

**INFORMATIONAL INEFFICIENCY AND/OR THE VALUE OF LIQUIDITY?
A study on the influence of market makers in Brazil**

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ABSTRACT

We analyzed the influence of hiring market makers on Brazilian stocks. Two event studies were applied: i) based on the hiring date of the market makers as disclosed on the investor relations site of each company, and ii) based on the date the market makers started performing their duties, as disclosed on the BM&FBovespa site. These studies were used to find patterns in the abnormal returns of the companies that hired the market makers. Data was collected on 66 companies between January 2004 and December 2013. The results showed that: (i) positive abnormal returns existed before and after the event dates, which may have contradicted the efficient market hypothesis (EMH) in a semi-strong way, (ii) a liquidity premium exists in the Brazilian stock market, as shown by other studies on security pricing.

Keywords: Market Makers, Event Study, Liquidity Pricing.

1. INTRODUCTION

Shen and Starr (2002) state that liquidity in a financial market refers to the capacity to significantly absorb the flow of buying and selling orders. Market makers act as intermediaries in purchasing securities from public sellers and selling to public buyers. Market makers provide necessary market liquidity and profit from the differences between buying and selling prices. Perotti and Rindi (2010) assert that market makers are financial intermediaries that provide additional liquidity to financial markets. Accordingly, a simple measure of the liquidity of a financial market is the bid-ask spread (Shen & Starr, 2002). The bid-ask spread is the price of the market maker's services, which adjusts in balance as a result of the optimizing behavior of the market maker (Bondarenko, 2001; Shen & Starr, 2002).

In this light, market makers are monopolistic competitors who strive to maximize the profit of the companies that hire them, since the presence and growth of new market makers can create internal competition given the threat of new competitors (Starr & Shen, 2002). Some studies (Kyle, 1985; Glosten & Harris, 1988) have shown that hiring market makers can significantly affect market efficiency by increasing financial volume, reducing price volatility, increasing liquidity and improving the dissemination of information to investors (Eldor, Hauser, Pilo & Shurki, 2006).

Zhu, Chiarella, He & Wang (2009) point out that a market maker can act as a liquidity provider, stabilizing markets and potentially acting as an active investor who seeks to maximize profits through active management. Accordingly, Lepone and Yang (2013) state that market makers do not actively acquire all available information and consequently contribute little to price discovery; however, even if they do not have all the information, market makers actively interfere in stock prices when they have superior or privileged information (Easley & O'Hara, 1987).

The Brazilian Securities Commission (CVM) authorized the use of market makers in Brazil in the mid 1990s via normative instruction 121 and regularized by normative instruction 384 (Galen, Rogers, Pereira & Fioratti, 2010). The objective of CVM was to regularize market maker activity in Brazil, rules of conduct, selection criteria, accreditation rules, disclosure rules, contract rules between market makers and issuers, penalties and impediments (CVM, 2013).

According to Perlin (2013), BM&FBovespa carried out several strategies to increase market maker participation. Their main objective was to increase share liquidity and thereby attract national and international investors. BM&FBovespa (2013) states that the market maker role may be exercised by brokers and banks, which are responsible for providing the market with significant selling and buying opportunities for a given number of securities that have been previously disclosed to all participants.

Ambrosini, Gaio, Bonacim and Cicconi (2008) discussed the increased liquidity of shares brought about by hiring market makers. Their findings corroborate those of Perlin (2013) and showed that market makers significantly increase share liquidity. Perlin (2013) found that the number of trades increased by an average 31% after hiring market makers.

Despite gains in liquidity, an issue that needs further discussion is **determining the relationship between hiring market makers and returns on shares of Brazilian companies?** This article develops this discussion by separately analyzing each market maker via an event study of hiring dates to determine if there is any influence on related stock returns. We also seek evidence of a liquidity premium in the Brazilian securities market by performing another event study using the dates market makers started performing their duties.

Our research contributes the following: (i) relevance in determining how the hiring of market makers affects short-term stock prices in the Brazilian securities market, (ii) identifying, through a review of leading journals and national conferences, that there are only three studies on this subject, (iii) a separate analysis of each market maker in the Brazilian capital securities market, and (iv) demonstrate an alternate way/method of visualizing the liquidity premium in the securities markets.

Our study is separated into the current section, which introduces the topic, section 2 on market makers and liquidity pricing, section 3 explaining our methodology (event studies, data collection and research sample), section 4 presenting our findings and section 5 presenting final considerations.

2. LITERATURE REVIEW

2.1. Market Makers

Liquidity performs an essential role in securities markets by helping to efficiently spread risks and encouraging the collection of information. Many financial markets depend on brokers or market makers to supply liquidity (Bondearenko, 2001). According to Wu, Liu, Lee and Fok (2013), market makers provide liquidity by buying and selling assets (shares) according to market demand and using various tools such as bid-ask spreads (price of the market makers' services) to compensate for the provision of liquidity to all participants. These authors add that by providing liquidity, market makers must hold inventories that bear the risks of these operations.

