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Does the liquidity effect exist in the brazilian stock market?

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ABSTRACT

The purpose of this article is to analyze whether the liquidity effect exists in the Brazilian stock market. In addition to analyzing the liquidity effect, this article evaluated the capacity of CAPM and the Fama-French three-factor model (1993) in explaining it. For such purpose, the companies with shares traded in Bovespa were analyzed, in the period from 1995 to 2008. According to the results obtained, it can be concluded that there is a liquidity premium in the Brazilian market, regardless of the proxy used. The monthly premium varied from 0.83% to 2.19%, not adjusted for risk, and from 1.77% to 2.78%, adjusted for risk pursuant to CAPM, and from 1.24% to 3.04%, adjusted for risk according to the three-factor model, respectively. It was also observed that the liquidity premium was not restricted to the month of January, and that there were no substantial modifications when different periods were used in the analysis. In view of such evidence, the hypothesis of this article, that there is a liquidity premium in the Brazilian market, cannot be rejected. Moreover, it was observed that both CAPM and the three-factor model fail to explain the liquidity effect. The results obtained in this study can instigate the establishment of corporate policies which alleviate the liquidity costs, i.e., which improve the liquidity of the securities negotiated, reducing, as a result, the capital cost. By doing so, a company can increase its market value, improving the liquidity of its securities and shares, since the lower the capital cost, the greater the value of the company.

Keywords: Anomalies; liquidity effect; assets pricing.

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1. INTRODUCTION

Liquidity is an important factor of an asset, and investors shall take it into consideration when they make investment decisions. According to Amihud and Mendelson (1988, 1991, 2006), an asset is liquid if it can be bought or sold quickly at the current market price and at a low cost. Therefore, the liquidity can be related to the cost involved in performing a transaction in the stock market. The correlation between liquidity and assets' return is related to the hypothesis of investors' aversion to risk. Investors with risk aversion require higher returns as compensation for higher risk levels. In the same way, they tend to have a preference for concentrating their investments in liquid assets, which can be negotiated quickly and at a low transaction cost. Thus, in order to attract the investors, the assets with lower liquidity shall offer a greater expected return. In summary, the expected returns of the assets are a decreasing function of liquidity (AMIHUD; MENDELSON, 1986; 1988; 1991).

Amihud and Mendelson (1986) were one [sic] of the first researchers to examine the role of liquidity in the pricing of assets, proposing a positive correlation between return and illiquidity. Since then, many works have been developed, with the intention of investigating the correlation between return and liquidity. However, the results are conflicting. In addition to this, there are differences in the methodologies used in the process of portfolio formation, in the periods studied, as well as in the econometric methods used, making it difficult to compare the results.

Additionally, the majority of research involving the correlation between liquidity and return of stocks was developed in the American market. Obtaining results beyond those found in the United States is essential to prevent the data snooping problem (LO; MACKINLAY, 1990). Moreover, studies in this area are still scarce in Brazil, a market where illiquidity is probably an important factor for many stocks traded in Bovespa.

> The liquidity effect can be related to risk factors in the models for asset pricing. Less liquid assets demand a return rate higher than that of more liquid assets, since for giving up the liquidity and assuming higher costs in future negotiations, by virtue of the low liquidity of the stock, investors would probably demand a premium to assume investments with such profile. Therefore, the price of liquid assets needs to decrease satisfactorily to attract investors (MACHADO; MEDEIROS, p. 384, 2011).

The theory of asset pricing suggests that the expected return of an asset increases with its risk level, because investors averse to risk require a compensation to accept more risk. Since investors are also averse to the illiquidity cost and want to be rewarded for

facing it, the expected return of an asset is an increasing function of illiquidity. Thus, the return of an asset depends on two characteristics: risk and liquidity (AMIHUD; MENDELSON, 2006). For Jacoby, Fowler and Gottesman (2000), risk and liquidity are inseparable variables. Therefore, when evaluating assets, financial analysts shall take into consideration not only the risk and the expected return of the asset, but also its liquidity. In light of the aforementioned, the following hypothesis shall be tested in this work:

H1: There is a liquidity premium in the Brazilian stock market.

Accordingly, the purpose of this article is to analyze whether the liquidity effect exists in the Brazilian stock market. In addition to analyzing the liquidity effect, this article evaluates the capacity of CAPM and Fama-French's three-factor model (1993) in explaining it.

This article has five parts, in addition to this one. In the next part, the theoretical reference is presented, in which the liquidity effect shall be addressed. In the third part, the methodology shall be addressed. In the fourth, the results of the research. In the fifth, the conclusion. And, finally, the references.

2. LITERATURE REVIEW

Liquidity, negotiability or transaction costs constitute important attributes in any financial instrument. Liquid assets are understood as those which can be bought or sold quickly at the current market price and at a low cost. Therefore, the liquidity is related to the cost of performing a transaction in the stock market (AMIHUD; MENDELSON, 1988, 1991, 2006; LIU, 2006).

For Amihud and Medelson (1986), liquidity is a basic characteristic of the financial market. According to the authors, its importance is directly related to the capital cost. Financial policies which increase liquidity can reduce the opportunity cost of capital. Additionally, the role of liquidity has grown in the last years, influencing conclusions in the pricing of assets, market efficiency and corporate finances (GOYENKO; HOLDEN; TRZCINKA, 2009).

Amihud and Mendelson (1986) developed a model which shows how liquidity affects asset prices. The model characterizes assets based on their transaction costs and investors based on their investment horizon. The model focus in the illiquidity and, in such model, investors have heterogeneous plans for holding investments, i.e., liquidation. Rational investors select assets which maximize their expected returns, net of transaction costs, and, in balance, assets with greater spreads are allocated to investors who keep

investment plans with a longer maturity term (clientele effect). As a result, the correlation between illiquidity and return is increasing and concave, i.e., it is less increasing for less liquid assets, held by long term investors who can depreciate their transaction costs throughout the period.

