain it, once that investors interpret unexpected changes in dividend levels as a negative change in managers' expectations of the company's future results. Therefore, reducing dividend levels would mean devaluing the company's shares. Later studies (Baker, Farrelly & Delman, 1985; Baker & Powell, 1999), in which interviews have been conducted with managers regarding the increase in dividends, they reached the same results as Lintner (1956).

Santana (2006) commented that dividends affect the company's value because changes in the amount of dividends distributed to shareholders reveal the expectations of managers regarding the company's future prospects. Thus, we observe that it would not be the shareholders' preference that would lead to increases in stock prices, but the expectation of future gains from the retention of profits.

### 2.2 Legal considerations of dividends in Brazil

This section presents aspects related to the legal treatment of dividends and interest on equity within the context of the Brazilian stock market, in accordance with the Brazilian Securities and Exchange Commission and Laws No. 6,404/1976 and No. 9,249/1995. Understanding the legal treatment of dividends within the Brazilian context allows us to understand more closely the concept of Incremental *Payout*.

Law No. 6,404/176, known as the Brazilian Corporate Law, deals in general with the mandatory requirements regarding dividend payment decisions, which are taken at an Annual General Meeting (AGM) or, for matters not mentioned in the article 132 of Law No. 6,404/1976, an Extraordinary General Meeting (EGM).

The AGM shall be held until the fourth month after the end of the year, and among its objectives is the resolution on the financial statements; the decision on the distribution of net

income and the payment of dividends. Then, the company must inform the Stock Exchange of the intention to pay dividends.

The A/S Law, in its articles 201 to 205, governs the normalization of dividends. Article 201 shows that dividends may originate from net income for the year, retained earnings, profit reserves and the capital reserve account for preferred shares.

Article 202 contemplates the instruction of the mandatory minimum dividend, whose basis is the protection of the minority shareholder to the detriment of the arbitrariness of the management or the majority shareholders. The minimum mandatory dividend is defined as a percentage of the profit described in the company's bylaws. Also according to article 202, when the by-laws do not inform the percentage of minimum mandatory dividend, the company is obliged to distribute at least 50% of the adjusted net profit (ANP) for the year as a minimum mandatory dividend.

In short, when the bylaws are omitted and the company calls a general meeting to introduce a rule on the matter, the mandatory dividend cannot be less than 25% of the adjusted net income, unless the shareholders' right to withdraw is guaranteed. Thus, when Law No. 6,404/1976 came into force, the existing companies were in a dilemma: how to maintain the omitted bylaws and to fit the percentage of 50% as mandatory dividend; or set a percentage lower than 25%, but give the disgruntled shareholders the right to withdraw. Most companies opted for a percentage of 25% of the ANP, as stated in Galvão, Santos and Araújo (2018) and in Leite, Bogoni and Hein (2019), for example.

That said, history shows us that companies that emerged after 1976 defined a mandatory dividend of less than 25% of the ANP. However, many ended up stipulating the percentage of 25%. Thus, this percentage became a standard among Brazilian companies, becoming recognized as the benchmark for the mandatory minimum dividend (Leite, Bogoni & Hein, 2019).

An important observation in the A/S Law is that companies shall be exempted from paying the mandatory dividend when the managers inform the AGM that, in that year, paying dividends is incompatible with the company's financial situation. In this case, therefore, there will be no distribution of profits and these should be recorded as a special reserve, if they are not absorbed by losses in future years, and must be paid as dividends as soon as the company's financial situation permits, as shown in § 4 of article 202.

In Brazil, dividends are exempt from taxation for individuals and companies. Therefore, any amounts paid as a form of remunerating shareholders must be fully received by them. In 1996, with Law No. 9,249/1995, a dividend payment mechanism has been created: Interest on Equity (IE), which is optional and allows companies to also remunerate their shareholders as a way.

The payment of dividends in the form of interest on own capital is classified as a tax deductible expense in the income tax calculation base, that is, it constitutes a tax benefit to the paying company since it can be deducted from the calculation base of income tax and Social Contribution on Net Income (SCNI) for the paying company. Thus, Decourt and Procianoy (2012) mention that IE are used by most companies, given the tax benefit. However, for investors, dividends are exempt from tax, while interest on equity is taxable as financial income. Table 1 illustrates the differences between IE and Dividends.

Table 1
**Difference between Interest on Equity and Dividends**

| **Interest on Equity** | **Dividends** |
|---|---|
| Optional distribution linked to the existence of this condition in the company's bylaws and to the existence of cash flows. | Mandatory distribution linked to the existence of profits and as stated in the companies' bylaws. |
| Calculation basis: shareholders' equity. | Calculation basis: adjusted net income. |
| Remuneration percentage: limited to the variation of | Percentile of distribution: defined by statute. |

| | |
|---|---|
| the Long Term Interest Rate (LTIR). | |
| Incidence of taxes for the shareholder: taxed at source at 15% of the amount distributed. | Incidence of taxes for the shareholder: the amount received is not taxed. |
| Tax situation for the company: the distributed IE are considered financial expenses and reduce the calculation base of the IRPJ and SCNI. | Tax situation for the company: the distributed dividends cannot reduce the calculation basis of the IRPJ and SCNI due by the company. |

Source: Adapted from Lagioia, Maciel and Libonati (2008).