Perlin (2013) points out that this effect, within a given price range, is called the inventory effect or the cost that the market maker must accept so that stock prices remain competitive throughout the trading day. Accordingly, a sequence of sell orders from investors means that market makers accumulate positive inventories (Perlin, 2013).

In October, 2002, a public committee in Israel provided an example of market maker creation (Eldor *et al.*, 2006). The introduction of market makers in the Tel Aviv Stock Exchange (TASE) served as a guide for this committee. TASE proposed incentives for market makers willing to negotiate some options (derivatives) and thereby directly compensated three market makers for their commitment. Among other things, these commitments required the market makers to provide continuous price quotes for buy and sell prices during a pre-determined period.

Eldor *et al.* (2006) analyzed the contribution of market makers on the liquidity and efficiency of trading options and found (i) increased liquidity (60% increase in trading volume and 35% reduction in the bid-ask spread), (ii) substantially improved the efficiency of some options and decreased asymmetry by about 30%, (iii) that the net cost of the exchange is based on the benefit to the trading public and that the presence of market makers encouraged trade between other participants at a level well beyond their own trading.

A clear example of the influence of market makers can be found in the Italian Stock Exchange where market makers are required to facilitate the disclosure of information on listed companies. In April 2001, the Italian Stock Exchange started assigning a designated market maker (DMM) to a group of small to medium cap stocks. The principal novelties of this were that DMMs: (i) are required to disclose information, (ii) must function as stock analysts, (iii) are required to produce at least two detailed financial analyses per year, and (iv) are required to organize at least two roadshows per year with professional investors (Perotti & Rindi, 2010).

Perotti and Rindi (2010) and Nimalendran and Petrella (2003) investigated the impact of market maker interventions on stock trading in the Italian financial market and concluded that the market maker system offers lower operating costs, easier security trading and stronger liquidity.

Haan (2001) and Mann *et al.* (2003) showed that stock prices in the Paris and in the European Stock Exchanges rose after introducing market makers. These studies also confirmed that prices increased even though there were no significant changes in liquidity. This evidence contradicts Eldon *et al.*, (2006) who found that market makers caused significant increases in the liquidity in the Israeli Stock Exchange. The impact of trading systems on

liquidity was also examined within the framework of the supply of liquidity limit orders by investors who act as market makers for certain securities. For example, Brooks and Su (1997) showed that NASDAQ had lower costs that reduced bid-ask spreads. These results are consistent with the findings of Foucault, Kadan and Kandel (2001) who showed that the introduction of liquidity suppliers made the financial market more liquid.

Mayhew (2002) discussed the effect of competition and market structure on the stocks and options listed in several European and US stock exchanges. The Mayhew (2002) study showed that options traded under the influence of market makers had greater spreads than those traded via an open-outcry trading system. Nevertheless, these last results seem to be robust for the previously cited spreads, that is, they are dependent on a comparison between options traded with market makers and those traded without market makers.

In Brazil, Galeno, Rogers, Pereira and Fioratti (2010) attempted to show whether hiring market makers influenced the stock prices and consequent performance of the companies that hired the market makers. They used an event study to measure the influence of market makers on stock price. The results showed that the market did not assimilate the information as quickly as expected and that there were no signs indicating the early release or use of privileged information. The hiring of market makers did not create positive outcomes for the hiring companies given that there were no significant short-term changes in the stock prices of the companies.

2.2. Liquidity Pricing

An efficient market is defined as a one where there are numerous rational economic players who maximize profits through active competition and where each player tries to predict the future market value of each derivative and where important, up-to-date information is freely available to all participants (Fama, 1970). Under these conditions, market participants should expect returns equal to fair value given assumed risks (Fama, 1991 and 1992), and the expected return on any asset can be found by the Capital Asset Pricing Model (CAPM).

CAPM was developed by Sharpe (1964), Litner (1965) and Mossin (1966) and based on the conclusions of Markowitz (1959). It basically proposes that market risk (systemic risk) is the only risk factor affecting expected returns on assets and that this risk can be captured by the beta of an asset. However, some researchers have found empirical evidence of other risk factors associated with stock returns (Fama & French, 1992). Some recent studies have shown the importance of liquidity in the pricing of individual securities (Amihud & Mendelson, 1986; Brennan & Subrahmanyam, 1996, Amihud, 2002).

The liquidity of a stock and its fluctuation over time are relevant concerns for many investors (Karolyi, Lee & Dijk, 2012), because empirical evidence shows that investors prefer stocks that are liquid (Liu, 2006). Investors are willing to pay more for stocks that allow them to exit positions at a reasonable cost during market declines or literally at times of low liquidity (Karolyi, Lee & Dijk, 2012).

