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VENDA A DESCOBERTO E INFORMAÇÃO PRIVILEGIADA
SHORT SELLING AND INSIDE INFORMATION

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SHORT SELLING AND INSIDE INFORMATION**

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RESUMO

Usando-se de dados relativos à totalidade dos contratos de empréstimos de ações no mercado brasileiro de 2009 a 2011, este trabalho responde às seguintes questões: i) vendedores a descoberto são mais informados no Brasil?, ii) quais desses vendedores a descoberto são informados?, e iii) como eles são informados? A resposta para a primeira pergunta é positiva: o investidor médio brasileiro é informado. Dentre esses, vendedores a descoberto individuais são tão informados quanto aqueles institucionais. Para responder a terceira pergunta, nossa abordagem é a de observar como a venda a descoberto se comporta ao redor de dias onde notícias corporativas são reveladas. Este trabalho mostra que fundos institucionais são mais informados logo depois da divulgação da notícia, um indicativo que estes investidores vendem a descoberto após processar notícias. Por outro lado, investidores individuais aumentam a venda a descoberto antes de notícias ruins, e diminuem antes de notícias boas.

ABSTRACT

Using data on all lending deals in the Brazilian stock market from 2009 to 2011, we provide answers to the following questions: i) are short-sellers informed in Brazil?, ii) which short sellers are informed?, and iii) how are they informed? The answer to the first question is positive, the average Brazilian short-seller is informed. Among these short-sellers, individual investors appear to be as informed as investment funds. To provide an answer to the third question, the approach is to observe how short-selling behaves around days when relevant corporate news is disclosed. This paper shows that funds are more informed just after the disclosure of news, an indication that these investors decide their short-selling operations after processing the news. On the other hand, individual investors increase short-selling prior to bad news and decrease short-selling prior to good news. This last result could be a sign of information leakages from insiders.

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1 Introduction

The objective of this paper is twofold. First, I ask whether and which short-sellers are informed. Second, the paper questions what are the sources of this information: do these investors process public information or do they trade on private information? While the former explanation is probably related to a superior investors' skill in interpreting news, the latter may be related to insider trading and information leakages to outsiders, since investors anticipate the content of yet unreleased public information. To do so, I employ a unique dataset containing the totality of Brazilian stock loan deals from January 2009 to June 2011.¹ By itself, this is a clear improvement on the literature that only have access to partial data from either brokerage firms or the U.S. stock markets (NYSE and NASDAQ). If this does not suffice, the dataset also differentiates stock borrowers into specific groups: individuals, institutions, foreigners, among others. I am able, therefore, to compare the information content of each group of short-sellers. To my knowledge, only one paper could do the same using U.S. data (BOEHMER; JONES; ZHANG, 2008).

The main conclusion of this study is that stock borrowers are informed, since a higher than usual short-selling for a specific stock predicts poor future returns for this same stock. This result is not a surprise considering previous literature on the matter. However, I also find that individuals and institutions (i.e. investment funds) are similar informed. That individuals' short selling can predict future returns in a similar magnitude as institutions is quite startling and unprecedented. When analyzing the causes of this superior information, I find that institutions appear to operate in the market on public information. On the other hand, individuals seem to know ex-ante the sign of a yet unreleased news. Interestingly, foreign investors also increase (decrease) short-selling prior to bad (good) news even though in regular days they are not informed. Contrary to this paper's results, empirical evidence in the U.S. short-selling market supports the reaction hypothesis, while evidence of anticipation is less robust.

The existence of informed outsiders, i.e., those who get information from insiders, may have serious consequences for the financial market. Although the classic view states that insider trading does help prices to become informative (MANNE, 1966), recent evidence, however, does not espouse this idea. Market efficiency may, in fact, decrease since information leakages may curb uninformed outsiders from acquiring information (FISHMAN; HAGERTY, 1992), and their investment might even reduce as consequence of the loss of confidence in the market (AUSUBEL, 1991). For these reasons, the presence of illegal in-

¹Note that investors may borrow stocks for several reasons, such as to escape taxes, to hedge their positions, to have voting rights on shareholders meetings or to short-sell. This paper focuses on the short-selling as being the major factor explaining why an investor borrow a stock.

sider trading should not be desirable for regulators. That most countries possess insider trading laws is a proof of this fact. However, according to Bhattacharya and Daouk (2002), laws alone are not a sufficient condition to curb this behavior. In addition to that, there must be law enforcement in the sense of convictions and fair punishments to those who break the law.

The rest of this dissertation is organized as follows. In chapter 2, I present a literature review on the informational advantage of short-sellers and its possible causes. In chapter 3, I explain the Brazilian stock loan market highlighting some peculiarities that allows us to use such rich data for the estimations. In chapter 4, I present the empirical approach, as well as discuss some results. Finally, in chapter 5, I conclude.