Given the above, it appears that, according to Law No. 6,404/1976, companies must distribute a mandatory dividend, that is, the distribution of earnings as established in the bylaws and defined in this survey by minimum *Payout*.

In order to calculate the distributed *Payout* by the companies and to be able to identify it as Minimum *Payout*, Incremental Payout or Reduced *Payout*, it is necessary to show the Payout paid based on the ratio of the total dividends distributed (dividends and IE) by the ANP, as follows in Equation 1 :

$$Payout\ Distribuído = \frac{JSCP_{\ Líquido} + Dividendos_{Pagos}}{LLA} \qquad \text{Equation 1}$$

Where:
Distributed *Payout*: Income effectively paid to shareholders;
$IE_{Liquid}$: Distributed Interest on Equity discounted from withholding income tax;
$Dividends_{Paid}$: Dividends paid to shareholders;
ANP: Adjusted Net Profit.

Therefore, likewise Galvão, Santos and Araújo (2018), this research uses the minimum mandatory *Payout* as a reference for the classification of *Payout* as minimum, incremental or reduced, depending on what is determined in the companies' bylaws. For the three levels of *Payout* evidenced in this research, the minimum *Payout* is equivalent to the dividend payment percentage established in the bylaws; the incremental *Payout* comprises the percentage of dividends paid above that established in the bylaws; and the reduced *Payout* occurs when the dividends distributed are below the level informed in the bylaws.

## 2.3 The Fama and French Model and some of its adaptations

Given the need to better understand asset returns and perform more accurate risk assessments, many studies are directed towards asset pricing models. The *Capital Asset Pricing Model* (CAPM), the *Arbitrage Pricing Theory* (APT) and the three-factor models by Fama and French (1993) are the best known. The CAPM model assumes that the rate of return of all risky assets is a function of the market Beta (β), which is the only risk measurement factor, according to Lintner (1956).

The APT model, developed by Ross (1976), differs from CAPM by understanding that there is more than one risk factor that has a systematic influence on assets. According to the author, the association between the expected return and the various sensitivities to Beta factors (β) must present a linear relationship. Therefore, it appears that, in the stock valuation models, the risk premium of the assets is a central variable in explaining the returns of these assets (Vieira, Maia, Klotzle & Figueiredo, 2017). In addition, the use of the APT model is interesting because of the possibility of including variables among the macroeconomic factors that relate the predictability of stock returns.

The Fama and French model (1993) is used to explain stock returns and presents itself as an alternative to CAPM, because, instead of using a single factor (the excess return of the market, which is the return of shares less the risk-free rate), uses two more risk factors, such as size and value. In addition to the excess market return factor ($R_m - R_f$), they employed SMB

factors for size (VM), which refers to the company's market value. The model suggests that the investor demands a higher return on shares with a lower market value than shares with a high market value.

The third risk factor considered by the Fama and French (1993) model, called *Book-to-market*, refers to the ratio between equity value (VC) and market value (VM). For these authors, the investor demands a higher return on a high-value share than on a low-value share.

The Fama and French three-factor model is based on the premise that the expected return on a portfolio above the risk-free rate $(R_t - R_f)$ is explained by the sensitivity of its return by three factors, namely: (1) the excess return of a broad market portfolio $(R_m - R_f)$; (2) the difference between the return on a portfolio of small companies and the return on a portfolio of large companies – *Small Minus Big* (SMB); (3) the difference between the return of a portfolio of high-value stocks and the return of a portfolio of low-value stocks – *High Minus Low* (HML).

The size factor is also related to profitability. When companies are grouped by this factor, we may assume that small companies tend to have lower return on assets than large ones. That said, the authors conclude that the size effect has a negative relationship with the average profitability.

The value factor is related to the economic fundamentals of the companies. Those with high VC/VM ratios are more likely to present low returns on assets and, when the company has low ratios, it is expected to have high returns on assets (Fama & French, 1993), which are therefore elements useful in the stock investment decision process.

The first step in the Fama and French model is to estimate the premium for each of the risk factors and then analyze the relationship of these factors to the return on the shares. That being said, it is important to note that the risk premium is obtained by the difference between the expected return on an asset at a given time (t) and the return on the risk-free asset. The size premium is calculated by the difference between the portfolio formed by small companies less those formed by large companies (SMB). Finally, the premium for the value factor is the result of the difference between high and low value companies (HML).

Among the main results of the study by Fama and French (1993), the following stands out:

a) Positive premiums have been found for all risk factors: market, size and value;
b) Most of the regressions of the model's portfolios presented an intercept statistically equal to zero, validating the model used and indicating that the three factors would be *proxies* for the relevant risk factors for investors;
c) All risk factors proved to be significant and seemed to complement each other in explaining the variations in portfolio returns.