Thus, evidence shows that liquidity is important and should be included as a risk factor in security pricing models. A natural test for the existence of a liquidity premium would be to include it in a security pricing model and analyze its statistical significance. This procedure has been adopted by several empirical studies in Brazil (Bruni & Famá, 1998; Correia, Amaral & Bressan, 2008; Vieira & Milach, 2008; Machado & Medeiros, 2011; Machado & Machado, 2014). Bruni and Fama (1998) examined the effect of liquidity on stock valuation and showed its importance in analyzing stock returns. Cross-section regression analysis of stocks traded on Bovespa between July 1988 and June 1997 showed a significant negative association between returns and liquidity.

Correia, Amaral and Bressan (2008) sought to show that liquidity plays a significant role in security pricing even whether market share value could be determined by share liquidity. Their methodology consisted of multiple regression analysis of panel data from stocks traded on Bovespa between March 1995 and December 2004, and the Seemingly Unrelated Regression (SUR) method. The authors showed that there was a positive linear relationship between stock returns and liquidity when measured either by turnover, trading volume or trading quantity (frequency).

Vieira and Milach (2008) described the behavior of liquidity / illiquidity measures from January 1995 to June 2005 and evaluated the role of liquidity in the pricing of shares in the Brazilian stock market. Twelve multiple regression models and the method proposed by Fama and Macbeth (1973) showed that trading activity in the Brazilian market improved significantly in both trading quantity and volume. Most coefficients of the liquidity variables were not significant. Only variables related to illiquidity and spread were significant, which is consistent with the information asymmetry in the Brazilian market.

Machado and Medeiros (2011) examined whether liquidity is priced and stock returns explained not only by systematic risk, as proposed by CAPM, the three factors of Fama and French (1993) and the timing factor of

Carhart (1997), but also by liquidity, as suggested by Amihud and Mendelson (1986). The study sample consisted of all companies listed on Bovespa between June 1, 1995 and June 30, 2008. CAPM was the least suitable at explaining returns among the pricing models. Adding size and book-to-market factors to CAPM was significant in most portfolios and improved the explanatory power of all portfolio returns. Adding liquidity to the four-factor model improved the explanatory power of the portfolio returns by 1.7%.

Machado and Machado (2014) analyzed whether the two-factor model developed by Liu (2006) explained fluctuations in stock returns in the Brazilian stock market and compared the performance of the two-factor model of Liu (2006) with the CAPM model and the three-factor model of Fama and French (1993). The study sample consisted of all companies listed on Bovespa between June 1, 1995 and June 30, 2008. Regression analysis of these three models showed a 0,77% liquidity premium (significant at 1% and not limited to the month of January). The explanatory power of the two-factor model was better than that of CAPM and similar to that of the three-factor model.

3. METHODOLOGY

3.1. Event study

According to MacKinlay (1997), event studies are useful given that investor rationality ensures that the effect of an event will immediately be reflected in stock prices. This methodology can be applied in many ways including dividend announcements, mergers and acquisitions, the issuance of debt or equity, earnings announcements, and macroeconomic variable announcements.

According to Camargos and Barbosa (2003), an event study is a way to determine normal or expected stock returns or the returns that would have been produced if an event had not occurred. Afterwards, the difference from the actual returns in the given period is calculated to identify possible abnormal behaviors during the period surrounding an event.

Brown and Warner (1980) found that the event study focused more on the extent to which the price performance of securities in the lead up to an event were abnormal, that is, the degree to which the returns were different from those considered normal as determined by equilibrium model of expected returns. Therefore, an event study tests the efficiency of semi-strong markets, since abnormal returns after an event are inconsistent with the hypothesis that the security prices immediately reflect new information (Fama, 1991).

The basic procedures needed to carry out an event study are: event definition, sample selection, measurement of abnormal return, estimation, testing, empirical results, and interpretation and conclusions (MacKinlay, 1997).

To calculate abnormal returns, the normality of the sampling distribution of returns was tested to determine the possibility of using the parametric Student-t test. It was concluded that the sample distribution of many returns was not normal (at 10%). Therefore, the tests were performed again with the nonparametric Wilcoxon and Sign tests. It should be noted that abnormal returns were estimated using the market model with Bovespa as the market return.

3.2. Data collection and sample

Data on whether the sample companies had hired market makers was extracted from the websites of each company (investor relations section), and the starting dates of these market makers were extracted from the BM&FBovespa site. Security prices were obtained using Economática® software. The sample period ranged from January 2004 to December 2013 and covered the time in which virtually all available market makers were hired.

By December 2013, there had been 199 companies on the BM&FBovespa that had hired market makers. Nevertheless, only companies meeting the following criteria were included in the sample: (i) a Brazilian company trading on the Bovespa, (ii) an active company and; (iii) more than 90% of its presence in the market. Sixty-nine companies remained after applying these filters, of which three were excluded due to a lack of trading within the established timeframe. Thus, the final sample size was sixty-six. The exclusion of several companies was expected, since if they had hired market makers, companies lacking liquidity would not have recorded pricing information on every day of the sample period.