2 Literature Review

There appear to be a consensus in the literature that short sellers are, on average, informed traders. An informed trader is able to predict firms' future valuations so as to profit from this operation. In this sense, short sellers that targets overvalued firms, with low future expected returns, are considered informed.² Diether, Lee and Werner (2008), for instance, provide evidence that short-sellers correct positive market overreactions by trading after positive returns and, at the same time, by predicting lower future returns. Another piece of evidence is presented by Boehmer, Jones and Zhang (2008), who find that the risk-adjusted returns of heavily shorted stocks are 1.16% lower than lightly shorted stocks over the following 20 days. As we, Boehmer, Jones and Zhang (2008) are able to differentiate among different types of short sellers and they find that institutional investors are informed, while individual investors are not.

The causes of short sellers superior information, on the other hand, are not clear in the literature. There are two possible sources of information: (i) short-sellers may be good public information processors³, i.e., the *reaction hypothesis*, or (ii) they may have private information which enable them to trade prior to the disclosure of public news, i.e., the *anticipation hypothesis*. While (i) means that higher short selling predicts even lower future returns in periods after news announcements, (ii) means that short-sellers appear to profit from news that were not yet disclosed, leading to suspicions of inside information. Note that these two sources of information are seen in the literature as alternatives. When public information is released, the asymmetry of information among investors is reduced (KORAJCZYK; LUCAS; MCDONALD, 1991), which undermines the advantage of informed in relation to uninformed traders. This, if short-sellers possess private information, their profitability in days of announcements would be lower. On the other hand, if short-sellers are good information processors, profitability in these days would be enhanced.

Recent empirical evidence for the U.S. stock market gives a solid support to the *reaction hypothesis*. For instance, Wu and Zhang (2013) find out that short-sellers appear to trade by observing and reacting to market anomalies that explain future returns, such as momentum, accruals and earning surprises. In fact, when the authors control for these anomalies, short-selling is no longer a predictor of future returns, exhausting the source of short-sellers

²Even though short selling is overall informed, there may be also uninformed short selling. Uninformed trading here means selling short for other reasons than about information and expectations regarding a firm stock price. For instance, short selling might have hedging motives. Hedge funds relies on borrowing and shorting stocks in their "long-short" strategies (D'AVOLIO, 2002).

³In fact, Rubinstein (1993) and Kandel and Pearson (1995) present evidence that investors interpret release public information differently and that this leads to a higher divergence of opinion in these days. Therefore, one theory states that short sellers not only interpret news differently, but they also interpret them better than other investors.

information. Additionally, Engelberg, Reed and Ringgenberg (2012) test both the anticipation and better processing of information hypotheses using all corporate news released to the public and they find evidence that short-sellers do interpret public information, but they do not seem to anticipate news events. One issue with this paper, however, is that by considering all types of news, it takes into account even those news that are not surprises to the market. For instance, if the average investor already knows the content of a negative news, prices at the day of announcement will not fall much because of the release (BEAVER, 1968) and, consequently, the increase in short selling prior to the announcement will not be profitable.

Regarding the *anticipation hypothesis*, evidence is much less robust. As I have already said, Engelberg, Reed and Ringgenberg (2012) dismiss the anticipation hypothesis for the U.S. market using a wide range of corporate news. Other evidences vary according to the type of news considered. For instance, Christophe, Ferri and Hsieh (2010) find higher abnormal short selling before the announcement of analyst rating downgrades using data on NASDAQ-listed stocks between 2000 and 2001. One explanation for these results might be analysts tipping off investors of their recommendation prior of disclosure. Blau and Wade (2012) confirm that short-selling increases prior to analyst downgrades in the years of 2005 and 2006. However, the same appears to occur with analyst upgrades, which leads to the conclusion that short-sellers do not seem to anticipate news events at all. Using earning announcements, results are also doubtful: some papers find that short-sellers anticipate these news (CHRISTOPHE; FERRI; ANGEL, 2004; BOEHMER; JONES; ZHANG, 2012), while other papers do not concur with this idea (DASKE; RICHARDSON; TUNA, 2005; BLAU; PINEGAR, 2012). Short-sellers appear to anticipate frauds and misrepresentation of balance sheets (DESAI; KRISHNAMURTHY; VENKATARAMAN, 2006; KARPOFF; LOU, 2010). The same is true for insider sales (CHAKRABARTY; SHKILKO, 2013).