That said, Mussa, Rogers and Securato (2009) comment that the three-factor model is valid to be used in the various financial decisions and is superior with relation to CAPM in explaining stock returns. As a consequence of the studies by Fama and French (1993), many authors began to empirically test the validity of the three-factor model against the CAPM model and to investigate the behavior of the return on shares based on the inclusion of other risk factors in the most diverse markets.

Neves and Leal (2003) investigated whether the factors related by the Fama and French model (1993) have any relationship with GDP growth and other macroeconomic variables. The results indicated that the factors HML and SMB remained statistically significant: HML showed an inverse relationship with GDP growth, and SMB, a direct relationship, as identified in Australia, Canada and Germany.

In turn, Malaga and Securato (2004) investigated whether the variations in stock returns from 1995 to 2003 could be explained by the three-factor model. They adopted the same methodology applied by Fama and French (1993), defining the monthly returns on premiums for risk factors and the returns on shares and portfolios. They tested the significance of the model and each of the factors by observing the coefficient of determination, $R^2$ and Student's t-statistic.

The results indicated that the three-factor model is superior to CAPM in explaining the stock returns of the sample used and that the three factors were significant.

With a view to obtaining further explanations about which factors best explain the stock return in face of the inability of the three-factor model to explain the cross-section variation of portfolio returns, Carhart (1997) added the moment factor to the Fama and French three Factor model (1993) and concluded that the new model substantially reduced the standard error in relation to the original model.

Joode (2011) analyzed the impact of the innovation variable of the Fama and French three factor model on the prediction of stock returns, based on the construction of ten portfolios based on the count of patents, and concluded that innovation may explain the return of stocks and the relevance of the size factor decreases due to the presence of the innovation factor in the model.

Santos, Famá and Mussa (2012) investigated whether the Fama and French three-factor model, with the inclusion of the "moment" variable, could explain the variations in the returns of Brazilian stocks listed in B3, from 1995 to 2006, and, for this purpose, employed the same methodology adopted by Fama and French (1993). The model has been tested by means of the coefficient of determination and the results indicated that the four-factor model is valid for the Brazilian stock market and superior to the three-factor model by Fama and French (1993), in explaining the variations in returns of the company's shares sample, so that the moment factor positively impacts the return on shares.

In order to test the three-factor model of Fama and French (1993) and to verify the impact of including a fourth factor, sustainability, Xiao, Faff, Gharghri and Lee (2013) carried out a study. The survey included an initial sample of 300,000 assets and monthly data in the period between 1999 and 2007. The results showed that the size and value factors had a strong power in explaining the stock returns and there was no evidence that the premium for sustainability factor had a significant impact on the stock returns of the countries analyzed.

The three-factor model by Fama and French, with the inclusion of the sustainability factor, has been applied to Brazil by Azevedo (2014). He investigated whether this model allowed for a better understanding of the return on shares in the Brazilian stock market between 2006 and 2013. The results show that the premium for corporate sustainability factor is significant in the model and allows for an increase in its determination coefficient. In addition, the factor generally has a negative impact on the expected return of the shares.

Given the above, this research carried out an adaptation of the Fama and French model with a view to including the *Payout* factor, in the expectation of testing whether this new model overlaps the original three-factor model in the sense of explain the return of stock portfolios. This proposition is based on the theory of relevance of dividends, which suggests that the payment of dividends contributes to adding value to the shares, as explored by Lintner, (1962), Gordon (1963), Loss and Sarlo Neto (2006), Martins and Fama (2012) and de Melo and Fonseca (2015).

## 3 METHODOLOGICAL ASPECTS

Based on the classification of distribution of dividends as mandatory minimum, reduced, incremental and non-payment of dividends, and based on the assumption of what is informed in the bylaws of companies, this research suggests a new model for evaluating the return on shares based on inclusion of the *Payout* factor to the Fama and French three-factor model, and investigates how it impacts explanations of changes in assets in the Brazilian market.

The population of this study is formed by companies listed on the São Paulo Stock Exchange: Brasil, Bolsa e Balcão (B3). The selected companies make up a non-probabilistic sample. This choice was made because it offers certain advantages, such as convenience, speed and low cost.

The necessary information for application of the three-factor model with the inclusion of the incremental *Payout* variable, that is, the VM, the VC ratio by the VM, the return on shares ($R_i$) and the *Payout* factor, have been obtained from the companies' electronic addresses, in the investor relations section, as well as at the Securities and Exchange Commission (CVM) website, B3, in the minutes of the AGM and in the Economatica® database in the period from 2004 to 2018. The option for year 2004 is justified by the fact that it is the oldest date made available by the CVM in the AGM minutes and that it would be possible to obtain sufficient information for the construction of portfolios by the methodology of Fama and French (1993).