Next, the companies were separated by market maker to determine if there was any influence on returns from groups of companies using the same market maker. Thus, market makers were separated from the 66 companies in the sample: (i) Bradesco (3 companies), (ii) Banco Plural (12 companies), (iii) BTG Pactual (16 companies), (iv) Credit Suisse (11 companies), (v) Itauvest (19 companies), and (vi) XP Investimentos (5 companies). These companies were separated in order to perform individual event studies to assess whether there was any influence

on stock returns from the hiring of these market makers. Additionally, two dates were considered for each event: 1) the date the hiring of the market maker was disclosed, and 2) the date the market makers commenced their duties, according to the BM&FBovespa site. This last date was analyzed to ascertain liquidity premiums.

4. RESULTS

Following the previously described methodology, average abnormal returns were calculated for a 15-day window before and after the disclosure of market maker hiring (according to company websites) and before and after the dates the market makers commenced activities (according to the BM&FBovespa site). Results were cumulative within these same intervals. It should be noted that BM&FBovespa reports the relationship and date of the registered market makers, their respective securities, and the main characteristics of each operation.

Even though two approaches were used: 1) one using the hiring date of the market makers, and 2) another using the market maker's actual commencement, the following discussions will deal only with this second analysis (using the dates disclosed by BM&FBovespa). This was decided because the average difference between the dates published by BM&FBovespa and those disclosed on the company websites averaged 2 days and yielding almost no difference in the results. There was clearly minimal variation between average abnormal returns and the consequent Sign and Wilcoxon tests. The second analysis was used instead of the first because it provided a dimension of any potential liquidity premium.

The disclosures generated positive expectations related to the event. In other words, in the days before and after the commencement of market maker activity, there were more positive returns than negative. On specific days (-12, -11, -8, 2, 8, 12) these positive abnormal returns were statistically significant (Table 1).

Table 1: Average abnormal returns from all market makers

Days from the event	Average Abnormal Return (%)	Cumulative Abnormal Return (%)	Z(TS)	Z(W)
-15	0.045	0.045	0.892	0.521
-14	0.216	0.261	0.526	0.982
-13	0.278	0.539	0.345	0.29
-12	0.479	1.019	0.129	0.092*
-11	0.596	1.614	0.093*	0.055**
-10	0.036	1.651	0.897	0.906
-9	-0.121	1.53	0.736	0.521
-8	0.841	2.371	0.019**	0.064*
-7	0.223	2.594	0.377	0.408
-6	0.048	2.642	0.9	0.866
-5	-0.244	2.398	0.519	0.589
-4	0.266	2.664	0.531	0.786
-3	0.493	3.157	0.211	0.296
-2	0.144	3.301	0.675	0.625
-1	-0.192	3.108	0.524	0.198
0	0.155	3.263	0.645	0.219
1	0.271	3.533	0.399	0.118
2	0.161	3.694	0.689	0.061*
3	0.475	4.169	0.244	0.288
4	0.104	4.273	0.746	0.826
5	0.402	4.675	0.287	0.314
6	0.127	4.802	0.53	0.538
7	0.216	5.018	0.349	0.359
8	0.904	5.923	0.003***	0.003***
9	0.248	6.17	0.553	0.157
10	0.28	6.45	0.524	0.542
11	-0.034	6.416	0.881	0.634
12	0.453	6.87	0.048**	0.030**
13	0.072	6.941	0.824	0.911
14	-0.222	6.72	0.393	0.982
15	0.619	7.339	0.073	0.146

Z(ST) = z-statistic (Sign Test), Z(W) = z-statistic (Wilcoxon Sign Rank Test),
 Statistical significance: * 10%, ** 5%, *** 1%. Source: produced by author.

These results may suggest that the Brazilian market lacked informational efficiency because the market did not assimilate information as fast as expected and evidence of leaks or insider information. Although some abnormal returns are common on the days surrounding an event, abnormal returns near the announcement occur because of delays between information availability and changes in share prices or announcements occurring so late on day zero, possibly after market close, that their effect is only reflected on the following day (Elton, Gruber, Brown & Goetzmann, 2012).