3 The Brazilian Stock Loan Market

The paper's data set contains all lending deals from January 5th of 2009 to June 29th of 2011 traded in the Brazilian stock market (BM&F Bovespa) lending system, called BTC. As a result of the regulatory system,⁴ the Brazilian lending market is centralized, and all lending deals must be cleared and registered on the BTC system. Thus, the data set provides us with a complete picture of lending activities for the whole market on a daily frequency. Finally, it also allows us to identify the daily amount of shares borrowed by each investors' type, i.e., whether shares were borrowed by individuals, funds (mutual and hedge funds), foreigners or others (mainly commercial banks and pension funds). Funds are responsible for 38.6% of the stock borrowing deals on the database, individuals 30%, foreigners 16.4% and others 15%.

Apart from providing a unique perspective, the data set is also representative of an important lending market. The Brazilian stock lending market has become increasingly strong over the last 10 years. Lending securities currently is a common practice among Brazilian market participants. In 2011, more than U.S.\$ 400 billion in stocks were lent in more than 1.4 million deals, representing about one-third of market capitalization of about U.S.\$ 1.2 trillion.

The lending system in Brazil works as follows. The BM&F Bovespa provides a platform where brokers can register offers from their clients directly through the BTC electronic system. Lenders place shares for loan directly into the system, where borrowers can electronically hit the offers. Even though it is also possible for borrowers to place loan bids into the system, this is not usual. More than 99% of the offers placed into BTC come from lenders. Securities lending can also arise from over-the-counter deals, which according to Brazilian regulation, must also be cleared by BM&F Bovespa. In either case, electronic and over-the-counter deals, the BTC registers the information for every deal. As a result, the BTC data set contains historical (order by order) information on the entire securities lending market in Brazil on a daily frequency.

Using the complete data set on lending transactions, this paper constructs variables that measure short-selling activity. By doing so, I implicitly assume that short-selling is the major factor explaining why an investor borrows a stock. Investors, however, may borrow a stock for other reasons than short-selling. They may borrow to have voting rights on shareholders

⁴Based on determinations by the Brazilian Securities Commission (CVM) and by the Brazilian Monetary Council (CMN).

meetings,⁵ or to fulfill an obligation to deliver a security to settle another transaction.⁶ During the term of the contract, as the borrower is regarded by the stock issuer as the effective shareholder, it will be the recipient of all corporate events. However, in this case, the borrower is obliged to reimburse the lender the proceeds of corporate events.⁷

The Brazilian tax legislation gives rise to another strategy that involves borrowing stocks for a different reason than short-selling.⁸ As different investors have different income tax deductions, an opportunity for profit arises on cash-payouts events. Suppose the owner of the stock is a foreign investor that decides to lend the stock to collect the loan fee. On the other side of the deal, a Brazilian financial institution borrows the stock, paying the agreed fee. If during the term of the loan contract the stock issuer announces dividends payouts, it will credit the borrowers account, and income tax will be deducted according to the borrower's tax status. In this case, there will be no tax deduction, as financial institutions are exempt. Since the actual owner of the stock is the lender, the BTC system then puts a hold on the borrower's account on the amount due to the lender, deducting the income tax due to the lender. As the lender is a foreign investor, the income tax deduction will be 15%. Therefore, the borrower's profit will be the difference between the 15% of the cash dividends minus the loans fees. I do not consider in the analysis the week (5 trading days) prior to the ex-date of dividends.

There is still another aspect of the data that needs to be addressed in order to improve the short-selling activity proxies. Since I am working with equilibrium variables, the activity on the BTC market is a response to both borrowers and lenders demands and supplies. As I am interested in analyzing if short-sellers are informed and can predict future price declines,

⁵On the other side of the deal, the lender of the equity is entitled to dividends and other payments made during the term of the loan agreement, including bonuses and consolidations.

⁶Stocks can also be lent automatically by the Automatic Loan Service (ALS). Whenever an investor sells a stock it doesn't have on portfolio at the time of settlement, the ALS locates shares on the BTC System and a loan agreement is automatically generated on behalf of the seller. The buyer receives the securities and the seller is registered as a borrower, paying stipulated fee.

⁷This process of reimbursements is performed by the BM&F Bovespa clearing house, and works as follows. In the case of cash payouts, such as dividends, interest and yields, the clearing house creates a credit provision in favor of the lender, retaining the tax due according to the lender's tax condition. The provision is created on the day of the announcement, and additional collateral is required by the borrower. On the payment date, the cash payment is debited from the borrowers account in favor of the lender's; borrower's collateral is then released. On the event of stock dividends, consolidations and splits, the clearing house adjusts the quantity of shares accordingly, maintaining the financial volume of the contract unchanged. Finally, on the case of shares subscriptions, the clearing hose allows the borrower to give the subscription rights back to the lender, but this is not enforced. If subscription rights are not given back, the lender an still buy the stock at the market price, and price difference with the issued price is covered by the borrowed.