While the liquidity costs of a simple transaction are low, in comparison to the price of assets, their cumulative effect is higher, because they are incurred repeatedly throughout their life. Accordingly, the impact of illiquidity costs should be, at least, equal to the present value of all costs incurred currently and in the future. Therefore, investors avoid investments in illiquid securities, if they are not adequately compensated. As a result, the price of illiquid assets needs to decrease sufficiently to attract investors (AMIHUD; MENDELSON, 1988, 1991, 2006).

According to Liu (2006), three factors affect the liquidity of securities. First, the liquidity becomes an important issue when the economy is in recession or there is an expectation that it will enter a recession. From the point of view of assets allocation, investors averse to risk prefer to invest in less risky assets and in liquid assets, if the forecast is of an economy in recession. Secondly, illiquidity may be caused by investors who have inside information. If there are insider traders in the market, and investors are aware of that, then non-informed investors will choose not to operate in the market. In the extreme scenario, the market can collapse. Thirdly, the companies can cause the illiquidity. *Ceteris paribus*, no investor is interested in keeping stocks of companies with high probability of bankruptcy or a weak management team.

While an investor can always reduce the risk of holding a security, forming a diversified portfolio, there is nothing to be done to prevent the illiquidity costs. The investor will incur such costs whenever he/she buys or sells a security, and keeping a portfolio of illiquid assets will not eliminate the transaction costs, which are always additional (AMIHUD; MENDELSON, 1989). This means that an illiquid assets portfolio remains illiquid. However the illiquidity can be managed.

According to Amihud and Mendelson (1988, 1991, 2006), corporate policies which alleviate the illiquidity costs to investors can be established, i.e., develop policies that improve the liquidity of securities, because, for a company that issues securities or shares, the lesser the return required, the lesser its capital cost. Consequently, a company can increase its market value, improving the liquidity of its securities and shares, as the lower the capital cost, the greater the value of the company.

Amihud and Mendelson (1988, 1991, 2006) establish strategies that the companies can use to increase the liquidity of its securities, which include: increase the investors base of the company, especially attracting small investors; voluntarily provide more information to the market, reducing information asymmetry; reduce the issue of fragmented securities and shares, and list the company in more liquid stock exchange. However, these strategies involve a tradeoff between costs and benefits, which must be analyzed, at the time the decision is made by the managers.

3. METHODOLOGY

3.1 RESEARCH CHARACTERIZATION

Concerning the characterization, this research is classified as an empirical-analytical study, which, according to Martins (2002, p.34), "[...] are approaches which have in common the use of techniques for collection, treatment and analysis of data which are markedly quantitative […]. They have great concern with the causal relation between variables. The validation of the scientific evidence is pursued by means of testing instruments, significance degrees and systematization of the operational definitions".

3.2 SAMPLE

The sample consisted of all companies with shares traded in the Stock Exchange of the State of São Paulo - BM&FBOVESPA - between June 1, 1995 and June 30, 2008. This period of time was used because it comprises a period of greater macroeconomic stability, after July 1994. With the intention of ensuring more accuracy to the accounting data, some filters were used. Thus, the following companies were excluded from the sample: financial companies, because, according to Fama and French (1992), their high indebtedness degree influences the Book-to-Market (BM) index, not having the same meaning as the high indebtedness degree of non-financial companies; companies which did not have consecutive monthly quotations for 24 months; companies which did not have market value on December 31 and June 30 of each year; companies which did not have positive Shareholders' Equity on December 31 of each year.

Therefore, this study analyzed, every year, data from 149 stocks (25.65% of the population), on average, presenting, in 2003, a minimum of 103 analyzed stocks (16.89% of the population), and, in 2006, a maximum of 191 shares (33.81% of the population). All data necessary for conducting this research were extracted from Economática's data base.

3.3 LIQUIDITY MEASUREMENT

For Goyenko, Holden, Trzcinka (2009), given the limited number of proxies for liquidity, there is not yet a consensus on which measure is better, and there is no guarantees that the proxies used capture the transaction costs. Accordingly, the authors develop a deep study on liquidity measures, with the intention to determine which measures are better. For such purpose, using data of 400 stocks selected randomly, in the period from 1993 to 2005, as well as three new spread measures, effective and realized, and nine new price impact measures, in addition to the measures traditionally used in the literature, they compare proxies calculated from low frequency data with sophisticated liquidity measures calculated from two high frequency data sets, from the correlation in time series and in cross-section.

The main results were that the low frequency measures, in daily or monthly bases, capture the transaction costs of the high frequency measures. Concerning the best proxy to be used, according to the authors, it depends on the interest of the researcher, having in view that there are measures which can be obtained in a simpler manner, and others which are more sophisticated, which demand more advanced computer applications.

Other authors emphasize that the liquidity is not directly observable and that it has various aspects which cannot be captured in one single measure (SHEPHERD; STAMBAUGHA, 2003; MIHUD, 2002; LIU, 2006). Accordingly, a more complete analysis of the liquidity requires the use of different measures which are capable of capturing its multiple dimensions, for example: the dimension of transaction costs (AMIHUD; MENDELSON, 1986), quantity negotiated (DATAR; NAIK; RADCLIFFE, 1998), price impact (AMIHUD, 2002; SHEPHERD; STAMBAUGH, 2003), among others. For this reason, the studies which analyze the liquidity influence in the explanation of the returns of stocks normally use different proxies to measure such variable.

Thus, in this study, five liquidity measures were chosen to be used in the portfolios construction process. The measures were obtained by the annual average of the monthly values of the 12 months prior to the period of portfolios formation. It should be emphasized that all measures have theoretical grounds.

The first one was the ***Turnover*** index, formed by the division of the number of shares traded by the number of shares issued. This proxy was used by Keene and Peterson (2007), Nguyen, Prakassh and Ghosh (2007), Jun, Marathe and Shawky (2003), Chan and Faff (2003), Marshall and Ypung (2003), Chordia, Subrahmanyam and Anshuman (2001),

Datar, Naik and Radcliffe (1998), Correia, Amaral and Bressan (2008), and Vieira and Milach (2008). In addition to the theoretical grounds, according to Datar, Naik and Radcliffe (1998), the advantages of using this proxy are that the liquidity cannot be directly observed and the data of the turnover rate are relatively easy to obtain.