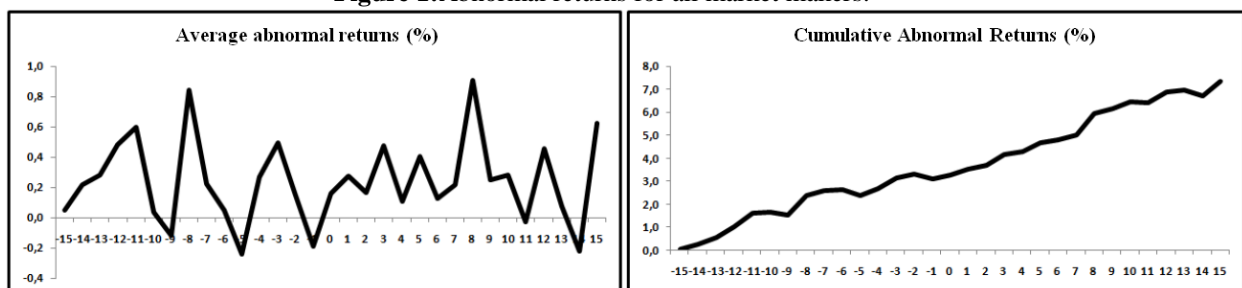
Significant abnormal returns on days -12, -11 and -8 before the event could indicate information leaks that represent semi-strong informational inefficiency. Nevertheless, it is also possible that these significant and isolated abnormal returns are due to information leaks from these companies regarding the hiring of market makers. Significant abnormal returns were detected on days 2, 8, and 12 after the event, which may also be considered semi-strong inefficiencies given the speed of the adjustment. Accordingly, the abnormal returns on these days may represent delayed market reactions to the disclosure of market makers, and may mean that the market needs a few days to interpret this type of announcement.

Another important point is that most of these abnormal returns were positive (averaging 0.24%) and statistically significant. This result suggests that, on average, disclosures of market maker hirings produced greater financial results than expected by the market.

The Figure 1 illustrates the abnormal returns within the event window. The variations in average abnormal returns were similar both before and after the events, whereas cumulative abnormal returns grew sharply over the event window. Average abnormal returns had no definite trend and appeared random before and after the event dates. This suggests an absence of leakage or use of privileged information by market players; however, Figure 1 shows that the average abnormal return (0.24%) oscillates above the zero axis indicating that the positive abnormal returns exceeded the negative ones.

Another hypothesis that is consistent with the results points to the inability of the adopted pricing model to correctly value stock prices. This hypothesis is always an alternative justification when there is semi-strong evidence against the efficient market hypothesis (Campbell, Lo & Mackinlay, 1997; and Camargos & Barbosa, 2003). The significant abnormal returns found using the market model suggests that other risk factors may exist that are not considered by CAPM. Thus, given that the focus of this study is an event (hiring of a market maker) that is intended to increase stock liquidity, the natural conclusion would be that liquidity represents value in the Brazilian stock market. This same conclusion has been reached by other studies (Bruni & Famá, 1998, Machado & Medeiros, 2011; Machado & Machado, 2014), but from different perspectives. Figure 1 shows the abnormal returns from all market makers.

Figure 1: Abnormal returns for all market makers.



Source: produced by author.

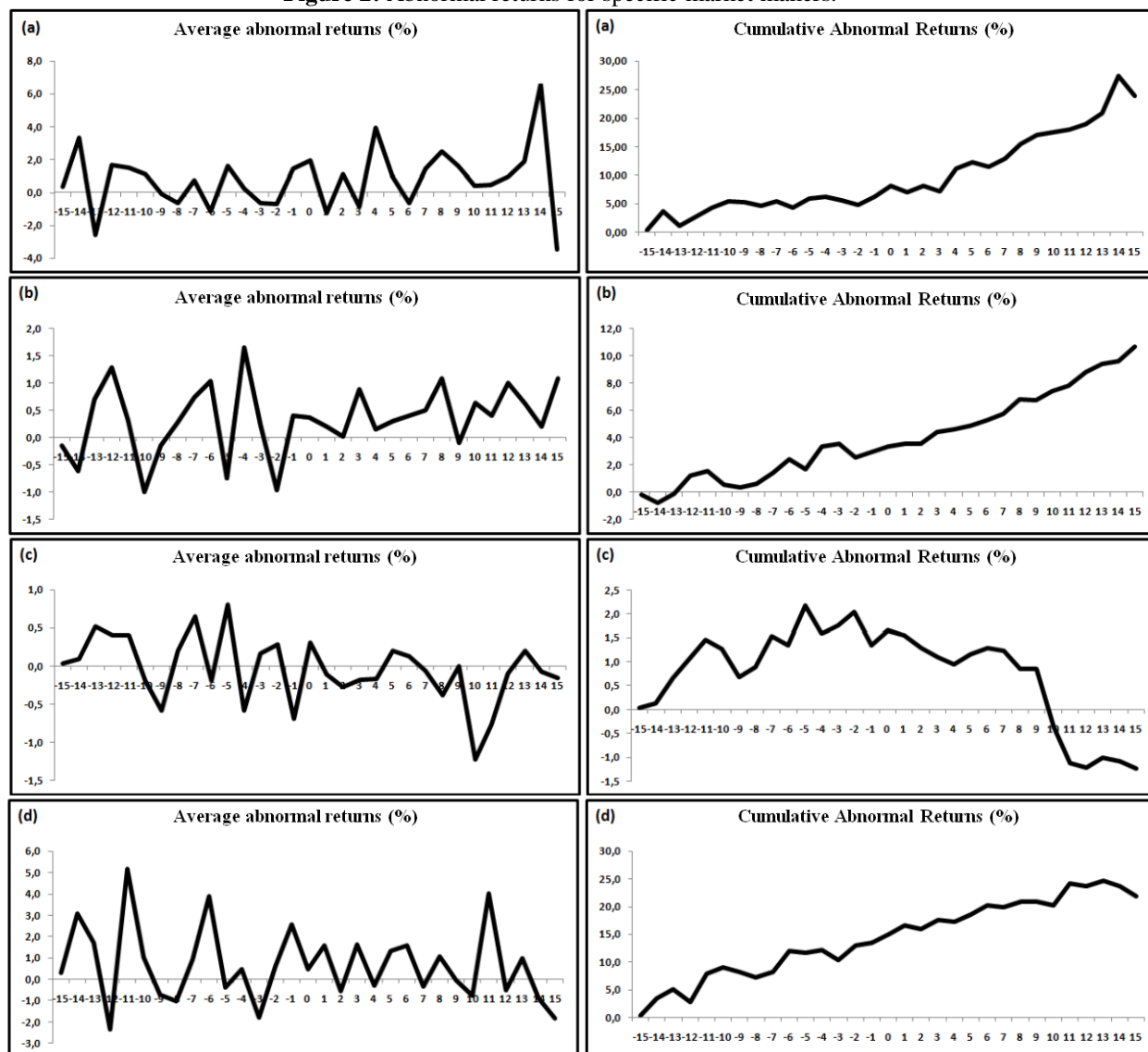
Figures 2 and 3 show the abnormal returns of the six market makers - Figure 2: (a) Bradesco, (b) BTG Pactual, (c) Itauvest S.A., (d) XP Investimentos, - Figure 3: (a) Banco Plural, and (b) Credit Suisse. These individual event studies for each market maker are intended to show any influence on stock returns for a specific company group from the associated market maker.