The criteria for sample selection were:

a) Present VM and/or VC between January 2004 and December 2018;
b) Present a positive equity value. Fama and French (1993) exclude from the sample companies with negative equity;
c) Not having declared other types of distribution such as stock split, dividends on shares, mergers between the declaration of previous dividends and the declaration of current dividends;
d) Not showing abnormal changes in the dividend variation;
e) Not being classified among companies in the financial sector, given its greater degree of leverage compared to companies in other sectors, thus exercising influence over the B/M index. Furthermore, the indebtedness of companies of the financial sector does not have the same meaning as the indebtedness of non-financial companies (Santos, Famá & Mussa, 2012);
f) Presenting consecutive monthly quotations for 12 months, in order to make it possible to calculate the return on the shares.

This study follows the Fama and French (1993) methodology of portfolio formation and factor calculations, market premium, HML and SMB to compose and calculate the *Payout* factor. It differs only in terms of the criterion of maintaining the *medium* (intermediate) classification of the HML and SMB factors used to compose the portfolios, since, if contemplated, would result in the formation of portfolios with no assets.

Therefore, twelve portfolios have been created from the orthogonalization of portfolios created by the VC *proxy*, by the equity value and market value VC/VM ratio and by the classification of the level of the companies' dividend payment, according to the following procedures:

1. The shares have been ordered and divided into two groups according to the median of the VM, defined as *Big* and *Small*.
2. New reordering. The shares have been ordered and divided into two groups according to the median of the VC/VM ratio, defined as *High* and *Low*.
3. Using the companies' level of dividend payment as a reference, the sample was divided into three levels: those that did not pay dividends ($Payout\ n_t$), companies that have paid minimum or reduced *Payout* ($Payout\ mr_t$) and those who paid incremental *Payout* ($Payout\ i_t$), called “N”, “MR” and “I”, respectively.

These procedures have been repeated annually, so the portfolio models were balanced annually, based on December, and this allowed for companies to change their portfolios according to the analysis of their indexes.

The portfolios included the common shares between the two size groups (*Small* and *Big*) and the two value groups (*Low* and *High*), and the three groups that indicate the dividend payment profile. $Payout\ n_t, Payout\ i_t, \text{e}\ Payout\ mr_t$. Table 2 illustrates the characteristics of each portfolio model.

Table 2
**Characteristics of the twelve portfolios formed for the calculation of factors HML, SMB and incremental *Payout***

| **Portfolio** | **Size** | **Amount** | ***Payout*** |
|---|---|---|---|
| S/L/N | *Small* | *Low* | $(Payout\ n_t)$ |
| S/H/N | *Small* | *High* | $(Payout\ n_t)$ |
| S/L/I | *Small* | *Low* | $(Payout\ i_t)$, |
| S/H/I | *Small* | *High* | $(Payout\ i_t)$, |
| S/L/MR | *Small* | *Low* | $Payout\ mr$ |
| S/H/MR | *Small* | *High* | $Payout\ mr$ |
| B/L/N | *Big* | *Low* | $(Payout\ n_t)$ |
| B/H/N | *Big* | *High* | $(Payout\ n_t)$ |
| B/L/I | *Big* | *Low* | $(Payout\ i_t)$, |
| B/H/I | *Big* | *High* | $(Payout\ i_t)$, |
| B/L/MR | *Big* | *Low* | $Payout\ mr$ |
| B/H/MR | *Big* | *High* | $Payout\ mr$ |

**Note.** The first column consists of nomenclature of each portfolio formed in this research. The second column consists of denominations for portfolios of lesser equity value (size) and, in the third column, the denominations for portfolios with low value and high market value characteristics. The last column lists the classifications of companies according to dividend policy.
Source: Own elaboration.

After calculating the four factors (market premium, size, value and incremental *Payout*), regressions have been performed using the ordinary least squares method in order to obtain the portfolio coefficients and to measure the degree of adjustment and explanatory power of the Fama and French three-factor model, with incremental *Payout*. The expression may be visualized in Equation 2:

$$\mathrm{Rci,t} - \mathrm{Rlrt} = \alpha + \beta(\mathrm{Rmt} - \mathrm{Rlrt}) + \beta\mathrm{SMBt} + \beta\mathrm{HMLt} + \beta Payout\ \mathrm{I} + \mathrm{ei,t} \qquad \text{Equation 2}$$

Where:
$\mathrm{Rci,t}$ = return of portfolio i at time t;
Rmt = return of the market portfolio in month t;
Rlrt = return on risk-free assets in month t;
SMBt= *Small Minus Big* or premium for the size factor in month t, that is, the difference between the average return on the shares of smaller companies and the average return on the shares of large companies;
HMLt: *High Minus Low* or premium for factor, that is, the difference between the average return of shares with a high index of book value over market value and the average return of shares with a low index of book value over market value;
$Payout$ I: Incremental *Payout* is the factor used to identify the amount of dividends distributed, per company and above established in the bylaws;
$\mathrm{ei,t}$ = Residue of the model for portfolio i at time t.

