WHAT HAPPENS IN THE BRAZILIAN STOCK MARKET WHEN IT IS A HOLIDAY IN THE USA?

Rodrigo Fernandes Malaquias [1]
Janaína Cássia Grossi [2]
Geovane Camilo dos Santos [3]
Jean Borges Siqueira [4]

ABSTRACT

The cross-market holiday effect refers to "lower trading volume associated with one or more external markets not trading" (Batrinca, Hesse, & Treleaven, 2018, p. 675). Based on this concept, the main purpose of this paper was to test the effect of North American holidays on the volume traded in the Brazilian stock market (North American holidays represent holidays in the USA during trading days in Brazil). We also evaluated the effect of American holidays on daily stock returns of Brazilian firms. Based on data of 80 Brazilian companies (80 different stocks) over the period from January/2009 to December/2021, using ARMA-GARCH models, the main results indicated that the volume traded on the stocks of the sample was lower during American holidays. On the other hand, for some stocks, their daily returns were higher when it was a holiday in the USA. Such results have implications for the theory of market efficiency, since there could be opportunities for obtaining abnormal returns based on calendar patterns. The main contribution of this paper is to analyze the cross-market holiday effect in the context of Brazilian stocks, expanding the literature on investments in emerging economies and considering trading activities of external markets.

Keywords: Calendar Effects; Cross-Market Holiday Effect; International Finance.

[1] PhD in Business Administration from EAESP/FGV. Associate Professor at Universidade Federal de Uberlândia. Address: Av. João Naves de Ávila, 2121, Bloco F, Sala 1F-216, Santa Mônica, Uberlândia, MG, Brasil. CEP: 38.400-902. Tel.: (34) 3239-4132. E-mail: rodrigofmalaquias@ufu.br. ORCID: https://orcid.org/0000-0002-7126-1051

[2] PhD Candidate in Business Administration at EAESP/FGV; Associate Researcher at Bells & Bayes Rating Analytics; MsC in Business Administration from PPGA/FAGEN/UFU Address: Rua Pequetita 215, sala 61, São Paulo, SP, Brasil. CEP: 04.552-060. Tel.: (34) 99920-2609. E-mail: janainagrossi_3@hotmail.com. ORCID: https://orcid.org/0000-0002-4070-3275

[3] PhD Student in Accounting Sciences at PPGCC/UFU; MsC in Accounting Sciences from PPGCC/UFU. Professor at Pontifícia Universidade Católica de Goias (PUC Goiás). Address: Av. João Naves de Ávila, 2121, Bloco F, Sala 1F-215, Santa Mônica, Uberlândia, MG, Brasil. CEP: 38.400-902. Tel.: (62) 3946-1000. Email: geovane_camilo@yahoo.com.br. ORCID: https://orcid.org/0000-0003-3253-830X

[4] Bachelor in Mechanical Engineering from Faculdade de Talentos Humanos, and Bachelor in Languages from Universidade de Uberaba. Holds MBA Business Management from FCETM. Address: Rua Artur Revenster, 215 A, Bairro: Centro. Brumado, BA. CEP: 46.100-000. Tel.: (34) 98411-8613. Email: jean_sique@hotmail.com. ORCID: https://orcid.org/0000-0001-7209-6951

Rodrigo Fernandes Malaquias, Janaína Cássia Grossi, Geovane Camilo dos Santos, Jean Borges Siqueira

O QUE ACONTECE NO MERCADO DE AÇÕES BRASILEIRO QUANDO É FERIADO NOS ESTADOS UNIDOS?

RESUMO

O efeito "*cross-market holiday*" refere-se a um menor volume de negociação em determinado país quando um ou mais mercados externos estão fechados (Batrinca, Hesse, & Treleaven, 2018). Considerando esse conceito, o principal objetivo desta pesquisa foi testar o efeito de feriados norte americanos no volume de ações negociadas na B3 durante dias úteis. Avaliou-se também o efeito de tais feriados nos retornos diários de empresas brasileiras listadas na B3. Utilizando modelos ARMA-GARCH e com amostra de ações de 80 companhias durante o período de Janeiro/2009 a Dezembro/2021, os principais resultados indicam que o volume negociado de ações é menor durante feriados Americanos. Tal resultado apresenta implicações para a teoria de eficiência de mercado, uma vez que poderia haver oportunidades para obtenção de retornos anormais com informações sobre padrões de calendário. A principal contribuição deste artigo está em analisar o efeito *cross-market holiday* no contexto de ações brasileiras, ampliando a literatura de investimentos em economias emergentes e considerando atividades de negociação de mercados externos.

Palavras-Chave: Efeito calendário. Efeito feriado entre mercados internacionais. Finanças internacionais.

1 INTRODUCTION

A peculiar seasonal pattern, in which stocks return are higher on the last trading day prior to a holidays, has been evidenced by finance literature (Tadepalli & Jain, 2018). Such a phenomenon was named "Holiday Effect" (Fields, 1934). This research topic is recurrent in the literature because it opposes the Efficient Market Hypothesis (Fama, 1970; Fama, 1991) and represents a possibility for investors to exploit abnormal excess return and profits by taking advantages of stock price difference.