Bradesco produced significant average abnormal returns on days prior the event (-12, -6, -4, -2), on the event (0) and on days after the event (5, 13 and 14). Most of the abnormal returns within the Bradesco event window were positive (averaging 0.77%) and statistically significant. Thus, Bradesco's market maker disclosure produced greater financial results than expected by the market.

Bradesco's graph is generally random; however, the positive peaks are more numerous and larger than the negative ones. The cumulative abnormal return graph reinforces this observation given its positive upward curve that

culminates in a 24% greater cumulative abnormal return 15 days after the event. This result was the greatest among all of the market makers considered in this study. However, these findings for Bradesco as a market maker should be accepted with caution, given that they refer to only three companies.

Figure 2: Abnormal returns for specific market makers.



Note: (a) Bradesco; (b) BTG Pactual; (c) Itauvest; (d) XP Investimentos.
 Source: produced by author.

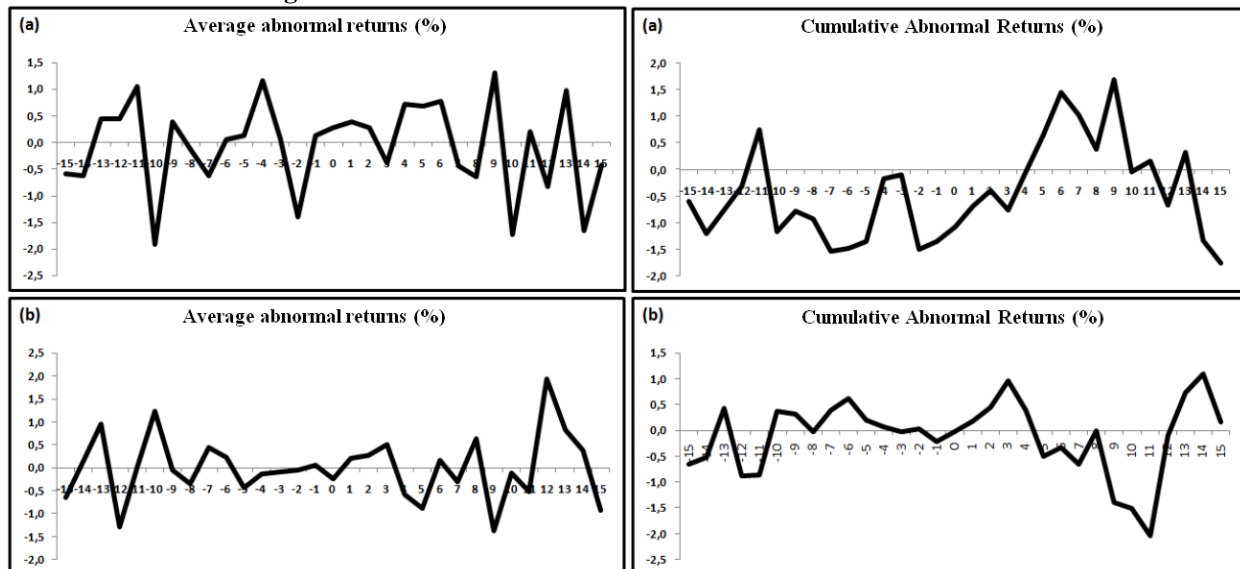
Variations in the abnormal returns from BTG Pactual were similar to those from Bradesco with significant average abnormal returns on days prior to the event (-12, -10, and -6) and on days after the event (3, 6, 8, 12 and 15). Most of the abnormal returns within the BTG Pactual event window were also positive (averaging 0.34%) and statistically significant. Hiring of XP Investimentos led to behavior that was similar to that of the previous two market makers: significant average abnormal returns on days before the event (-14, -10, -5, -4 and -1) and on days after the event (1 and 11). Again, most of the abnormal returns within the event window were positive (averaging 0.67% and statistically significant).

