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Abnormal Stock Returns In Stability And Crisis Scenarios: An Analysis Of The Brazilian Market

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Abstract:
This article aimed to analyze the abnormal return on stocks in the Brazilian market, in periods of stability and national crisis, considering the variables profit, dividend distribution, company size and level of corporate debt. A documentary research with a quantitative approach and descriptive purpose was carried out. The data were obtained from the Economática database and analyzed through multiple linear regression. The results showed that, in the Brazilian scenario, the distribution of dividends, profit and level of corporate debt had a positive relationship with the abnormal return on stocks. However, the distribution of dividends and profits tend to decrease and the level of debt tends to increase in periods of crisis. On the other hand, size had a negative relationship with the abnormal return on stocks.

Key Word*: Brazilian finance; Stock market; Dividend returns; Financial crisis.*

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I. Introduction

In the capitalist system, which is considered unstable, financial crises are common (Borges *et al*., 2018). Between 2003 and early 2008, the global economy was characterized by great expansion, with low inflation and high development. Low interest rates encouraged real estate growth, culminating in the so-called real estate bubble (Espejo; Clemente, 2016). In addition, the reduction of taxes for companies and individuals generated greater purchasing power, increasing consumption (Espejo; Clemente, 2016).

However, in 2007, the first signs of the crisis appeared in the North American real estate market, which had a domino effect, spreading rapidly, with the entire world feeling its consequences (Ribeiro; Gerigk, 2016; Ribeiro; Scherer; Silva, 2016). The 2008 crisis had economic causes due to the bankruptcy of US banks in the subprime segment, a risky credit granted to a borrower who does not offer guarantees (Borges *et al*., 2018). In this context, there were several real estate loans from insolvent debtors that led several banks and financial institutions to bankruptcy (Ribeiro; Gerigk, 2016).

The financial market, in general, involves risks, and investors adhere to them to obtain greater returns. In times of crisis, there is an excessive concern about the possible loss of invested capital, which causes several redemptions of invested resources (Espejo; Clemente, 2016). At this time, there is a retraction in the private securities market, and banks seek to mitigate risks and long-term offers (Franzotti *et al*., 2021). This frequent reduction in the availability of capital and credit during times of crisis requires companies to take actions that impact their financing decisions (Borges *et al*., 2018).

The divestment movement can also be observed in the Brazilian crisis. Its recession, which began in 2014 and continued until 2018, is the deepest and most lasting decline in the level of economic activity since the mid-1940s (Pamplona; Silva, 2021). There were 11 consecutive quarters of decline in the Gross Domestic Product (GDP), in addition to a drop in household consumption and a reduction in investments (Nonato; Tófoli, 2020).

The crisis affected the financial system, generating losses in different sectors of the Brazilian economy (Pereira *et al*., 2019). This recession impacted the supply of credit, affecting the financial conditions of organizations (Franzotti *et al*., 2021). Rising interest rates, inflation, and unemployment worsened the economic scenario, resulting in a supply-demand clash resulting from errors in economic policy (Pontel; Tristão; Boligon, 2020).

Several factors contributed to the economic crisis, such as overproduction, recession and depression, GDP decline, rising interest rates, and remnants of the 2008 crisis. The economy went through an unstable period and inflation got out of control, which led to a decrease in the production and sale of products and an increase in unemployment (Pontel; Tristão; Boligon, 2020). The period of consecutive recession ended in 2017, when the economy grew by 1%, but still had not recovered the losses resulting from years of decline (Nonato; Tófoli, 2020; Duarte *et al*., 2019).

In relation to organizations, these crises are external factors that compromise a company's assets, which can lead to debt (Pereira *et al*., 2019). It is possible that, in these periods, companies may reduce investments

due to the uncertainty in the economy (Duarte *et al*., 2019). One strategy to retain investors in organizations is the payment of dividends. However, in times of crisis, companies tend to reduce cash as a precaution, affecting dividend payment decisions, which may lead to the need for external financing (Leite *et al*., 2020).

In the Brazilian stock market, there is a legal requirement for the distribution of dividends, so the percentage to be distributed is defined by each company. If the bylaws are silent on this portion, the mandatory minimum dividend will generally correspond to 50% of the company's net income in each fiscal year, minus or plus the amounts related to the amount allocated to the legal reserve and the amount allocated to the contingency reserve (Viana Junior *et.al*., 2017).