While prior research on holiday effect focused on its impact on their respectively local markets, recently, new research results have shown that national holidays in certain larger economies, as those of the United States for example, may affect stock trade returns and volume in other financial markets (Batrinca, Hesse, & Treleaven, 2018; Carchano & Pardo, 2015; Casado, Muga, & Santamaria, 2013). Such a phenomenon of co-movements in international markets, as a result of holidays, has been named as "cross-market holiday effect" (Batrinca et al., 2018).

The cross-market effect of holidays could become increasingly common as the international flow of investment increases. Data show that the global flow of investments in equity and fund shares more than doubled in the last years, from 15US$ billion in 2010 to 31US$ billion by the end of 2017. From that amount, the United States were responsible for the most part of what is invested abroad - 9 US$ billion, which represents 28% of the total. The country is also the ultimate

international holder of Brazilian financial assets (International Monetary Fund [IMF], 2017). Therefore, based on the interdependence, co-integration and contagion of markets, an event in a given country can affect other economies, especially from a large market like the US to a small market like Brazil (Oliveira, Albuquerque & Carvalho, 2019).

Additional information shows that in 2016 foreign investors held 52.3% of the total negotiation in the Brazilian Stock Market Exchange (B3) (BM&FBovespa, 2017). Based on the significant flow of North American portfolio investment to Brazil, one can assume that the cross-market holiday effect could also be observed in the Brazilian financial market. In this way, what happens in the Brazilian Stock Market when it is a holiday in the USA? To explore this aspect, the main purpose of this paper is to test the effect of North American holidays on the volume traded in the Brazilian stock market (American holidays represent holidays in the USA during trading days in Brazil). We also evaluated the effect of American holidays on daily stock returns of Brazilian firms. We examine data of 80 stocks from different Brazilian companies over the period from January/2009 to December/2021. Our results indicate that the cross-market holiday effect also impact Brazilian stock market by lowering the traded volume and increasing stocks return.

The results of our study have theoretical and practical contributions. It contributes to the literature that opposes the Efficient Market Hypothesis, showing that under the assumption of a cross-country holiday effect, it is possible to obtain abnormal returns exploiting a market inefficiency. It also contributes the literature related to calendar anomalies/seasonal patterns exploring the cross-country holiday effect - which has not been widely investigated in the literature, nor has it been evidenced on Brazilian market.

There are also useful contributions related to trading strategies and investment decisions of investors, traders and portfolio managers. From the perspective of investors, we argue that they could try to exploit the anomaly/seasonality we study to have abnormal/excess returns and profits, buying shares in the Brazilian stock markets prior to the start of a holiday in the United States and selling them near (or at) the end of the holiday, thereby generating profit from the price differences (however, it is important to note that transaction costs need to be considered in this scenario). Furthermore, our results may help traders and portfolio managers to develop profitable trading strategies and plans by quantifying and forecasting trading volumes in advance of cross-country holiday effects, in order to predict their position and performance. Brazil has many characteristics that motivate studies related to its financial market, such as "high interest rates, higher country risk, weak investor protection, and lower levels of transparency vis-à-vis the developed countries" (Brugni, Klotzle, Pinto, Fávero, & Sial, 2021, p. 53).

This study expands previous research on calendar effects, such as, for example, the research of Lai and Windawati (2017), Al-Hajieh, Redhead and Rodgers (2011) and Seyyed, Abraham and Al-Hajji (2005), which address the Ramadan effect. According to Lai and Windawati (2017), an advantage of analyzing the Ramadan in the context of calendar effects is that during the Muslim holy month, the financial market remains open while it is usually closed on regular holidays (Lai & Windawati, 2017). In this study, we also have data of the Brazilian financial market during the holidays (the holidays of other country), since the Brazilian stock market is not necessarily closed when it is a holiday in the USA. Al-

Hajieh et al. (2011) states that the Ramadan effect can be related with positive sentiment of investors. In the case of our study, we can indicate some additional evidence about the effects of holidays that are not necessarily related with investor sentiment, but with the lower levels of operations of large investors from other countries.

2 LITERATURE REVIEW

Contrasting the Efficient Market Hypothesis (Fama, 1970; Fama, 1991), which states that all abnormal returns should be eliminated by arbitrage, the presence of regularities and seasonality in historical stock returns has been widely documented in international finance (Winkelried & Iberico, 2018). Under the scope of this branch of literature, such a patters are considered to be seasonal or calendar anomalies.

Of all evidenced calendar anomalies, the first one to be detected was a pattern of higher returns in Dow Jones Index's stocks on days prior to holidays (Fields, 1934), which was named Holiday Effect. It was defined as an "inclination of a stock market to gain on the last trading day before an exchange-mandated long weekend or holiday" (Tadepalli & Jain, 2018, p.23). In this sense, investors could exploit such effect by buying stocks some days before holidays and selling them in the last trading day prior to the holiday.