The second measure was the **Negotiated Volume**, represented by the volume, in Brazilian Reais, monthly traded for the stock. This proxy was used by Chordia, Subrahmanyam and Anshuman (2001), Jun, Marathe and Shawky (2003), Keene and Peterson (2007), Correia, Amaral and Bressan (2008), and Vieira and Milach (2008).

The third measure was the **Quantity of Transactions**, consisting of the quantity of transactions carried out monthly with the stock. This proxy was used by Correia, Amaral and Bressan (2008), and Vieira and Milach (2008).

The fourth measure used was the **Negotiability**, which measures the relative participation of the stock in transactions conducted at the São Paulo Stock Exchange, obtained according to Equation 1. This proxy was used by Bruni and Famá (1998), and Xavier (2007).

$$Negotiability = 100 \times \frac{p}{P} \times \sqrt{\frac{n}{N} \times \frac{v}{V}} \qquad (1)$$

Where: p = number of days where at least one transaction with the stock was carried out within the chosen period; P = total number of days of the chosen period; n = number of transactions with the stock within the chosen period; N = number of transactions with all stocks within the chosen period; v = volume of money of transactions with the stock within the chosen period; V = volume of money of transactions with all stocks within the chosen period.

The fifth measure used was the **Standardized Turnover** adjusted by the number of days without negotiation in last the 12 months, developed by Liu (2006), according to Equation 2:

$$LIQ = \left| X + \frac{1}{\frac{Z}{11.000}} \right| \times \frac{21 \times 12}{Y} \qquad (2)$$

Where: X = the number of days without negotiation in the last the 12 months; Y = the number of days with negotiation in the market; Z = average turnover of the last 12 months, obtained by the sum of daily turnover of the last 12 months, with the daily

turnover being obtained by the division of the number of shares traded on the day by the number of outstanding shares at the end of that day.

According to Liu (2006), the deflator of 11.000 is chosen so that $0 < \frac{\frac{1}{Z}}{11.000} < 1$ for all stocks. The second term inside brackets of Equation 2 reveals that two stocks with the same number of days without negotiation can be different, with the one with greater turnover being the most liquid. Since the number of days with negotiation in the market in one month varies from 15 to 23 days, the multiplication by the factor $\frac{21 \times 12}{Y}$ standardizes the number of days with negotiation in 21. The LIQ variable will be constructed in June of each year, starting in 1995 and ending in 2008, based on daily data, representing the turnover adjusted by the number of days without negotiation in the last 252 days.

In accordance with Liu (2006), this liquidity measure, given by Equation 2, captures multiple liquidity dimensions, with particular emphasis in the negotiation speed, which researches been ignoring. First, the number of days without negotiation captures the continuity and the potential delay or difficulty to execute an order, i.e., the lack of negotiation of a security indicates its illiquidity degree: the greater the frequency of negotiation absence, the lesser the liquidity of the security. In addition to the speed dimension, the liquidity measure proposed captures the dimension quantity, measured by turnover. Finally, it reflects the dimension negotiation cost, i.e., the more liquid the stock, the lower the costs to negotiate it.

It should be emphasized that the purpose of this work is not to analyze the best liquidity proxy, but to use alternative measures, with the intention of capturing multiple liquidity dimensions. To this effect, the reading of the article by Goyenko, Holden and Trzcinka (2009) is suggested.

3.4 MODEL DESCRIPTION

For the development of the study, the use of portfolios was chosen, because this methodology provides results which are better than those obtained by means of analysis of individual assets, as Blume and Friend (1973), Fama and French (2004) and Vaihekoski (2004) suggest.

In order to reach the objective proposed, the analysis was divided into two stages. The first stage consisted of verifying whether there is a liquidity premium in the Brazilian

market. For such purpose, the stocks were grouped in portfolios, in accordance with the five liquidity measures used in the research.

Thus, in June of each year *t*, beginning in 1995 and ending in 2008, all stocks of the sample were organized in decreasing order, in accordance with the liquidity measures, and divided into five portfolios, from the portfolio with the highest value to that with the lowest value. The *High* portfolio was formed by stocks with the highest values and the *Low* portfolio formed by shares with the lowest values of the measures used as bases for construction of portfolios.

From July of year *t* to June of year *t+1*, the monthly return of each one of the five portfolios was calculated, by means of weighing, by the market value of the share in relation to the market value of the portfolio, the returns of the stocks which compose them. Annually, the portfolios were rebalanced. For the calculation of the excess return, the Selic rate monthly return was adopted, as a proxy for the risk free return rate, as Fraletti (2004) suggests.

If there is a trend in the excess returns across the five portfolios, the effect exists. Thus, it can be concluded that the liquidity premium exists if the excess return of less liquid portfolios beat (are higher than) the excess returns of more liquid portfolios.

The second stage consisted of ascertaining if the liquidity premium exists when the return is adjusted for the CAPM and for the Fama-French three-factor model, i.e., the capacity of CAPM and the three-factor model in explaining the liquidity premium was evaluated. For such purpose, regressions in time series were performed in each one of the portfolios, pursuant to Equations 3 and 4.

$$R_i - R_f = \alpha_i + b_i\left(R_m - R_f\right) + \varepsilon_i \qquad (3)$$

Where: R_i is the monthly return of each portfolio; $R_m - R_f$ is the premium for the market risk, obtained by the difference between the average, weighed by the value of each stock, of the monthly returns of all stocks of the sample and the risk free rate, adopting the Selic rate as proxy.

$$R_{c_{i,t}} - R_f = \alpha_i + b_i\left(R_{m_t} - R_{f_t}\right) + S\left(SMB_t\right) + H\left(HML_t\right) + \varepsilon_{i,t} \qquad (4)$$

Where: $R_{c_{i,t}}$: return of the portfolio *i* in month *t;* $R_{m_t} - R_{f_t}$: premium for market factor in month *t;* SMB_t : premium for size factor in month *t;* HML_t : premium for B/M factor in month *t*; $\varepsilon_{i,t}$: model's residual for portfolio *i* in month *t*.