Hiring Bradesco, BTG Pactual and XP Investimento led to semi-strong market inefficiency in the pricing of stocks of the companies that hired them. Only five companies hired XP Investimentos as a market maker, thus associated findings should be considered cautiously.

Figure 2 shows that only the hiring of Itauvest seems to have run counter to the other market makers. This observation was confirmed by statistical tests - the average abnormal return was only significant (and negative) 12 days after the event. If this study had only considered Itauvest as a market maker, it would have indicated

evidence of informational efficiency in the Brazilian market regarding the announcement of market makers since the assimilation of this information was not delayed and there was no evidence of leaks or insider information. The randomness test (run test) of average abnormal returns in the event window was not significant. Thus, randomness could not be rejected for the series of returns such that the average abnormal returns from this period can be considered statistically equal to zero. Conclusions for Itauvest are more robust given that there were 19 companies in this sample.

Figure 3: Abnormal returns for Banco Plural and Credit Suisse.



(a) Banco Plural; (b) Credit Suisse.

Source: produced by author.

Average abnormal returns for the market makers Banco Plural and Credit Suisse (Figure 3) varied much more strongly than those of the other market makers. This variation may be due to possible market efficiency given the significant negative and positive abnormal returns before and after the disclosure date. However, the abnormal average returns of Banco Plural were significant on days -10, -8, and -1 prior to the event and on days 9 and 14 after the event, whereas the same for Credit Suisse occurred on days -14 and -12 prior to the event and days 2, 6 and 15 after the event.

For both of these market makers (Figure 3), average abnormal positive returns were balanced by average abnormal negative returns, such that there was no evidence of statistical significance in the series of abnormal returns for these market makers. Thus, despite the apparent randomness of the series of returns for Banco Plural and Credit Suisse, the statistical tests showed that there may have been leaks or insider information and delays in information assimilation by the market.

Note that the non-parametric tests used for the statistical inferences are powerful for both for large and small samples as shown in this study. The power-efficiency of the Sign Test is 95% for samples of six observations while the power-efficiency of the Wilcoxon Test is also 95% but for both small and large samples (Siegel & Castellan, 2006).

When all market makers are considered, our findings go against those of Galeno *et al.*, (2010), where it was concluded that average abnormal and negative and significant median returns on the day of and the days prior to the event showed that the hiring and activity of independent market makers functioned as negative news in the Brazilian securities market. The authors' conclusions were contrary to the general perception that market makers positively affect the returns of the companies that hire them. In contrast, the present study found that disclosing the hiring of market makers generated positive expectations and positive average abnormal returns in the days before and after the event.

Nevertheless, the differences between the two studies are perfectly justifiable. Galeno *et al.*, (2010) looked at only 38 companies that hired market makers between 2007 and 2008 and that did not lack pricing for more than 5 consecutive days. This criteria was necessary because the number of companies that hired market makers was already small. Conversely, the population size in the present study was considerable, which meant that companies with low liquidity could be excluded from the sample.

The Galeno *et al.*, (2010) study selected companies without considerable liquidity (so much so that it was necessary to use the trade-to-trade procedure) and consequently worse performance. The present study only selected companies with acceptable liquidity and a consequently better performance biases.

The results of the event studies for all of the companies that hired market makers contradict the efficient market hypothesis (EMH) regarding the semi-strong efficiency of the Brazilian market that is consistent with the findings of other authors (Kyle,1985, Glosten & Harris, 1988).