More recent studies have broaden the possible effect of holidays, showing that certain major local holidays may affect the stock markets of more than one economy, Al-Hajieh et al. (2011), Al-Khazali (2014), Al- Ississ (2015) and Al-Khazali, Bouri, Roubaud and Zoubi (2017) for example, evidenced significantly higher stock returns during the holy month of Ramadan in Muslin financial markets - Egypt, Indonesia, Jordan, Kuwait, Malaysia, Morocco, Pakistan, Qatar, Saudi Arabia, Turkey, Bahrain, Oman, Tunisia, UAE (Dubai) - in different time periods. According to these studies, the positive calendar effect of Ramadan on stock's return is associated to psychological and behavioral drivers, as investor's emotions, sentiment and social mood (Al-Hajieh, Redhead & Rodgers, 2011; Al-Khazali, 2014; Al-Ississ, 2015; Al-Khazali et al., 2017). In addition to that, Al-Assiss (2015) suggests that another explanation for the abnormal returns during Ramadan could be related to a liquidity premium demanded by active investors. On these holy days most part of the market participants is absent owing to religious practice, so the trading volume of the market decreases; thereby, traders would receive higher returns due to decreased liquidity (Al-Assiss, 2015).

Chinese New Year festival – when China's stock market is closed for a week – may also affect Asian markets' stock pricing (Wu, 2013; Yuan & Gupta, 2014). Wu (2013) evidenced higher return prior to the festival and lower returns post festival in Chinese stocks traded in the United States, which could be explained by a positive holiday sentiment prior to the holiday. Yuan & Gupta (2014) found the holiday effect on stocks returns on seven markets (China, Hong Kong, Japan, Malaysia, Singapore, South Korea and Taiwan). However, the authors do not base their findings' explanation on behavioral finance aspects; they suggest that the results are associated with increase in risk premium.

Going further in this matter, other studies focus on a possible cross-market effect of certain countries' national holidays on other financial markets' stock

trade returns, which have closer relation with our theme of research. We surveyed for relevant recent papers on this subject in the main international database of scientific research - Science Direct, Wiley, Scopus, JSTOR, Taylor & Francis and Emerald. We found only two studies addressing the transmission of information across international markets in cases of national holidays (Batrinca et al., 2018; Casado et al., 2013).

Casado et al. (2013) broke fresh ground to reveal the effect of US holidays on European markets - France, Germany, Euro-zone stock market, United Kingdom, Spain – by increasing the rate of return and decreasing volatility during the days that the New York Stock Exchange (NYSE) is closed. According to the authors, such patterns are consequences of changes in the flow of public information and in the investor mix by the time of US holidays.

Casado et al. (2013)'s idea is that institutional investors, who are considered sophisticated traders, represent most part of the American investors trading in foreign countries. Their absence changes the investor mix in other stock markets, that becomes composed mostly by noise traders. As a result, noise trader risk increases, causing return to increase too.

Another possible explanation for the cross-market holiday effect might be the reduction in the information flow between American and other stock markets, as the NYSE is closed for trading. Also, investors in other financial markets do not have to deal or react to macroeconomic variation coming from world's leading economy (Casado et al., 2013).

In the same line, the novel study by Batrinca et al. (2018) investigates whether lower trading volume in a given stock market could be associated with one or more external markets not trading. The results indicate the existence of a negative relation between the cross-market holiday effect and trading volume in European markets. The author also showed that the effect is stronger when they originate in larger markets as those of the United States, the United Kingdom, Germany, or Italy. In contrast, other markets are more susceptible to be affected by the phenomenon, as those of Belgium, Spain, France, Hungary, the Netherlands, Portugal, and South Africa. For the authors, the empirical results give support to the literature that evidences the existence of a contagion and transmission effect across international financial markets.

Considering the perspectives presented by the studies of Batrinca et al. (2018) and Casado et al. (2013), we argue that the cross-market holiday effect could also be extended to the Brazilian financial market. Our prediction is based on the great Brazilian financial market's insertion in the international context, as figures illustrate: portfolio investment flow to Brazil has expressively grown in recent years; it increased from 669 billion dollars in 2004 to 1,8 trillion dollars by 2016 (Bacen, 2017). According to BM&FBovespa (2017), foreign investors held 52,3% of the total negotiation in the Brazilian Stock Market Exchange (B3) in 2016. In addition, a survey conducted by the International Monetary Fund (IMF) shows that Brazil occupied the 8th place in the ranking of Portfolio Investment Assets' main destination countries (IMF, 2017).

In this sense, we foresee that i) the reduction in information volume regarding macroeconomic news and stock market data coming from world's leading economy and ii) the absence of traders and institutional investors from

large markets could reduce stock trading volume and increase stock return in the Brazilian Stock Market Exchange.