Size, market and B/M index factors (Equation 5) were obtained by following the same procedures of Fama and French (1993) and Machado and Medeiros (2011), namely:

(i) In June of every year *t*, starting in 1995 and ending in 2008, all stocks of the sample were organized in ascending order, in accordance with the market value in June of the companies they represent. The median was used to divide the sample in two groups, classified as S (*Small*) and B (*Big*), i.e., companies of low and high market value, respectively;

(ii) In this same month, all shares were rearranged in ascending order, in accordance with the BM index of the companies they represent. This index was calculated with accounting and market values of the shareholders' equity for December of the year prior to the year of formation of portfolios. Then, such stocks were divided into three groups: 30% Low, 40% Medium and 30% High, containing the companies with lower BM indices, intermediate BM indexes and higher BM indexes, respectively;

(iii) Finally, in June of each year *t*, after the two previous classifications, six portfolios were constructed, resulting from the intersection of the two groups, described according to Chart 1. From July of year *t* to June of year *t +1*, the monthly return of each stock, in logarithmic form, and of each one of the six portfolios was calculated, by means of weighing, by the market value of the stock in relation to the market value of the portfolio, of the returns of the stocks which compose them (Equation 5). Annually, the portfolios were reformulated. The portfolios were rebalanced at the end of June of each year, in order to ensure that the data contained in the financial statements related to the previous calendar year had already been officially disclosed, preventing the bias known as look-ahead bias;

(iv) On a monthly basis, the size risk factor premium was calculated, by the difference between the average of monthly returns of *Small* portfolios and the average of monthly returns of *Big* portfolios (Equation 6), and the premium for the BM risk factor, by the difference between the average of monthly returns of *High* portfolios and the average of monthly returns of *Low* portfolios (Equation 7). Finally, on a monthly basis, the premium for market risk factor was calculated. For such purpose, the difference between the average of the monthly returns of all stocks of the sample, weighed by the market value of each stock, and the risk free rate was calculated (Equation 8). For the

calculation of the risk free return rate, Selic's monthly return was adopted, as a proxy for the risk free return rate, as Fraletti (2004) suggests.

Portfolio	Description
B/H	(Big, High) - Stocks with high market value and high BM index
B/M	(Big, Medium) - Stocks with high market value and medium BM index
B/L	(Big, small) - Stocks with high market value and low BM index
S/H	(Small, High) - Stocks with low market value and high BM index
S/M	(Small, Medium) - Stocks with low market value and medium BM index
S/L	(Small, Low) - Stocks with low market value and low BM index

Chart 1 - Portfolios Description

$$R_{p,t} = \sum_{t=1}^{n} \left(\frac{VM_{i,t}}{\overline{VM}_{p,t}} \times R_{i,t} \right) \qquad \text{Eq. (5)}$$

Where:

$R_{p,t}$ = return of portfolio *p* in *month t;*

$R_{i,t}$ = return of stock *i*, belonging to portfolio *p* in month *t;*

$VM_{i,t}$ = market value of stock *i*, at the end of month *t;*

$\overline{VM}_{p,t}$ = market value of portfolio *p*, at the end of month *t*, represented by the sum of the market values of the stocks in the portfolio.

$$SMB_t = \overline{RS_t} - \overline{RB_t} \qquad \text{Eq. (6)}$$

Where:

SMB_t = premium for size factor, in month *t*;

$\overline{RS_t}$ = monthly average return of *Small* portfolios, given by:

$\overline{RS_t}$ = (S/H + S/M + S/L) / 3

$\overline{RB_t}$ = monthly average return of *Big* portfolios, given by:

$\overline{RB_t}$ = (B/H/ + B/M +B/L) / 3

$$HML_t = \overline{RH_t} - \overline{RL_t} \qquad \text{Eq. (7)}$$

Where:

HML_t = premium for BM index factor, in month *t*;

$\overline{RH_t}$ = monthly average return of *High* portfolios, given by:

$\overline{RH_t}$ = (B/H + S/H)/ 2

$\overline{RL_t}$ = monthly average return of *Low* portfolios, given by:

$\overline{RL_t}$ = (B/L + S/L/) / 2

$$PM_i = \left[\sum_{t=1}^{n} \frac{VM_{i,t}}{VM_{M,t}} \times R_{i,t} \right] - Rf_i \qquad \text{Eq. (8)}$$

Where:

PM = Market Risk Factor Premium in month *t;*

$R_{i,t}$ = return of the stock *i*, pertaining to the market portfolio, at the end of month *t;*

$VM_{i,t}$ = market value of stock *i*, at the end of month *t;*

$VM_{M,t}$ = market value of the market portfolio, at the end of month *t*, considering all stocks of the sample.

Rf_i = return of risk free asset, in month *t*.

4 RESULTS

Table 1, Panel A, evidences the average values, per portfolio, of the variables used, and panel B the market value of portfolios, in accordance with the variable used as portfolio construction criteria. Thus, the average negotiability of portfolios varied from 1.591 to 0.002, the average turnover from 0.157 to 0.002, the average quantity of transactions from 11,066.99 to 24,14, the average volume negotiated from 526,740.36 to 220.47, and the average standardized turnover from 2.69 to 167.78.

As can be observed in Panel B of Table 1, the market value of portfolios formed by high liquidity shares, whatever the proxy used, is greater than the market value of portfolios formed by low liquidity shares. It is also observed that the market value decreases monotonically from the most liquid portfolio (portfolio 1) to the least liquid portfolio (portfolio 5), suggesting a positive correlation between size and liquidity, as well as the market value of the shares as a possible proxy for liquidity.

Therefore, illiquid stocks tend to be *small*, in the Brazilian market. A possible explanation for this fact is that the stocks may have low level of negotiation because the investors do not give importance to stocks with low market value and which are less visible.