From the perspective of EMH, it appears that only Itauvest fulfilled its role as market maker, a conclusion shared by Perlin (2013). Bradesco, XP Investimentos and BTG Pactual showed signs of insider information and given: (i) the abnormal returns of these market makers were consistently positive after the event date, a question arises about the potential to generate price arbitrage in hiring these market makers, and (ii) that Bradesco and XP Investimentos represented small numbers of companies (three and six, respectively), the indications of insider information are more evident and easier to investigate. Perlin (2013) also found evidence that the market makers of BTG Pactual posted prices that deviated from a price that was considered efficient, thereby increasing the proportion of informed investors.

Market makers from Credit Suisse and Banco Plural were the only ones to cause cumulative abnormal returns that were more negative than positive. Thus, not only did they not fulfill their roles as market makers in terms of EMH, the shareholders of the companies that hired these market makers experienced portfolio losses during the 15 days prior to their hiring. In both cases, the possibility of arbitrage cannot be eliminated because after hire, either agent could buy stocks at a low price to later resell at a higher price. These behaviors could be discussed in an information plan where the market was informed about the hiring of both market makers and affected by the credibility of both. Accordingly, we reviewed the information disclosed during that period and present some of the stories that may have led to mistrust or even a lack of credibility (Table 2).

Table 2: Market Information on Credit Suisse and Banco Plural.

Credit Suisse	Banco Plura
Federal Police make arrests at a Swiss bank in Sao Paulo. Agents seize agency computers from Credit Suisse to be investigated on suspicion of illegal transfer and money laundering. Source: Folha de São Paulo (2006).	Faced with the scandal created on the floor of the RS Legislature, it was revealed that there is a secret agreement between Banrisul and BancoPlural to create an IPO. Source: Assembléia Legislativa do Rio Grande do Sul (2008).
Executives of Swiss banks are arrested in Brazil and accused of transferring illegal funds to Switzerland. Source: International Service of the Swiss Broadcasting Corporation (2007).	Banco Plural removes executives from Credit Suisse andMorgan Stanley. Source: Revista Exame (2012).
Black market money changers worked in Credit Suisse, said witnesses. Remittances occurred within the bankaccording to testimony from former workers and a black market money changer. Source: Estadão (2008).	The recently appointed treasurer of the Worker’s Party (PT) in Rio received R\$ 100,000 from a corruption syndicate . The money was withdrawn from an agency of Banco Rural in August 2003 duringthe first year of President Lula’s government. The money originated from a DNA account – a company used by Marcos Valério de Souza to disguise the source of money transfers. Source: Revista Veja (2013).
Federal Police arrested a Credit Suisse employee accused of offering private banking services in Brazil without a licence from the Brazilian Central Bank during an operation to combat the illegal transfer of money out of the country. Source: Estadão (2008).	
A senior official of Credit Suisse was arrested by the Federal Police Wednesday morning (23/4), in Rio de Janeiro. The bank is under investigation for operating in Brazil without Central Bank authorization and for sending client funds abroad via blackmarket money changers. Source: Conjur (2008).	

Source: produced by authors

News of illegal funds transfers, money laundering, using money changers for profit transfers, embezzlement scandals and Federal Police investigations of Credit Suisse and Banco Plural, may have caused negative abnormal returns in the shareprices of the companies in question. Essentially, market information is relevant in inefficient markets, that is, the market requires time to price this information.

Thus, news and information, whether negative or positive, is extremely important for decision making. Negative news, as above, can build mistrust and fear among investors.

5. FINAL CONSIDERATIONS

We used event studies to investigate the effect of hiring market makers on stock returns. Our results showed evidence of abnormal returns both before the event, possibly indicating information leaks or only a contamination of the study from the disclosure of other relevant facts, and after the event, indicating delays in market assimilation, which both produce semi-strong informational inefficiency.

We also found cumulative abnormal returns over 7% (statistically significant) during a period of 15 days before and after the hiring of market makers by the 66 companies in our sample. This result indicates a liquidity premium in the Brazilian securities market, as shown by other studies.

The literature shows that hiring market makers improves the liquidity of companies. Nevertheless, our results showed that market makers, specifically two market makers, produced negative returns, suggesting that the market did not react positively to their hiring. Negative market news also contributed to substantially negative returns.

Thus, based on these event studies and in compliance with specific objectives, each market maker was analyzed individually. This analysis showed that only the Banco Credit Suisse and Banco Plural market makers produced negative cumulative abnormal returns. It should be noted that these cumulative abnormal returns were negative and decreased more strongly than those of the other market makers in the study, given the quality and content of the information disclosed during the period. Consequently, the companies that chose these two market makers had a stronger negative influence on their shareprices.

These results may be related to market expectations caused by news releases about these market makers. News involving embezzlement scandals, dismissals due to active and passive corruption, and Federal Police investigations may have influenced investors to be somewhat suspicious of these two market makers.

A more thorough evaluation might lead to questions about whether the hiring of market makers causes abnormal returns or only reduces investor risks. In addition, we recommend that future studies examine other market events linked to market makers as well as qualitative research on market announcements and other publications that may provide additional background information about target events.

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