3 DATA AND METHOD

We obtained data regarding daily stock prices and volume traded from Economatica database. Based on daily stock prices, we calculated daily log-returns to be used in the quantitative analysis. It is important to note that stock prices were adjusted by dividends and by events such as splits, and collected in original currency. Regarding the volume traded, it indicates the total volume (in BR$) negotiated by stock, each day. To avoid differences of scale, we used the natural logarithm of the daily volume. Previous studies (such as Murcia & Machado, 2013) have also used information related to volume to construct a proxy for liquidity.

Our sample period covers the weekdays from January 2nd, 2009 to December 6th, 2021. Only stocks with daily returns for the entire sample period were included in the study sample. Moreover, in order to avoid some eventual bias from stocks that have lower levels of negotiation, to be included in the sample, the stock had to present a volume traded large than zero during the days of the study period (and must have a non-null market value at the end of every year). Finally, for companies that presented more than one stock in our study sample, we selected the stock with large average volume traded. Following these procedures, our sample was comprised of 80 different stocks.

As we test the effect of North American holidays on the volume traded in the Brazilian stock market and on daily stock returns of Brazilian firms, it is worth clarifying that North American holidays represent holidays in the USA, but it is a working day in Brazil, when the Brazilian stock market is trading normally. To define the national holidays in the USA, we considered the days in which the NYSE (New York Stock Exchange) was closed to trades, except weekend days. Therefore, we created a dummy variable to represent the national USA holidays; the dummy variable is scored one if the day is a national holiday in the USA but a trading day in Brazil, and zero otherwise. As a control variable, our database also contains a variable for Mondays (dummy variable which receives 1 for Mondays and 0 for the other days of the week).

We tested the holiday effect through time series analysis, using an ARMA model, which combines autoregressive and moving average characteristics (Yaffee & McGee, 2000). There are many different previous studies that used ARMA models to test market efficiency in Brazil (Gaio, Alves, & Pimenta Júnior, 2009; Campos, Lamounier, & Bressan, 2015). Since "financial market volatility is known to cluster" (Poon, 2005, p.37), we also consider a Generalized AutoRegressive Conditional Heteroscedasticity (GARCH) model; in this particular case, an ARMA-GARCH model. Considering that a GARCH(1,1) represents "the most popular structure for many financial time series" (Poon, 2005, p. 40), we used such model to test our hypothesis.

For each stock, we estimated the coefficients for a group of 24 models, as presented in Table 1, including two independent variables (the dummies for U.S. Holidays and Mondays). The selection of the most appropriate model, by stock, was based on the Akaike Information Criterion, following an equivalent procedure

employed by Campos et al. (2015). Considering that the sample is comprised of 80 stocks, we estimated 1,920 models.

Table 1
Time series models considered for hypotheses testing

Model		Model		Model	
1	ARMA(0,1)	9	ARMA(0,1)-GARCH(1,0)	17	ARMA(0,1)-GARCH(1,1)
2	ARMA(0,2)	10	ARMA(0,2)-GARCH(1,0)	18	ARMA(0,2)-GARCH(1,1)
3	ARMA(1,0)	11	ARMA(1,0)-GARCH(1,0)	19	ARMA(1,0)-GARCH(1,1)
4	ARMA(1,1)	12	ARMA(1,1)-GARCH(1,0)	20	ARMA(1,1)-GARCH(1,1)
5	ARMA(1,2)	13	ARMA(1,2)-GARCH(1,0)	21	ARMA(1,2)-GARCH(1,1)
6	ARMA(2,0)	14	ARMA(2,0)-GARCH(1,0)	22	ARMA(2,0)-GARCH(1,1)
7	ARMA(2,1)	15	ARMA(2,1)-GARCH(1,0)	23	ARMA(2,1)-GARCH(1,1)
8	ARMA(2,2)	16	ARMA(2,2)-GARCH(1,0)	24	ARMA(2,2)-GARCH(1,1)

Notes: for each stock, we estimated 24 models and selected the most appropriate based on the AIC.
Source: prepared by the authors.

After estimating the coefficients of these 1,920 models and selecting the most appropriate model for each stock (therefore, 80 models, since our sample contains 80 different stocks), we generated a table indicating the number of positive and negative coefficients for the independent variables (USA Holidays and Mondays) that were significant at 5%, both in volume and in log-returns.

4 RESULTS AND DISCUSSION

Table 2 contains the descriptive statistics of the variables of our study. About 20% of the weekdays of the sample period are Mondays (0.199) and the average daily log-return of the stocks of the sample is 0.04%. To obtain this average, first, we calculate the mean of log-returns for each stock; then, we calculated the mean value for the 80 stocks, as reported in Panel A of Table 2. Considering an analysis by the day of the week, Appendix A provides initial evidence that both volume traded and stock returns in Brazil are affected by American holidays.