Brazilian financial institutions therefore have specific attributes for establishing regular dividend payments, which is, to a certain extent, interesting for investors. Thus, given that dividend policy decisions convey implicit informational content to investors, paying dividends regularly and predictably can avoid negative signals to the market (Fonteles *et al*., 2012; Forti; Schiozer, 2015; Silva; Dantas, 2015).

In this context, there is a tendency to maintain stability in dividend policy, with the purpose of avoiding possible negative signals to the market. Nevertheless, dividend distribution acts as a mitigator of agency conflicts, since it reduces the resources available to company managers (Gonzaga, Costa, 2009).

In view of the above, it can be inferred that the relationship between dividends and stock returns, as well as between the interaction of dividends and profits with stock returns, occurs differently, according to the macroeconomic scenario, and that considering this factor in econometric analyses helps to explain stock returns. Thus, this research aims to analyze the abnormal return on stocks in the Brazilian market, in periods of stability (2010 to 2013) and national crisis (2014 to 2018), based on Moreira *et al*. (2021). It was analyzed how the variables profit, dividend distribution, size and level of debt of companies affect the return on these stocks, in the different periods considered.

II. Material And Methods

To conduct this research, data from the Economatica database were used. The sample is a data panel composed of 1,562 annual observations, covering the historical series from 2010 to 2018. The shares of non-financial companies registered and listed on B3, formerly BM&FBovespa, were considered. Furthermore, the most liquid share classes (preferred or common) of each company in the period analyzed were considered, so that there would be no duplication of observations on the same company in the same period. Finally, to avoid the effect of observations with extreme values (outliers), some values were "winsorized" at the 5% percentile.

Variable Definitions

The formulas for the dependent and independent variables are in accordance with the study by Brugni *et al*. (2012).

Dependent Variable: Abnormal Return

The dependent variable was used to measure the abnormal return of the shares. Simões *et al*. (2021) argue that, in order to conceptualize the abnormal return, one must mention the expected and observed return. The expected return can be calculated under the same conditions as a company and, by subtracting the observed return from it, the abnormal return (RA) is created. The authors argue that the RA is a representation of market actions that is directly linked to the other two returns.

$$RAi,t = Ri,t - RIBOVt$$

Where:
$RA_{i,t}$ = Abnormal Return for company i in period t;
$R_{i,t}$ = Return of company i in period t;
$RIBOV_t$ = Expected Return according to the market line for company i in period t.

The stock return was calculated as follows:

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1}}{P_{i,t-1}}$$

Where:
$R_{i,t}$ = Rate of return of company i in period t;
$P_{i,t}$ = Stock price of company i in period t;
$P_{i,t}$ - 1 = Stock price of company i on date t - 1.

The market return (RIBOV) was calculated in the same way as the stock return:

$$RIBOV_t = \frac{IBOV_t - IBOV_{t-1}}{IBOV_{t-1}}$$

Where:
RIBOVt = Rate of return of IBOVESPA in period t;
IBOVt = Price of IBOVESPA on date t;
IBOVt-1 = Price of IBOVESPA on date t-1.

Independent Variables
Adjusted Net Income

Adjusted net income is one of the calculation bases that the company can choose to distribute dividends (Assaf Neto, 2019), and is calculated as follows:

$$LLA_{i,t} = \frac{LL_{i,t}}{VM_{i,t-1}}$$

Where:
LLA_{it} = Adjusted profit of company i in period t;
LL_{it} = Net profit of company i in period t;
VM_{it} -1 = Market value of company i in period t- 1.

As a market value metric, the product of the number of shares available on December 31 (or the last previous trading date on the trading floor) and the value of the share on the closing date of the day was considered.

Adjusted Dividend

$$DIVA_{i,t} = \frac{DIV_{i,t}}{VM_{i,t-1}}$$

Where:
$DIVA_{i,t}$ = Adjusted dividend of company i in period t;
$DIV_{i,t}$ = Dividend disclosed by company i in period t; i,t-1;
$VM_{i,t}$ = Market value of company i, in period t-1.