The dependent variable, called the portfolio's market premium, is calculated within the portfolio's annual return with relation to the risk-free asset. For the formation of independent variables: (1) market factor premium: equivalent to the portfolio return by subtracting the premium obtained for risk-free assets; (2) size factor (SMB): referring to the premium obtained by the difference in return between companies characterized as *Small* or *Big*; (3) value or ratio factor (HML): equivalent to the premium obtained for shares characterized as *High*, *Medium* or *Low*, that is, it considers the excess of average return between the high BE/ME index and low BE/ME index; and (4) *Payout* factor is calculated from the difference between the average annual returns of the minimum *Payout* group's portfolio. In other words, companies that paid exactly the amount of dividends declared in the AGM Minutes, with average portfolio of the

companies classified by the incremental *Payout* and the average return of the companies that paid reduced *Payout*. Table 3 summarizes the calculation procedures for each mentioned factor.

Table 3
**Procedures for calculating the factors used in the F&F model with *Payout***

| Factor | Definitions |
|---|---|
| Prêmio de mercado $= \left[\sum_{i=1}^{n} \frac{VM_{i,t}}{VM_{p,t}}(R_{i,t})\right] - Rf_t$ | $VP_{i,t}$: Book value of share *i* in month *t*;<br>$VM_{i,t}$: Market value of share *i* in month *t*;<br>$R_{i,t}$: Return of stock *i* in month *t*;<br>$Rf_t$: Return on risk-free assets in month **t**; |
| Size factor: $SMB_t = \overline{R_{S,t}} - \overline{R_{B,t}}$ | $SMB_t$: Return by the size risk factor in year *t*;<br>$\overline{R_{S,t}}$ : Average return of the three S portfolios in year *t*;<br>$\overline{R_{B,t}}$: Average return of the four or fourth portfolios B in year *t*. |
| Value or ratio factor $HML_t = \overline{R_{H,t}} - \overline{R_{L,t}}$ | $HML_t$: Return by risk factor VC/VM in year *t*;<br>$R_{H,t}$: Average return of portfolios H in month *t*;<br>$\overline{R_{L,t}}$: Average return of portfolios L in month *t*; |
| Prêmio do $Payout_t = \overline{Payout\,i_t} - \overline{Payout\,n_t}$ | *Payout* $n_t$: average return on shares of companies that have not paid dividends in month *t*;<br>*Payout* $i_t$: average return on shares of companies that pay incremental *Payout* in month *t*;<br>*Payout* $r_t$: average stock returns for companies that pay reduced or minimum *Payout* in month *t*. |

**Note.** The first column lists the nomenclature for each factor and its equation. The second column consists of the names of the elements that make up the equations of the respective factors of the model.
Source: Own elaboration.

After presenting the operational methodological procedures of the research and the definitions of the population and samples, as well as the construction of the four-factor model with *Payout*, from the adaptation of the three-factor model by Fama and French, the following section presents and comments the main results found regarding the evaluation of the proposed model and the relevance of the *Payout* factor as a risk factor to evaluate the return of formed portfolios.

## 4 RESULTS

In order to achieve the goal of investigating whether the model adapted from Fama and French with the inclusion of the *Payout* factor (F&F with *Payout*) would allow a better understanding of the returns of portfolios of companies listed in B3 than the single Fama and French three-factor model, the first step was to compare the explanatory power, the dependence analysis of the residues and the tests of the model adjustment and the significance of the coefficients between the models.

Then, the coefficients and p-value of each factor have been analyzed in order to assess the effect that each has on the return of the portfolios. Thus, Table 4 presents the results of the model adjustment; the analysis of the autocorrelation of residues, the quality of the model fit and the significance of the coefficients for the original Fama and French three-factor model (abbreviated by F&F) and the model adapted with the inclusion of the *Payout* factor (abbreviated by F&F with *Payout*).

Table 4

**Comparison between explanatory power, residue dependency analysis and tests of model fit and significance of coefficients for the three-factor model and the proposed four-factor model**

| Portfolio | Models | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | F&F | F&F with *Payout* | F&F | F&F with *Payout* | F&F | | F&F with *Payout* | |
| | $R^2$adjusted | $R^2$adjusted | DW Analysis | DW Analysis | Test F | Prob. F | Test F | Prob. F |
| **SLN** | 0.597 | 0.751 | No autocorrelation | No autocorrelation | 96.67 | 0 | 84.61 | 0 |
| **SHN** | 0.528 | 0.572 | No autocorrelation | No autocorrelation | 57.27 | 0 | 52.47 | 0 |
| **SLI** | 0.695 | 0.712 | No autocorrelation | No autocorrelation | 114.83 | 0 | 88.11 | 0 |
| **SHI** | 0.701 | 0.735 | No autocorrelation | No autocorrelation | 125.20 | 0 | 106.69 | 0 |
| **SLMR** | 0.597 | 0.422 | Inconclusive | Inconclusive | 34.91 | 0 | 34.78 | 0 |
| **SHMR** | 0.687 | 0.437 | No autocorrelation | No autocorrelation | 44.49 | 0 | 33.59 | 0 |
| **BLN** | 0.498 | 0.526 | No autocorrelation | No autocorrelation | 36.49 | 0 | 42.32 | 0 |
| **BHN** | 0.574 | 0.671 | No autocorrelation | No autocorrelation | 55.25 | 0 | 51.45 | 0 |
| **BLI** | 0.420 | 0.531 | No autocorrelation | No autocorrelation | 25.87 | 0 | 19.83 | 0 |
| **BHI** | 0.339 | 0.437 | No autocorrelation | No autocorrelation | 22.96 | 0 | 18.12 | 0 |
| **BLMR** | 0.625 | 0.426 | No autocorrelation | No autocorrelation | 19.85 | 0 | 15.01 | 0 |
| **BHMR** | 0.679 | 0.421 | Absence of autocorrelation | Absence of autocorrelation | 21.89 | 0 | 16.56 | 0 |