According to Panel A of Appendix A, holidays in the USA play an important role in the volume traded, since this variable is considerably lower during holidays of the USA in comparison to normal weekdays. Such lower level of volume traded in the Brazilian stock market seems to present some benefits for local investors, since, during these days, they can obtain higher levels of stock returns (see Panel B of Appendix A). This evidence is equivalent for all the days of the week.

Together, Panels A and B of Appendix A indicate that foreign investors seem to reduce (or they do not develop) their negotiations in Brazil when it is a holiday in their local exchanges (in the USA, in the case of this study). Therefore, the volume of financial resources in the Brazilian stock market tends to be lower during North American holidays.

Table 2
Descriptive Statistics

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Panel A of this table reports the average values of the time series descriptive statistics for each stock. For example, for each stock, we calculated the mean daily volume and obtained 80 different values (one mean for each stock, since each stock has 3,197 observations for daily volume) - then, we calculated the average of these 80 means. Following this reasoning, we calculated the Standard Deviation of daily volume for each stock (one calculation of standard deviation for each stock, since each stock has 3,197 observations for daily volume) - then, we calculate the average of these 80 standard deviations; the same reasoning was employed for the statistics of Minimum and Maximum in the Panel A of this Table, as well as for the statistics related to the variable Daily Return.

Panel A

Variables	n	Mean of Mean	Mean of S.D.	Mean of Min.	Mean of Max.
Volume (Log)	80	16.593	1.139	12.259	20.228
Daily Return (Log)	80	0.040	2.689	-23.958	22.317

Panel B

Variables	n	Mean	Frequency	
			Dummy = 1	Dummy = 0
USA	3,197	0.024	78	3,119
Monday	3,197	0.199	637	2,560

Notes: Volume (Log) = represents the natural logarithm of daily volume traded in the respective stock of the sample; Daily Return (Log) = represents the daily log-returns of stocks in the sample; USA = it is a dummy variable that receives one if the day is a national holiday in the USA but a trading day in Brazil, and zero otherwise; Monday = it is a dummy variable that receives one for days that are Mondays and zero in the other cases; the sample period is from January 02, 2009 to December 06, 2021.
Source: prepared by the authors.

The results available in Appendix A may be suggestive. However, they are still descriptive, so we employed a set of time-series models in order to analyze the relationship between the holidays and the variables: volume traded and daily returns. As explained in the methods section, we estimated 1,920 time-series models (24 models for each one of the 80 stocks, as reported in Table 1). We selected the most appropriate model for each stock based on the Akaike Information Criterion.

Table 3 summarizes these results, considering also a control variable for Mondays. The difference between the volume traded (log) during normal weekdays and days in which it is a North American holiday is negative and statistically significant at 5% in 96.3% of the models estimated. This difference confirms the descriptive evidence obtained in Panel A of Appendix A. In other words, there are lower levels of volume traded in the Brazilian stock market when it is a holiday in the USA (refer to Panel A of Table 3).

When we change the dependent variable to daily returns (refer to Panel B of Table 3), we can observe the positive effect of North American holidays variable in the dependent variable, but for a relatively small number of stocks (13.8% of the sample). In other words, during the holidays of the USA, local (Brazilian) investors may obtain higher levels of stock returns in some Brazilian stocks. This result is partially in line with the descriptive analysis made on Appendix A. Casado et al. (2013) and Batrinca et al. (2018), observed the presence of positive returns in European stock market when the US market is closed. Therefore, our results are partially in line with the study of Casado et al. (2013), which also indicates the

relevance of foreign investors to the behavior of stock markets, even for stocks of foreign countries, specifically in relation to the volume traded.

Table 3
Results for the Cross-Market Holiday Effect

Panel A	Dep. Var. = Volume (Log)			
Variables	Nº Positive Coeff. Significant at 5%		Nº Negative Coeff. Significant at 5%	
USA	0	(0.0%)	77	(96.3%)
Monday	0	(0.0%)	71	(88.8%)

Panel B	Dep. Var. = Daily Return (Log)			
Variables	Nº Positive Coeff. Significant at 5%		Nº Negative Coeff. Significant at 5%	
USA	11	(13.8%)	0	(0.0%)
Monday	4	(5.0%)	8	(10.0%)

Notes: Volume (Log) = represents the natural logarithm of daily volume traded in the respective stock of the sample; Daily Return (Log) = represents the daily log-returns of stocks in the sample; USA = it is a dummy variable that receives one if the day is a national holiday in the USA but a trading day in Brazil, and zero otherwise; Monday = it is a dummy variable that receives one for days that are Mondays and zero in the other cases; number of stocks = 80; the sample period is from January 02, 2009 to December 06, 2021; for the estimations with Volume (Log) as the dependent variable, the most frequent model was ARMA(2,2)-GARCH(1,1); for the estimations with Daily Return (Log) as the dependent variable, the most frequent models were ARMA(2,2)-GARCH(1,1), ARMA(1,1)-GARCH(1,1) and ARMA(0,1)-GARCH(1,1) – Table 1 indicates the 24 models considered in this research; the Akaike Information Criterion was used to select the most appropriate model for each stock.
Source: prepared by the authors.