Size

The natural logarithm of the company's total assets was used as a *proxy* for company size, as shown below:

$$TAM_{i,t} = 1n(AT_{i,t})$$

Indebtedness

The proxy adopted to control the effect of the level of indebtedness of companies was tested to also take into account the operational liabilities of companies, which in Brazil have a relative expression within total liabilities, being represented by the relationship between third-party capital (operational and non-operational liabilities, short and long term) and total liabilities:

$$END_{i,t} = \frac{CT_{i,t}}{PT_{i,t}}$$

Where:
$END_{i,t}$ = Debt of company i in period t;
$CT_{i,t}$ = Third-Party Capital (Current Liabilities + Non-Current Liabilities) of company i in period t;
$PT_{i,t}$ = Total Liabilities (PC + PnC + PL) of company i, in period t.

Econometric techniques and testing

In this research, an econometric test was carried out using multiple linear regression, as per Equation 8.

$$RA_{it} = \beta_o + \beta_1 LLA_{it} + \beta_2 DIVA_{it} + \beta_3 TAM_{it} + \beta_4 END_{it} + CRIS_{it} + \varepsilon_{it} \quad \text{(E.8)}$$

Where:
RA_{it}, = Abnormal Return on the share of company i in period t;
LLA_{it} = Adjusted Net Income of company i in period t;
$DIVA_{it}$ = Adjusted Dividend of company i in period t;
TAM_{it} = Control variable for the Size of company i in period t;
END_{it} = Control variable for the debt of company i in period t;
$CRIS_{it}$ = *dummy* to identify a period of crisis, being 0 for the period between 2010 and 2013 and 1 for the period between 2014 and 2018.

The model represented in Equation 8 was tested in different macroeconomic periods, following Moreira *et al*. (2021), therefore having: non-crisis period (2010 to 2013); crisis period (2014 to 2018); in addition to the general period (2010 to 2018). Thus, it was possible to compare the relationship between the variables in three different scenarios.

The regression model with panel data was used. According to Fávero (2013), panel data allows the use of a greater number of information, more varieties in the data, reduced collinearity between the variables, better quality of independence and applicability in the estimates, including, in the temporal study, cross-section data (Fávero, 2013).

The three most common approaches to panel data analysis are: 1) POLS (Pooled Ordinary Least Squares) which considers the beta of an explanatory variable to be the same for all observations over time; 2) Fixed-effects, which, unlike POLS, considers changes over time; 3) Random-effects, which analyzes the individual differences in the intercept of each company in the error term (Fávero *et al*., 2009).

The Breusch-Pagan, Chow and Hausman tests were applied to define the best model among Fixed Effects, Random Effects and POLS in each period. In the general sample period, the results showed that the POLS approach is the most appropriate. In the non-crisis period, the most appropriate approach was the Fixed Effect. In the crisis period, the tests were indeterminate. Table 1 presents the tests (Breusch-Pagan, Chow and Hausman) for each period.

Table 1 - Tests by period

Period	Breusch-Pagan	Chow	Hausman
General (2010-2018)	POLS	POLS	Fixed
Stability (2010 a 2013)	POLS	Fixed	Fixed
Crisis (2014 a 2018)	Random	POLS	Fixed

Source: prepared by the authors.

Given that the objective of this study is to compare the relationship between variables in different periods, without changing the model, it was decided to standardize the estimation of the results, to provide better comparability in the analysis. Thus, for the reasons explained below, the Fixed Effects estimator was defined as the most appropriate for testing the relationships in the three periods considered in the research.

According to Gujarati and Porter (2011), if the Fixed-Effect model is adequate, the pooled data estimator will always be inconsistent, and even if pooled or Random Effect is the most suitable, the estimation with Fixed-Effects will always be consistent. Likewise, if the most appropriate model is with a Fixed-Effects estimator, the estimation with Random Effects will be inconsistent (Gujarati, Porter, 2011).

It is worth noting that the three White tests showed the existence of heteroscedasticity in the models, which is why they were estimated in robust mode.

III. Result

In order to present an overview of the behavior of the variables in the panel data regression models, Table 2 shows the descriptive statistics of the variables used in the study between 2010 and 2018.

Table 2 – Descriptive Statistics

Variable	Obs.	Mean	Stand. dev.	Min	Max
WRA	2,616	.0229938	.3790158	-.6162288	.8358162
WLLA	2,473	-.1376339	.5340203	-2.026538	.2601796
WDIVA	1,607	.0397854	.0358333	.0014073	.1376012
WLTAM	2,791	14.61374	1.876253	10.69925	17.66945
WEND	2,789	.7577194	.5983468	.1727746	2.77713
Notes: RA = abnormal return; LLA = adjusted net income; DIVA = adjusted dividend; TAM = size; END = debt.					