Table 1 - Average values of the variables used per portfolio

Variables/Portfolios	1	2	3	4	5
Panel A: Characteristics					
Negotiability	1.591	0.205	0.043	0.010	0.002
Turnover	0.157	0.022	0.005	0.001	0.002
Quantity of transactions *	11,066.99	2,013.61	291.29	77.68	24.14
Volume*	526,740.36	49,849.73	6,953.57	1,362.93	220.47
Standardized Turnover	2.69	6.52	30.99	89.67	167.78
Panel B: Market Value (in BRL Thousand)					
Negotiability	292,536,407.06	65,221,294.10	25,769,395.03	17,830,662.78	5,405,247.84
Turnover	143,034,686.44	86,958,729.18	60,744,466.63	67,089,843.82	48,935,280.76
Quantity of transactions	282,271,383.46	66,983,631.63	28,000,587.87	20,839,392.01	8,668,011.86
Volume	298,907,520.31	62,054,976.53	26,188,297.81	15,110,909.05	4,501,303.13
Standardized Turnover	209,904,827.51	125,145,563.56	44,038,476.98	19,282,490.61	8,391,648.17

*In thousands

Table 2 evidences the excess returns not adjusted to risk of the five portfolios, formed based on the proxies used for liquidity, as well as the standard deviation, the test *t* and *p* value.

It is noticed that the returns increase almost monotonically, except for when the turnover and standardized turnover are used as proxy, with portfolios formed by less liquid shares having the highest returns, and those formed by the more liquid shares having the lowest returns. It can be observed that the premium varies from 0.83% to 2.19% per month, when using the standardized turnover and the negotiability as proxy, suggesting evidence of the liquidity effect in the Brazilian market, corroborating the findings of Hwang and Lu (2007) and of Amihud and Mendelson (1986), and contrary to the findings of Gharghori, Lee and Veeraraghavan (2007) and Liu (2006).

From the proxies used to measure the liquidity, the premium revealed to be significant at a 10% level, when using the negotiability as proxy. By using the variables turnover and standardized turnover, however, the premium did not have statistical significance and, by using the variables quantity of transactions and volume, the premium had marginal significance.

It is observed, also, that, when using the turnover variable as proxy, the premium had sign contrary to the one expected, suggesting the non-existence of the liquidity premium. The negative premium obtained, when using the standardized turnover variable, is due to the form in which the variable is constructed (it is about an illiquidity measure, therefore, a relation contrary to the other variables).

In the works of Keene and Peterson (2007), on the American market, and Chan and Faff (2005), on the Australian market, and Vieira and Milach (2008) and Correia, Amaral and Bressan (2008), in the Brazilian market, the turnover variable also did not reveal to be statistically significant. It should be emphasized that, in the works of Vieira and Milach (2008) and Correia, Amaral and Bressan (2008), who worked with individual assets, the liquidity also had a sign contrary to the one expected. Thus, the evidences suggest that the turnover does not constitute an adequate proxy for liquidity, in the Brazilian market.

Table 2 - Monthly returns of the portfolios according to the proxy used

Variables/Portfolios	1	2	3	4	5	5-1
Panel A: Returns						
Negotiability						
Average return	0.0497	0.0485	0.0535	0.0509	0.0716	0.0219
Standard Deviation	0.0980	0.0788	0.0751	0.0686	0.1369	0.1517
Test *t*	6.0835	7.3894	8.5496	8.8922	6.2790	1.7365
p Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.082
Turnover						
Average return	0.0534	0.0521	0.0507	0.0455	0.0430	-0.0104
Standard Deviation	0.0895	0.0814	0.0911	0.0952	0.0945	0.0795
Test *t*	7.1646	7.6782	6.6851	5.7421	5.4641	-1.5706
p Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.1163
Quantity of transactions						
Average return	0.0487	0.0520	0.0490	0.0522	0.0613	0.0126
Standard Deviation	0.0995	0.0833	0.0847	0.0695	0.0727	0.0986
Test *t*	5.8713	7.4953	6.9466	9.0197	10.1168	1.5326
p Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.1254
Negotiated volume						
Average return	0.0497	0.0478	0.0553	0.0525	0.0702	0.0205
Standard Deviation	0.0969	0.0748	0.0737	0.0737	0.1545	0.1662
Test *t*	6.1501	7.6644	9.0080	8.5569	5.4484	1.4794
p Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.139
LIqLiu						
Average return	0.0603	0.0537	0.0430	0.0482	0.0519	-0.0083
Standard Deviation	0.0837	0.0823	0.0918	0.0875	0.0965	0.1010
Test *t*	8.6348	7.8230	5.6271	6.6165	6.4599	-0.9878
p Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.3233

4.1 LIQUIDITY PREMIUM'S ROBUSTNESS TESTS

The purpose of this section is to verify if the liquidity premium observed in Table 2 is restricted to the month of January (January effect) or to some specific period. For such purpose, the premiums were analyzed without taking into consideration the month of January, and the analysis period was divided into two: one from July 1996 to December 2002 and the other from January 2003 to June 2008.

The January effect is one of the most known anomalies of the stock markets. This anomaly was discovered by Keim (1983), who observed that the returns of the shares in the month of January were surprisingly higher than the returns of the other months of the year. According to the hypothesis of market efficiency, this anomaly should disappear, as soon as the investors became aware of its existence. However, intriguingly, it continues to exist, even after its discovery.

Regarding the liquidity premium, Eleswarapu and Reinganum (1993) observed that the liquidity premium was reliably positive only in the month of January, while Liu (2006) and Datar, Naik and Radcliffe (1998) observed that said premium was not restricted to the month of January.

Table 3 records the returns of portfolios and the liquidity premiums removing the months of January from the analysis. It can be observed that the premiums observed did not suffer significant modifications in comparison to those presented in Table 2. It can be observed, however, a slight reduction in the significance of the variables, caused by the increase of the standard deviations. Thus, it can be concluded that the liquidity premium observed in this work is not limited to the month of January, corroborating the findings of Liu (2006) and Datar, Naik and Radcliffe (1998) and contrary to the research of Eleswarapu and Reinganum (1993).