The main results of this paper also seem to be explained by the considerations made by Casado et al. (2013), especially based on their two arguments: i) the volume decreases because there are less institutional investors operating in the market (Casado et al., 2013); and ii) less macroeconomic information is available in these days, which have an effect on the flow of public information (Casado et al., 2013).

It is also important to note that the effect of Mondays on volume traded and in daily returns is partially in accordance of previous research (such as French, 1980; Keim & Stambaugh, 1984; Jain & Joh, 1988; Lakonishok & Maberly, 1990; Choudhary & Choudhary, 2008; Mamede & Malaquias, 2017). In other words, on Mondays, both volume traded and stock returns are lower in the Brazilian financial market (the variable Monday was negative and significant for only 10.0% of the stocks of the sample). In the Brazilian market, previous research also has identified equivalent results regarding the Monday effect (Costa Júnior, 1990; Silva et al., 2013).

5 CONCLUSION

In this paper, we tested the effect of North American holidays on the volume traded in the Brazilian stock market (American holidays represent holidays in the

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USA during trading days in Brazil). We also evaluated the effect of American holidays on daily stock returns of Brazilian firms. This study expands previous research on calendar effects, showing that the effect of holidays may also expand the boarders of local markets (Casado et al., 2013), especially when we consider the "cross-market holiday effect" proposed by Batrinca et al. (2018). The result can be related both to the lower level of public information available in the market during American holidays and to the number of investors operating in the stock market, as previously discussed in Casado et al. (2013).

The main contribution of this paper is to show that emerging markets can be affected by the calendar patterns of other developed countries, since investors of these markets may seek to obtain the benefits of international diversification through investments overseas. North American holidays seem to affect the Brazilian stock market through the reduction in the volume traded in many Brazilian stocks.

Moreover, this paper contributes to previous research related to calendar effects, such as the research of Lai and Windawati (2017), Al-Hajieh et al. (2011) and Seyyed et al. (2005), which address the holiday of Ramadan and link the effects on other financial markets to behavioral reasons. Our study complements this argument by showing that the effect of holidays is not necessarily related with investor sentiment, but it can be related to the lower levels of operations of large investors from other countries.

Observing the considerations made by Batrinca et al. (2018), few studies explored this phenomenon. Therefore, it seems that this is the first study which addresses the cross-market holiday effect in Latin America, specifically in Brazil. The main results of our study indicate that during foreign holidays (namely, when there is a holiday in the USA) the volume traded in Brazilian stock market is considerably lower. Holidays represent public information that can be obtained with small cost and this information can drive investor decisions in order to optimize portfolio allocation.

In relation to future studies, we recommend an analysis of the cross-market holiday considering also the holidays from other developed economies. Other methods of estimation could also be employed in order to analyze the persistence of the results obtained in this paper. Moreover, we suggest for future studies the analysis of American holidays on the stock market of other countries in Latin America, since there are other emerging countries in which foreign investors may seek to invest in order to obtain the benefits of diversification. Another recommendation for further work is the analysis of some characteristics of the countries that may be related with a large (or lower) level of the cross-market holiday effect.

Some limitations need to be mentioned in this study, and the first is the absence of consideration of transaction costs during the analysis. The results indicate some potential opportunities to obtain positive returns in the Brazilian stock market, but this results could be different considering the presence of transaction costs. Further studies can address this issue. Moreover, our conclusions rely on the quantitative procedures employed in this research. Finally, the criterion used to select an appropriate sample may affect the main results of this study, since companies that initiated their activities or were closed during the period were not included in the analysis (a kind of survivorship bias).

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REFERENCES

Al-Hajieh, H., Redhead, K., & Rodgers, T. (2011). Investor sentiment and calendar anomaly effects: A case study of the impact of Ramadan on Islamic Middle Eastern markets. *Research in International Business and Finance, 25*(3), 345-356. doi: https://doi.org/10.1016/j.ribaf.2011.03.004

Al-Ississ, M. (2015). The holy day effect. *Journal of Behavioral and Experimental Finance, 5*, 60-80. doi: https://doi.org/10.1016/j.jbef.2015.02.007

Al-Khazali, O. (2014). Revisiting fast profit investor sentiment and stock returns during Ramadan. *International Review of Financial Analysis, 33*, 158-170. doi: http://dx.doi.org/10.1016/j.irfa.2014.02.003

Al-Khazali, O., Bouri, E., Roubaud, D., & Zoubi, T. (2017). The impact of religious practice on stock returns and volatility. *International Review of Financial Analysis, 52*, 172–189. doi: http://dx.doi.org/10.1016/j.irfa.2017.04.009

Bacen. (2017). *Série Histórica da Posição de Investimento Internacional*. Retrieved October 25, 2018, from Banco Central do Brasil: http://www.bcb.gov.br/htms/Infecon/seriehistposintinv.asp