**Note.** The determination coefficient (adjusted $R^2$) indicates the model's ability to be explained by the variables included in the model; the Durbin-Watson analysis assesses the autocorrelation of residues. The F Test and Probability F (Prob. F) are needed to assess the fit of the model and the significance of the coefficients.
Source: Own elaboration.

When comparing explanatory power, the F&F model with Factor *Payout* allows for a significant improvement in the explanation of the return of eight of the twelve portfolios, having explanatory power superior to the F&F model for portfolios that have not paid dividends and that have paid incremental dividends. It is, therefore, an important instrument for the formation and evaluation of portfolios with extreme dividend distribution profiles, since it obtained an adjusted $R^2$ coefficient greater than 70% for these portfolios.

When analyzing the superiority of the four-factor model with *Payout* in high-value portfolios, we realized that the explanatory power of the model varied between 43% and 67%. This indicates a good fit, however, new risk factors are needed to further improve the explanatory power of the model, since, despite indicating a moderate explanatory capacity, new information can contribute to the adjustment of the model. In that case, it is likely that the GDP factors; time; innovation; and sustainability, evidenced by Neves and Leal (2003), Santos, Famá and Mussa (2012), Joode (2011) and Xiao, Faff, Gharghri and Lee (2013), respectively, may contribute to the improvement of the model.

In turn, the F&F model was more robust in explaining the returns of the portfolios of companies that paid minimum mandatory dividends (SLMR; SHMR; BLMR. BHMR), as established in its bylaws. It is noteworthy that the results found indicate an explanatory power

greater than 60%, so they are useful to understand the return of companies that usually pay dividends.

Continuing the analysis of construction of the models, the Durbin-Watson tests, the F test and the F probability were used to assess whether the models were well formulated. The Durbin-Watson test, in general, showed similar results for the two models analyzed, since eleven portfolios converged, showing an absence of autocorrelation. The interpretation that there is no autocorrelation means that the adjacent observations are not correlated, that is, the model was well adjusted, as its residues were not correlated (Gujarati, 2006).

The F test and the F probability indicate the quality of the model's fit and the significance of the coefficients. The result of F Test, when greater than ten, indicates that the model is well adjusted. Therefore, the model was well adjusted for all twelve portfolios of the two models. The F probability indicates that we can reject at 1% significance that all coefficients are simultaneously equal to zero, that is, at least one parameter is different from zero for both models.

Given the above, it is possible to say that the F&F model with *Payout* was more efficient in explaining the return of small and large portfolios that do not pay dividends or that pay incremental dividends. Whereas the three-factor model applies best to portfolios that pay minimum or reduced dividends. Thus, the four-factor model may be used for investment decisions when it is desired to consider information on dividend distribution abnormalities.

Continuing the comparative analysis of the models, the next step was to perform the regression analysis for both models, in order to identify the effects of risk factors on the return of the portfolios. After analyzing the normality distribution of the data using the Kolmogorov-Smirnov and Lilliefors test, which confirmed the normality hypothesis, we moved on to regressions for each of the twelve portfolios.

Table 5 shows the results of the regressions for the three-factor F&F model and four-factor model proposed in this study (F&F with *Payout*), indicating the relevance of the risk factors and the model coefficient for each portfolio. In Table 5, the values highlighted in bold correspond to the coefficients of the risk factors that presented statistical significance at 5%, since their results for *p-value* were below 0.005. It should be noted that, the lower the *p-value* results, the more statistically significant are its coefficients. In the last column, the regression determination coefficient is presented for each portfolio, indicating that the closer to one, the better the model fit. In this sense, it should be noted which factors are relevant and whether the model was well defined for each formulated portfolio profile.

As shown in Table 5, it is possible to verify that, for the Fama and French (1993) model, the premium coefficients for the market risk factor were significant in all twelve portfolios. When analyzing the coefficients of the SMB factor, it was possible to identify that in only one portfolio there was no statistical significance, the case in question occurred in the SHMR portfolio It was also found that the values of the coefficients remained positive for the Small portfolios and negative for the portfolios Big, which indicates that smaller companies have higher returns, corroborating with Fama and French (1993).