Table 3 - Monthly returns of the portfolios disregarding the month of january

Variables/Portfolios	1	2	3	4	5	5-1
Panel A: Returns (%)						
Negotiability						
Average return	0,0499	0,0466	0,0515	0,0510	0,0709	0,0209
Standard Deviation	0,0988	0,0733	0,0738	0,0693	0,1415	0,1556
Test t	5,8048	7,3003	8,0293	8,4608	5,7513	1,5461
Value *p*	0,0000	0,0000	0,0000	0,0000	0,0000	0,122
Turnover						
Average Return	0,0508	0,0518	0,0500	0,0454	0,0425	-0,0083
Standard Deviation	0,0806	0,0785	0,0919	0,0964	0,0953	0,0720
Test t	7,2440	7,5844	6,2463	5,4113	5,1239	-1,3319
p Value	0,0000	0,0000	0,0000	0,0000	0,0000	0,1829
Quantity of transactions						
Average Return	0,0488	0,0520	0,0450	0,0507	0,0622	0,0133
Standard Deviation	0,1003	0,0821	0,0773	0,0699	0,0743	0,0999
Test t	5,5891	7,2832	6,6783	8,3261	9,6173	1,5348
p Value	0,0000	0,0000	0,0000	0,0000	0,0000	0,1248
Negotiated volume						

Average Return	0,0495	0,0470	0,0539	0,0520	0,0713	0.0218
Standard Deviation	0,0972	0,0732	0,0736	0,0743	0,1604	0,1720
Test t	5,8527	7,3815	8,4152	8,0430	5,1101	1,4586
p Value	0,0000	0,0000	0,0000	0,0000	0,0000	0,145
LIqLiu						
Average Return	0,0574	0,0539	0,0408	0,0477	0,0517	-0,0057
Standard Deviation	0,0754	0,0827	0,0856	0,0868	0,0969	0,0957
Test t	8,7395	7,4897	5,4691	6,3096	6,1278	-0,6847
p Value	0,0000	0,0000	0,0000	0,0000	0,0000	0,4935

Table 4 evidences the liquidity premium in two periods: from July 1996 to December 2002 and from January 2003 to June 2008. It is observed that there were no substantial modifications in the liquidity premium, in the periods analyzed. Thus, the liquidity premium observed in Table 2 is not restricted to a specific period. The results observed in each period are similar to the total period.

Table 4 - Monthly returns of the portfolios per period

From 1996 to 2002							From 2003 to 2008						
	1	2	3	4	5	5-1		1	2	3	4	5	5-1
Panel A: Returns							Panel A: Returns						
Negotiability							**Negotiability**						
Average Return	0.04	0.04	0.05	0.04	0.08	0.03	Average Return	0.06	0.05	0.06	0.06	0.07	0.01
Standard Deviation	0.12	0.09	0.09	0.08	0.18	0.19	Standard Deviation	0.06	0.06	0.06	0.06	0.07	0.08
Test t	3.19	4.14	4.86	4.98	3.88	1.54	Test t	7.26	7.82	8.33	8.41	7.53	0.83
p Value	0.00	0.00	0.00	0.00	0.00	0.12	p Value	0.00	0.00	0.00	0.00	0.00	0.41
Turnover							**Turnover**						
Average Return	0.05	0.05	0.05	0.04	0.04	-0.01	Average Return	0.06	0.06	0.05	0.05	0.05	-0.01
Standard Deviation	0.10	0.09	0.11	0.12	0.11	0.09	Standard Deviation	0.07	0.06	0.06	0.06	0.07	0.06
Test t	3.94	4.49	3.83	3.04	2.84	-0.96	Test t	7.26	7.27	7.68	7.02	6.25	-1.38
p Value	0.00	0.00	0.00	0.00	0.00	0.34	p Value	0.00	0.00	0.00	0.00	0.00	0.17
Quantity of transactions							**Quantity of transactions**						
Average Return	0.04	0.05	0.04	0.04	0.06	0.02	Average Return	0.06	0.06	0.06	0.06	0.06	0.01
Standard Deviation	0.12	0.10	0.10	0.08	0.09	0.12	Standard Deviation	0.06	0.06	0.07	0.06	0.05	0.05
Test t	3.03	4.30	3.77	5.18	5.99	1.28	Test t	7.17	7.82	7.01	8.14	10.36	0.90
p Value	0.00	0.00	0.00	0.00	0.00	0.20	p Value	0.00	0.00	0.00	0.00	0.00	0.37
Negotiated volume							**Negotiated volume**						
Average Return	0.04	0.04	0.05	0.04	0.08	0.03	Average Return	0.06	0.05	0.06	0.06	0.06	0.00
Standard Deviation	0.12	0.09	0.08	0.08	0.20	0.21	Standard Deviation	0.06	0.05	0.06	0.06	0.07	0.08
Test t	3.24	4.31	5.28	4.59	3.45	1.43	Test t	7.22	8.06	8.39	8.63	6.70	0.38
p Value	0.00	0.00	0.00	0.00	0.00	0.15	p Value	0.00	0.00	0.00	0.00	0.00	0.70
LIqLiu							**LIqLiu**						

Average Return	0.05	0.05	0.04	0.05	0.04	-0.01	Average Return	0.07	0.06	0.05	0.05	0.06	-0.01
Standard Deviation	0.08	0.10	0.11	0.11	0.12	0.11	Standard Deviation	0.09	0.06	0.06	0.06	0.07	0.09
Test t	6.00	4.35	2.98	3.75	3.38	-0.77	Test t	6.17	8.59	6.32	7.08	7.35	-0.61
p Value	0.00	0.00	0.00	0.00	0.00	0.44	p Value	0.00	0.00	0.00	0.00	0.00	0.54

Additionally, having in view that the exchange rate became flexible, from 1999, the sensitivity of the results evidenced in Table 2 was verified, by restricting the sample to the period after 1999, i.e., from 1999 to 20008. According to Table 5, it can be observed that there were no substantial modifications in the premiums observed in comparison to the ones presented in table 2, evidencing, thus, that the results did not reveal to be sensitive to the change in currency exchange policy.