Batrinca, B., Hesse, C. W., & Treleaven, P. C. (2018). European trading volumes on cross-market holidays. *International Journal of Finance and Economics, 23*(4), 675-704. doi: https://doi.org/10.1002/ijfe.1643

Brugni, T., Klotzle, M. C., Pinto, A. C. F., Fávero, L. P. L., & Sial, M. S. (2021). Aggregate earnings and returns in Brazil. *Contabilidade Vista & Revista, 32*(2), 38-58. doi: https://doi.org/10.22561/cvr.v32i2.5942

BM&FBovespa. (2017). *Ofertas Públicas e IPOs*. Retrieved October 2, 2018, from BM&FBovespa: http://www.bmfbovespa.com.br/pt_br/servicos/ofertas-publicas/estatisticas/

Campos, O. V., Lamounier, W. M., & Bressan, A. A. (2015). Valor de mercado e fundamentos contábeis: uma avaliação a partir de modelos uni e multivariados de previsão. *Revista de Contabilidade e Organizações, 9*(23), 48-57. doi: https://doi.org/10.11606/rco.v9i23.75590

Carchano, O., & Pardo, Á. (2015). The pan-European holiday effect. *Spanish Journal of Finance and Accounting, 44*(2), 134-145. doi: https://doi.org/10.1080/02102412.2015.1016716

Casado, J., Muga, L., & Santamaria, R. (2013). The effect of US holidays on the European markets: when the cat's away... *Accounting and Finance, 53*(1), 111-136. doi: https://doi.org/10.1111/j.1467-629X.2011.00460.x

Choudhary, K., & Choudhary, S. (2008). Day-of-the-week Effect: Further Empirical Evidence. *Asia-Pacific Business Review, 4*(3), 67-74. doi: https://doi.org/10.1177/097324700800400307

Costa Junior, N. C. A. (1990). Sazonalidades do Ibovespa. *Revista de Administração de Empresas, 30*(3), 79-84. doi: https://doi.org/10.1108/AJB-08-2017-0020

Fama, E. F. (1970). Efficient Capital Markets: A review of theory and empirical work. *The Journal of Finance, 25*(2), 383-417. https://doi.org/10.2307/2325486

Fama, E. F. (1991). Efficient Capital Markets: II. *The Journal of Finance, 46*(5), 1575-1617. doi: https://doi.org/10.1111/j.1540-6261.1991.tb04636.x

Fields, M. J. (1934). Security prices and stock exchange holidays in relation to short selling, *The Journal of Business, 7*(4), 328-338. https://www.jstor.org/stable/2349545

French, K. R. (1980). Stock returns and the weekend effect. *Journal of Financial Economics, 8*(1), 55-69. doi: https://doi.org/10.1016/0304-405X(80)90021-5

Investing (2018). Available at: https://www.investing.com. Accessed in August, 2018.

Gaio, L. E., Alves, K. L. F., & Pimenta Júnior, T. (2009). O mercado acionário brasileiro do novo milênio: um teste de eficiência. *Brazilian Business Review, 6*(3), 231-246.

IMF - International Monetary Fund (2017). Coordinated Portfolio Investment Survey. Retrieved January, 18, 2019, from IMF Data: http://data.imf.org/?sk=B981B4E3-4E58-467E-9B90-9DE0C3367363&sId=1424875079575

Investing (2018). Available at: https://www.investing.com. Accessed in August, 2018.

Jain, P. C., & Joh, G-H. (1988). The Dependence between Hourly Prices and Trading Volume. *The Journal of Financial and Quantitative Analysis, 23*(3), 269-283. doi: https://doi.org/10.2307/2331067

Keim, D. B., & Stambaugh, R. (1984). A further investigation of the weekend effect in stock returns. *The Journal of Finance, 39*(3), 819-835. doi: https://doi.org/10.2307/2327945

Lai, Y.-W., Windawati, A. (2017). Risk, return, and liquidity during Ramadan: Evidence from Indonesian and Malaysian stock markets. *Research in International Business and Finance, 42*, 233-241. doi: https://doi.org/10.1016/j.ribaf.2017.04.054

Lakonishok, J., & Maberly, E. (1990). The Weekend Effect: Trading Patterns of Individual and Institutional Investors. *The Journal of Finance, 45*(1) 231-243. doi: https://doi.10.2307/2328818

Mamede, S. P. N., & Malaquias, R. F. (2017). Monday effect in Brazilian hedge funds with immediate redemption. *Research in International Business and Finance, 39*(A), 47-53. doi: https://doi.org/10.1016/j.ribaf.2016.07.032

Murcia, F. D.-R., & Machado, M. V. (2014). Impacto do Nível de Disclosure Corporativo na Liquidez das Ações de Companhias Abertas no Brasil. *Contabilidade Vista & Revista, 24*(3), 54-77.