Still in relation to the three-factor model, analyzing the HML factor, its coefficients showed significance in half of the analyzed portfolios and with both a positive and a negative effects. Among the significant coefficients, this factor had the greatest impact on small portfolios that have not paid dividends, SLN and SHN, with coefficients of −1.507 and 1,705, respectively. In general, we may make the assumption that the companies with the highest growth opportunities (*High*) have a positive relationship with the return, and those with the lowest growth opportunities (*Low*) mostly present a negative relationship with the return.

Regarding the discussion of the four-factor model coefficients, when examining the coefficients of the premium factor for the market risk factor, it is noted that it was significant in all twelve portfolios, as in the three-factor model, this same behavior was observed for the SMB factor, which remained statistically significant for all portfolios, except for SHMR. This

conclusion was also reached in the F&F model. One possible reason for this is the fact that the Durbin-Watson test was inconclusive for this portfolio.

Still in relation to the SMB factor, we found that the values of the coefficients remained positive for the *Small* portfolios and negative for the *Big* portfolios, indicating a positive relationship between the return of the portfolios and the portfolios of lesser value and an inverse relationship between the returns of portfolios and larger portfolios. It should be remembered that the SMB factor was measured by the companies' market value *proxy* and it is noteworthy that this result converges with the results of Fama and French (1993), when indicating that the investor requires a higher return on shares of lower market value than high market value stocks.

Regarding the analysis of the *Payout* factor, it appears that in nine of the twelve portfolios the coefficients were significant, with a negative impact for the four portfolios whose companies did not pay dividends (SLN, SHN, BLN, BHN), implying that the greater the return on these portfolios, the less likely it is that there will be a premium for the *Payout* factor. In other words, not paying dividends positively affects the return on portfolios.

Regarding the significant and positive impact of this factor on the studied portfolios, we found that, in the SLI, SHI, SLMR, BLI and BHI portfolios, the payment of incremental and reduced minimum payments implies on a higher return of the portfolios. This indicates that portfolios made up of small and large-value companies that pay incremental dividends are more prone to higher returns as they pay more dividends. This logic corroborates the discussions of the theory of relevance of dividends (Lintner, 1956; Gordon, 1959), since paying constant and greater dividends represents certain gains in the present and that the appreciation of the stock is an uncertain event in the future. That said, paying dividends corroborates to reduce uncertainty, which in turn implies an increase in the company's share prices.

Table 5
**Results of time series regressions for the F&F model and the F&F model with *Payout***

| Portfolio | Constant | | Rm-Rf | | SMB | | HML | | *Payout* | | R²adjusted | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | F&F | *F&F with Payout* | F&F | *F&F with Payout* | F&F | *F&F with Payout* | F&F | *F&F with Payout* | F&F | *F&F with Payout* | F&F | *F&F with Payout* |
| **SLN** | 0.125 | -0.187 | **0.420** | **0.371** | **1,226** | **0.792** | **−1.507** | **−1,906** | Not applicable | **−0.650** | 0.597 | 0.751 |
| **SHN** | 1,231 | 1,453 | **0.589** | **0.601** | **1.352** | **0.781** | **1,705** | **1,952** | | **−0.576** | 0.528 | 0.572 |
| **SLI** | 0.642 | 0.721 | **0,941** | **0.953** | **0.312** | **0.275** | 0,109 | 0.096 | | **0.175** | 0.695 | 0.712 |
| **SHI** | 0.254 | 0.367 | **0.876** | **0.861** | **0.261** | **0.452** | 0.179 | 0.101 | | **0.356** | 0.701 | 0.735 |
| **SLMR** | **1,992** | **1,671** | **0.954** | **0.206** | **0.405** | **0.193** | **−0.751** | **−0.836** | | **0.559** | 0.597 | 0.422 |
| **SHMR** | -0.156 | -0.161 | **0.705** | **0.097** | 0.205 | 0.103 | **0.251** | **0.276** | | -0.108 | 0.687 | 0.437 |
| **BLN** | **3,421** | **3,157** | **0.981** | **0.941** | **−0.357** | **−0.976** | **−0.621** | **−0.401** | | **−0.901** | 0.498 | 0.526 |
| **BHN** | 0.789 | 0.624 | **0.905** | **0.813** | **−0.181** | **−0.529** | **0.159** | **0.281** | | **−0.291** | 0.574 | 0.671 |
| **BLI** | **−1,742** | **−1,621** | **0.669** | **0.471** | **−0.382** | **−0.326** | -0.091 | -0.054 | | **0.171** | 0.420 | 0.531 |
| **BHI** | 1.109 | 1.223 | **0.491** | **0.389** | **−0.479** | **−0.421** | -0.059 | -0.088 | | **0.221** | 0.339 | 0.437 |
| **BLMR** | 0.351 | 0.412 | **0.689** | **0.621** | **−0.589** | **−0.523** | -0.179 | -0.201 | | 0.197 | 0.625 | 0.426 |
| **BHMR** | 1,792 | 1,297 | **0.815** | **0.812** | **−0.402** | **−0.325** | 0.089 | 0.023 | | 0.059 | 0.679 | 0.421 |

**Note.** The model-dependent variable, called the portfolio market premium, considers the portfolio's annual return in relation to the risk-free asset. For the formation of the independent variables, return by market risk factor, SMB, HML and *Payout* indices have been considered the premiums between the factors, as highlighted in section 2. This table shows the coefficients of the variables, the respective significance values and the adjusted R² for each regression.
Source: Research data.