Table 5 - Monthly returns of the portfolios for the period after 1999

Variables/Portfolios	1	2	3	4	5	5-1
Panel A: Returns (%)						
Negotiability						
Average Return	0.0566	0.0557	0.0627	0.0562	0.0784	0.0217
Standard Deviation	0.0755	0.0690	0.0678	0.0654	0.1496	0.1570
Test t	8.0101	8.6301	9.8768	9.1764	5.5957	1.4784
p Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.139
Turnover						
Average Return	0.0626	0.0611	0.0569	0.0502	0.0489	-0.0137
Standard Deviation	0.0866	0.0728	0.0743	0.0744	0.0770	0.0804
Test t	7.7226	8.9653	8.1844	7.2060	6.7828	-1.8258
p Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.0679
Quantity of transactions						
average return	0.0554	0.0596	0.0581	0.0595	0.0680	0.0125
Standard Deviation	0.0783	0.0650	0.0782	0.0674	0.0728	0.0847
Test t	7.5617	9.7997	7.9364	9.4248	9.9694	1.5814
p Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.1138
Negotiated volume						
average return	0.0567	0.0547	0.0656	0.0574	0.0760	0.0193
standard deviation	0.0747	0.0639	0.0656	0.0709	0.1700	0.1756
Test t	8.1129	9.1333	10.6752	8.6373	4.7737	1.1712
p Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.242
LIqLiu						
Average Return	0.0667	0.0600	0.0525	0.0552	0.0588	-0.0079
Standard Deviation	0.0828	0.0790	0.0827	0.0674	0.0769	0.0923
Test t	8.5919	8.1092	6.7750	8.7467	8.1543	-0.9130
p Value	0.0000	0.0000	0.0000	0.0000	0.0000	0.3612

4.2 PERFORMANCE OF CAPM AND OF THE THREE-FACTOR MODEL IN THE EXPLANATION OF THE LIQUIDITY EFFECT

The purpose of this section is to analyze the capacity of CAPM and of the three-factor model in the explanation of the liquidity effect observed in Table 2. For such purpose, regressions in time series were made in each one of the five portfolios, constructed in accordance with the negotiability, the quantity of transactions and the negotiated volume, proxies in which the liquidity effect revealed to be consistent (Table 2).

If the intercepts are statistically significant, and if there is a positive or negative trend in the intercepts across portfolios, and if the difference between the intercepts of the portfolios located in the extremities (premium) is significant, the liquidity effect exists, and the models have failed to explain it. A comparison of the magnitude of the intercepts between the models allows to identify which model has a better performance in the explanation of the returns and, as a result, of the liquidity effect. The lower the intercept, the better the model. Additionally, the adjusted determination coefficient was also used in the comparison of the models.

Tables 6, 7 and 8 evidence the returns adjusted to risk, as well as the risk premiums, in accordance with the proxy used. The same trend is observed in Table 2, where the returns are adjusted to risk both by CAPM and by three factors. A monthly premium of 2.78%, 1.77% and 2.56% is observed, adjusted by CAPM, and 2.77%, 1.24% and 3.04%, adjusted by the three-factor model, using the negotiability, the quantity of transactions, and the volume negotiated such as proxies for liquidity, respectively. A premium stronger than the return not adjusted to risk is observed.

It is noticed that both CAPM and the three-factor model failed to explain the liquidity anomaly, since all intercepts and premiums revealed to be significant, regardless of the proxy used. Additionally, it is observed that the portfolios formed by less liquid shares have returns higher than the returns of the portfolios formed by more liquid shares, however they have lower risk, measured by the beta coefficient, suggesting a negative correlation between risk and return, contrary to what is expected according to the theory, ratifying, therefore, the inadequacy of the models in the explanation of the returns. The negative correlation between risk and return can be observed in the difference between the beta of the least liquid portfolio (5) and that of the most liquid portfolio (1). It is observed that the difference was negative and significant, whatever the proxy used. Therefore, there is evidence that the beta coefficient alone is not a good measure of risk, having in view that it does not capture the liquidity risk to which a security is exposed.

There is evidence, also, that both CAPM and the three-factor model are not adequate in the explanation of the returns of less liquid portfolios, when using the negotiability and the negotiated volume as proxies (Tables 6 and 8), pursuant to test *F*, which did not reveal to be significant.

However the three-factor model has better performance in the explanation of the returns than CAPM, since, when adding the size factor and BM factor, the adjusted determination coefficient increases in all portfolios.

Table 6 - Returns adjusted to CAPM and to the three factors model of portfolios sorted by negotiability

	1	2	3	4	5	5-1
			CAPM			
a	0.0412	0.0407	0.0456	0.0435	0.0690	0.0278
p Value (*a*)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0307
b	0.2743	0.2524	0.2559	0.2380	0.0843	-0.1900
p Value (*b*)	0.0000	0.0000	0.0000	0.0000	0.2309	0.0216
R^2adjust	0.1769	0.2339	0.2654	0.2754	-	-
Test F	0.0000	0.0000	0.0000	0.0000	0.2624	-
JB	0.0000	0.0000	0.0000	0.2060	-	-
Schwarz	-1.9311	-2.4482	-2.5854	-2.7799	-	-
Akaike	-1,9811	-2,4840	-2.6266	-2,8211	-	-
			3 Factors			
a	0.0464	0.0436	0.0493	0.0473	0.0742	0.0277
p Value (*a*)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0358
b	0.2394	0.2361	0.2499	0.2349	0.0801	-0.1593
p Value (*b*)	0.0000	0.0000	0.0000	0.0000	0.2882	0.0396
s	-0.9170	-0.4088	-0.0227	0.0750	0.1047	1.0217
p Value (*s*)	0.0000	0.0055	0.8510	0.5222	0.4647	0.0000
h	0.1625	0.0897	0.1240	0.1269	0.1742	0.0118
p Value (*h*)	0.3294	0.5466	0.2889	0.1351	0.3215	0.9498
R^2adjust	0.4793	0.3233	0.2673	0.2798	-	-
Test F	0.0000	0.0000	0.0000	0.0000	0.5268	-
JB	0.0000	0.0000	0.0012	0.1193	-	-
Schwarz	-2.3428	-2.5174	-2.5332	-2.7311	-	-
Akaike	-2.4253	-2.5999	-2.6157	-2.8136	-	-

Standard-Errors estimated with Newey-West correction with 4 lags.
In order to detect the presence of multicollinearity, FIV (*variance inflation factor*) and tolerance tests were used. A FIV of 0.974 and 0.961 and tolerance of 1.027 and 1.041 were obtained, for the variables market and size, of the three-factor model, concluding for the inexistence of collinearity.