Source: prepared by the authors.

It is observed that, on average, the return on companies' shares was positive compared to the market return. However, it is examined that, on average, companies also enjoyed more losses than profits in the period, and that, on average, companies paid 3.9% in dividends in relation to the market value.

Table 3 – Correlation Matrix

	RA	LLA	WDIVA	WLTAM	WEND	CN
RA	1.0000					
LLA	0.0097	1.0000				
WDIVA	0.1841*	0.0412	1.0000			
WLTAM	0.0445*	0.0766*	-0.0040	1.0000		
WEND	-0.0801*	-0.2115*	-0.0200	-0.3957*	1.0000	
CN	-0.1297*	-0.0445*	0.0007	-0.0114	0.0713*	1.0000
Notes: RA = abnormal return; LLA = adjusted net income; DIVA = adjusted dividend; TAM = size; END = debt and CN = national crisis.						

Source: prepared by the authors.

The correlation matrix data showed that there is no strong correlation between the model variables. As can be seen in Table 3, 'dividend' and 'size' showed a positive correlation with the abnormal return on shares, at a significance level of 5%. On the other hand, debt and the crisis period showed a negative correlation with the abnormal return on shares, at a significance level of 5%.

Table 4 – Regression Test

Variable	WRA (General period)	WRA (Stability period)	WRA (Crisis period)
WDIVA	2.502*** (6.47)	3.905*** (7.62)	1.830*** (5.03)
WLLA	0.377*** (3.68)	0.286* (1.75)	0.275*** (3.89)
WLTAM	-0.149*** (-4.18)	-0.116 (-1.29)	-0.0130* (-1.71)
END	0.150 (1.07)	-0.226 (-1.03)	0.182*** (2.78)
CONS	2.170*** (3.97)	1.887 (1.42)	0.0319 (0.30)
N. de obs	1562	727	835
VIF	1.15	1.19	1.14
R^2	0.0961	0.1369	0.0792
Control, per year	Yes	Yes	Yes
Notes: RA = abnormal return; LLA = adjusted net income; DIVA = adjusted dividend; TAM = size; END = debt; CONS = constant; N. of obs. = number of observations; ***, ** and * = statistical significance at 1%, 5% and 10%, respectively.			

Source: prepared by the authors.

IV. Discussion

Based on the regression data, in the three periods considered, paying more dividends showed a positive relationship with the abnormal return on shares. According to Novis Neto and Saito (2003), the payment of dividends signals to the market and shareholders that the company's financial and economic conditions are under control. In this sense, in any period (general, non-crisis and national crisis), having more profit showed a positive relationship between profit and the abnormal return on shares. Silva *et al*. (2016) argues that the information that companies are making a profit is reflected in the price of shares and, therefore, companies tend to pass on the information that they are making a profit.

In the variable 'size', in the general period and in the crisis period, larger companies had a lower abnormal return on shares, corroborating the studies by Oliveira et al. (2019), which, in their results, suggest that the particularities of companies interfere in the abnormal return on shares. However, the non-crisis period did not show statistical significance. In periods of crisis, more indebted companies had higher stock returns.

The results of the VIF test showed that there was no multicollinearity problems in the estimates performed. The variables in the normal period explain 9% of the variation in the abnormal stock return. In the non-crisis period, the variables explain 13% of the variation in the abnormal stock return. In the crisis period, the variables explain 7% of the variation in the abnormal stock return. Therefore, the set of independent variables better explains the variation in the abnormal stock return in the non-crisis period.

V. Conclusion

This study analyzed the relationship between periods of financial crisis and non-crisis in the abnormal return of stocks in the Brazilian market. The results obtained show that dividends and profits tend to decrease in periods of crisis, even though they have a positive relationship with the abnormal return. In turn, debt is predisposed to increase in periods of crisis, in addition to having a positive relationship with the abnormal return. Size, on the other hand, tends to negatively influence the abnormal return.

As a limitation, this research did not consider the sector of activity of the companies studied. Therefore, an analysis of the sector of activity is suggested, in the period of national and international economic crisis. It is

also recommended that future studies analyze the relationship in a scenario of national and international economic crisis, such as that which occurred in 2020, resulting from the pandemic caused by Covid-19.

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