Oliveira, F. F. de, Albuquerque, A. A. de, & Carvalho, F. L. de. (2019). Estudo das inter-relações entre os mercados acionários do BRICS e dos Estados Unidos. *Contabilidade Vista & Revista, 30*(2), 1-21. doi: https://doi.org/10.22561/cvr.v30i2.4717

Poon, S.-H. (2005). *A Practical Guide to Forecasting Financial Market Volatility*. John Wiley & Sons Ltd.

Seyyed, F. J., Abraham, A., & Al-Hajji, M. (2005). Seasonality in stock returns and volatility: The Ramadan effect. *Research in International Business and Finance, 19*(3), 374-383. doi: https://doi.org/10.1016/j.ribaf.2004.12.010

Silva, W. A. C., Melo, A. O., & Pinto, E. A. (2013). Day of the Week' Effect: analisys of return anomalies of the stock indexes in the Brazilian market. *REGE - Revista de Gestão, 20*(4), 477-495. doi: https://doi.org/10.5700/rege510

Tadepalli, M. S., & Jain, R. K. (2018). Persistence of calendar anomalies: insights and perspectives from literature. *American Journal of Business, 33*(1/2), 18-60. doi: https://doi.org/10.1108/AJB-08-2017-0020

Winkelried, D., & Iberico, L. A. (2018). Calendar effects in Latin American stock markets. *Empirical Economics, 54*(3), 1215-1235, doi: https://doi.org/10.1007/s00181-017-1257-y

Wu, C. (2013). The Chinese New Year holiday effect: evidence from Chinese ADRs. *Investment Management and Financial Innovations, 10*(2), 8-14.

Yaffee, R., & McGee, M. (2000). *Introduction to Time Series Analysis and Forecasting with Applications of SAS and SPSS*. Academic Press.

Yuan, T., & Gupta, R. (2014). Chinese Lunar New Year effect in Asian stock markets, 1999-2012. *The Quarterly Review of Economics and Finance, 54*(4), 529-537. doi: https://doi.org/10.1016/j.qref.2014.06.00

Appendix A
Average Returns and Average Volume Traded, by day of the week
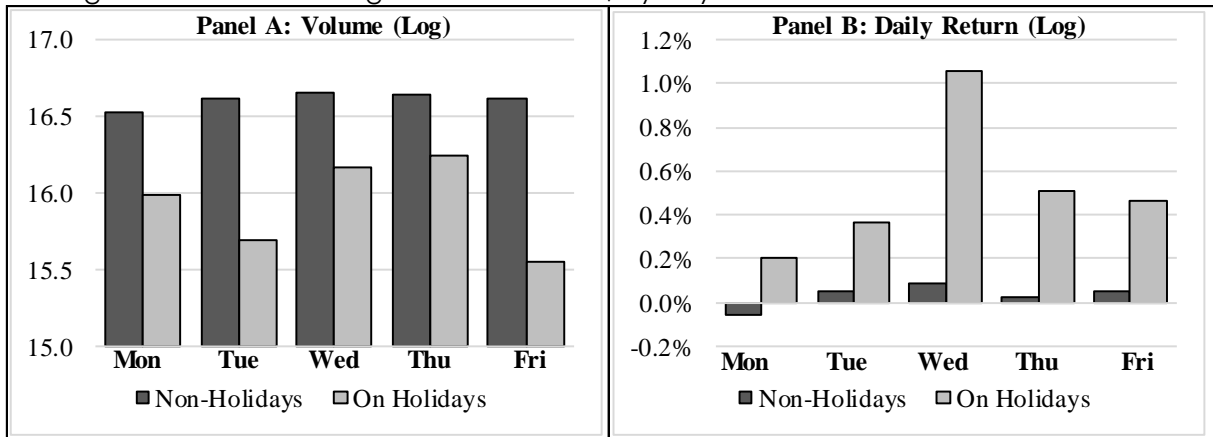
Notes: Panel A of Appendix A indicates the average daily of Volume (Log), which it is the natural logarithm of the Volume Traded each day; Panel B of Appendix A indicates the average log returns by each day of the week; in the case of this Appendix, we consider all the holidays in the USA together in a dummy variable (it receives 1 in weekdays which are holidays in the USA and 0 otherwise).
Source: prepared by the authors.

AUTHORS' CONTRIBUTIONS

Contributions	Rodrigo Fernandes Malaquias	Janaína Cássia Grossi	Geovane Camilo dos Santos	Jean Borges Siqueira
1. Idealization and conception of the research subject and theme	✓			✓
2. Definition of the research problem	✓	✓	✓	✓
3. Development of Theoretical Platform	✓	✓	✓	
4. Design of the research methodological approach	✓			
5. Data collection	✓		✓	
6. Analyses and interpretations of collected data	✓	✓		
7. Research conclusions	✓	✓	✓	
8. Critical review of the manuscript	✓	✓	✓	
9. Final writing of the manuscript, according to the rules established by the Journal.	✓	✓	✓	
10. Research supervision	✓	✓	✓	✓

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