Table 7 - Returns adjusted to CAPM and to the three-factor model of portfolios sorted by quantity of transactions

	1	2	3	4	5	5-1
			CAPM			
A	0,0403	0,0436	0,0405	0,0453	0,0581	0,0177
p Value (*a*)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0175
B	0.2711	0.2717	0.2769	0.2235	0.1048	-0.1663
p Value (*b*)	0.0000	0.0000	0.0000	0.0000	0.0192	0.0084
R^2adjust	0.1672	0.2428	0.2440	0.2359	0.0418	-
Test F	0.0000	0.0000	0.0000	0.0000	0.0080	-
JB	0.0000	0.0000	0.0000	0.7304	0.0000	-
Schwarz	-1.8974	-2.3487	-2.3169	-2.7016	-2.3855	-
Akaike	-1.9386	-2.3899	-2.3582	-2.7429	-2.4268	-
			3 Factors			
A	0.0465	0.0462	0.0426	0.0498	0.0589	0.0124
p Value (*a*)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0812
B	0.2344	0.2535	0.2682	0.2185	0.1059	-0.1285
p Value (*b*)	0.0000	0.0000	0.0000	0.0000	0.0318	0.0023
S	-0.9309	-0.4853	-0.1904	0.0420	0.0797	1.0106
p Value (*s*)	0.0000	0.0040	0.2466	0.7069	0.5132	0.0000
H	0.1952	0.0797	0.0687	0.1502	0.0309	-0.1643
p Value (*h*)	0.2459	0.6355	0.6860	0.0637	0.7610	0.1056
R^2adjust	0.4784	0.3524	0.2549	0.2435	0.0319	-
Test F	0.0000	0.0000	0.0000	0.0000	0.0568	-
JB	0.0000	0.0000	0.0000	0.7944	0.0000	-
Schwarz	-2.3104	-2.4502	-2.2766	-2.6658	-2.3204	-
Akaike	-2.3929	-2.5327	-2.3591	-2.8393	-2.4029	-

Standard-Errors estimated with Newey-West correction with 4 lags.

Table 8 - Returns adjusted to CAPM and to the three-factor model of portfolios sorted by negotiated volume

	1	2	3	4	5	5-1
			CAPM			
A	0.0411	0.0401	0.0478	0.0458	0.0667	0.0256
P value (*a*)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0710
B	0.2766	0.2491	0.2432	0.2193	0.1117	-0.1649
P value (*b*)	0.0000	0.0000	0.0000	0.0000	0.1385	0.0698
R^2adjust	0.1843	0.2534	0.2489	0.2009	-	-
Test F	0.0000	0.0000	0.0000	0.0000	0.1877	-
JB	0.0000	0.0000	0.0000	0.3664	-	-
Schwarz	-1.9713	-2.5777	-2.6024	-2.5402	-	-
Akaike	-2.0125	-2.6189	-2.6436	-2.5814	-	-
			3 Factors			
A	0.0458	0.0440	0.0526	0.0492	0.0762	0.0304
P value (*a*)	0.0000	0.0000	0.0000	0.0000	0.0002	0.0392
B	0.2424	0.2346	0.2365	0.2134	0.1028	-0.1396

P value (*b*)	0.0000	0.0000	0.0000	0.0000	0.2134	0.1050
S	-0.9217	-0.2980	0.0075	-0.0315	0.1507	1.0723
P value (*s*)	0.0000	0.0306	0.9498	0.8247	0.3246	0.0000
H	0.1435	0.1283	0.1630	0.1162	0.3210	0.1775
P value (*h*)	0.3953	0.3889	0.1405	0.2806	0.1116	0.3957
R^2adjust	0.4913	0.3163	0.2582	0.2016	-	-
Test F	0.0000	0.0000	0.0000	0.0000	0.2393	-
JB	0.0000	0.0170	0.0000	0.4431	-	-
Schwarz	-2.3886	-2.6109	-2.5600	-2.4861	-	-
Akaike	-2.4711	-2.6934	-2.6425	2.5686	-	-

Standard-Errors estimated with Newey-West correction with 4 lags.

5 CONCLUSIONS

The assets pricing theory suggests that the expected return of an asset increases with its risk level, because investors averse to risk require a compensation to accept more risk. Since investors are also averse to illiquidity cost and want to be rewarded for facing it, the expected return of an asset is an increasing function of the illiquidity. Accordingly, the purpose of this article is to analyze whether the liquidity effect exists in the Brazilian stock market. In addition to analyzing the liquidity effect, this article evaluated the capacity of CAPM and of the Fama-French three-factor model (1993) in explaining it.

According to the results obtained, it can be concluded that a liquidity premium exists in the Brazilian market, regardless of the proxy used. Said premium varied from 0.83% to 2.19%, not adjusted to risk, and from 1.77% to 2.78%, adjusted to risk pursuant to CAPM, and from 1.24% to 3.04%, adjusted to risk pursuant to the three-factor model, respectively. It was also observed that the liquidity premium was not restricted to the month of January, and there were no substantial modifications, when using different periods in the analysis. In light of such evidence, the hypothesis of this article, that there is a liquidity premium in the Brazilian market, cannot be rejected. Moreover, it was evidenced that both CAPM and the three-factor model failed to explain the liquidity effect.

The results obtained in this study can instigate the establishment of corporate policies which alleviate the liquidity costs, i.e., which improve the liquidity of the securities negotiated, reducing, as a result, the capital cost. This way, a company can increase its market value, by improving the liquidity of its securities and shares, since the lower the capital cost, the greater the value of the company.

It should be emphasized that this research was restricted to the companies organized in the form of a publicly held corporation, with shares traded in the São Paulo

Stock Exchange - Bovespa, in the period from June 1, 1995 to June 30, 2008. Accordingly, the conclusions obtained are restricted to the sample used.

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