We may also visualize that companies that do not pay dividends have a negative relationship with the return, indicating that shareholders value the payment of dividends and, when companies do not, there is a negative impact on the return, given to the devaluation of the portfolios. In view of the above, we assume that the results of this research culminate with the bird in hand theory (Gordon, 1963; Lintner, 1962), since shareholders prefer the payment of current dividends to future dividends or capital gain.

When the factors were analyzed together, it was possible to observe that only the SLMR and BLN portfolios, among the twelve portfolios, showed significance in all factors simultaneously, and the SLN, SHN, BHN and BLI portfolios showed significance in four factors, including the constant, confirming that, in general, the factors of the model proposed in this study are relevant and are related to the returns of the developed portfolios. The *Payout* factor was relevant in nine of the twelve portfolios.

That said, we propose that the quality of the model F&F with *Payout*, information obtained by $R^2a$, which indicates how much the proposed model is able to explain the return of the portfolios from the studied variables, is adequate to explain the returns of the SLN, SLI, SHI and BHI portfolios with more than 60% and, for the rest, it has explanatory power between 40% and 50%.

It is also worth noting that the positive relationship of dividend paying companies with return is in line with the findings of Gordon (1959), based on the explanation that high dividend payments reduce the cost of capital for third parties and, consequently, increase the value of actions. In addition, Gordon (1959) comments that investors are risk averse and when they find themselves in an environment of uncertainty, they will choose to receive dividends as soon as possible.

According to the results obtained in this research, we say that the F&F model with *Payout* is theoretically and empirically relevant in the various financial decisions, especially with regard to the process of portfolio formation and investment decision, since while considering the premium for the payment of dividends, the model proved to be relevant in explaining the return of stock portfolios, corroborating with the theory of the relevance of dividends, which suggests that the payment of dividends contributes to adding value to the shares, according to Lintner, (1962), Gordon (1963) and more recently with the results of Loss and Sarlo Neto (2006), Mussa, Rogers and Securato (2009), Martins and Fama (2012) and Melo and Fonseca (2015).

## 5 CONCLUSIONS

This research aimed to investigate whether the model adapted from Fama and French with the inclusion of the *Payout* factor (F&F with *Payout*) would allow for a better understanding of the returns of the portfolios of companies listed on B3, than the understanding of the Fama and French three-factor model.

The inclusion of the *Payout* factor in the asset valuation model is justified by the lack of consensus on the relationship between the amount paid for dividends and the value of the share, thus constituting an opportunity to adapt to the model of Fama and French and test its efficiency in explaining the return of portfolios formed by companies traded in Brasil, Bolsa, Balcão between 2014 and 2018 and, consequently, contributing to the portfolio formation process and investment decision.

In response to the objective of this research, to highlight the explanatory power of the model and, therefore, the problem question that guides this study – what is the impact of adding the *Payout* factor to the Fama and French model in explaining the variations in stock returns for publicly traded companies in Brazil – we found that the adaptation of the Fama and French model (1993) was well estimated and able to explain the return of the portfolios based on the variables studied and, for the most part, with greater explanatory power than the three-factor model.

In this sense, the four-factor model with *Payout* is better than the three-factor model in explaining the return of eight of the twelve portfolios, and for smaller portfolios (*small*) that have not paid dividends and the ones that have paid incremental dividends, such as SHI, SLI, SLN and SHN, the model can explain the return by 70%. And, in high-value portfolios, the explanatory power varied between 43% and 67%. Therefore, the inclusion of the *Payout* factor in the Fama and French (1993) model is relevant for portfolio assessment studies.

Given the above, we may infer that this research is useful to investors, since it highlights the payment of dividends as a relevant factor for the formation of portfolios and that the *Payout* factor is important when added to the Fama and French three-factor model, configuring itself as an alternative to assist in the formation of portfolios and investment decision, mainly when considering the dividend distribution policy.

It should be noted that this research supports the theory of the relevance of dividends (Lintner, 1956; Gordon, 1959) and the bird in the hand (Lintner, 1962; Gordon, 1963), since we found a positive relationship between the payment of dividends and the return of portfolios, allowing to infer that there is a positive association between them and, therefore, that the payment of dividends contributes to the appreciation of the portfolios of companies that pay normal and incremental dividends.

Finally, as a suggestion for future research, we recommend identifying why the *Payout* factor has a negative impact on the SLN, SHN, BLN and BHN portfolios, as well as conducting research in order to investigate what information companies want to transmit while distributing incremental dividends.

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