⁸According to Federal law 11,033 of 12/21/2004, income taxes are differ for different investors. If the lender is an individual investor or an institution, income taxes are 22,5%, 20%, 17,5% or 15%, if the length of the loan contracts is, respectively, 6 months or less, between 6 months and 12 months, between 12 months and 24 months, or above 24 months. If the investor is a foreign individual or institution, income tax is 15%. However, if the investor is a financial institutions, there is no income tax.

one needs to identify demand shifts – the borrowers activity – from supply shifts.

The literature that investigates short-sellers activity from short-selling equilibrium data has proposed some ways to separate demand shifts from supply shifts. Looking at combinations of positive and negative changes in prices and quantities, Cohen, Diether and Malloy (2007) propose an identification that reveals weeks in which a out-wards or in-wards supply or demand shifts were predominant. In another paper using the same data set, but with a different set of stock equities, De-Losso, Genaro and Giovannetti (2013) are able to clearly identify demand shifts as, for the stocks they consider, they can control for supply shifts using points they observe on the supply curve.

In this paper, I will follow most papers in this literature, and assume that the supply curve is flatter than the demand curve and that changes in the quantities of equilibrium are a result of demand shifts. I will, however, avoid situations where supply constraints may be binding. Stocks may have zero short-selling because of binding lending supply and not because stock borrowers are optimistic about future returns of this stock, but because of well-known restrictions in the short-selling market (MILLER, 1977; JONES; LAMONT, 2002). As De-Losso, Genaro and Giovannetti (2013) have pointed out for the data set, such constraint occur sometimes with significant effects on asset returns. Thus, in order to avoid working with illiquid stocks, I restrict the database to stocks that are lent every week, totalizing 62 stocks. I also drop from the data set deals with loan fees higher than 10%. Such high-loan fee deals amounts to only 5% of the data set.

We match the loans data with the Economática dataset. This dataset provides information on historical stock equity prices (adjusted by splits, inplits, and dividend payouts); shares outstanding, trading volume and book-value. Additionally, risk-factors to adjust returns are taken from Brazilian Financial Studies Lab (NEFIN). In the centers' webpage, there is a detailed description on how the factors were computed for the Brazilian case.⁹

Table 1 Panel A shows the cross-section statistics of the time-series averages by ticker (62 in total). First, note that only the largest stocks were considered. The average size, measured by market capitalization, is on average US\$ 13.3 billions with the lowest US\$ 150.99 millions and the largest R\$ 152.1 billions.¹⁰ The stocks in the data set show great dispersion on the daily trading volume spectrum. The average volume is US\$ 38,3 millions with the smallest being US\$ 15 thousand and the largest US\$ 1.387.9 billion. The average daily raw return is 0.08% and the average daily standard deviation across stocks is 1.81%.

⁹Available at the NEFIN webpage on <http://www.fipe.org.br/>

¹⁰Market capitalization is calculated as the number of outstanding shares for the stock times its unadjusted price. We present this variable in US dollars in order to facilitate the comparison with the US equity market. We, however, employ these variables in Brazilian Reais in our estimations. In this period, 1 dollar corresponds to 1.80 Brazilian reais.

Table 1 Panel B presents some statistics of the short selling proxy, shorting flow, the number of deals closed per day of each stock, and the loan fee charged. This paper employs the shorting flow variable, calculated as the ratio between the amount of shares lent and shares outstanding. Recent papers also focus on this proxy (DIETHER; LEE; WERNER, 2008; CHRISTOPHE; FERRI; ANGEL, 2004; CHRISTOPHE; FERRI; HSIEH, 2010; BOEHMER; JONES; ZHANG, 2012). On average per day and stock, 0.08% of the shares outstanding are lent and 33.63 lending deals are closed. Note that this market is significantly smaller if compared with the U.S.. Boehmer, Jones and Zhang (2008) shows that between 2000 and 2004, the number of trades per day and per stock equals 145. Institutional investors have the greatest participation in this ratio, since they alone borrow around 0.036% of the shares outstanding every day, while individuals trade only 0.005%. The average loan fee for all investors is 2.686%, being individual those who seem to pay a higher loan fee, on average.

Table 1: Descriptive Statistics

This table presents summary statistics on some stock specific variables in our database (Panel A) and on short selling proxies for each stock (Panel B). We present summary statistics on market capitalization and trading volume by converting these variables from Brazilian Reais (BRL) to US dollars (USD) using a daily average exchange rate. We divide short selling for all investors, and also for their subgroups, i.e.: institutional, individual, foreign and other investors. Stock lending refers to the ratio of shares lent to shares outstanding of stock i at day t (in %). Number of Deals equals the number loan deals closed at day t for each stock i . Loan Fee is the fee accorded between borrower and lender.

Variable	Mean	Std. Dev.	Min.	25%	50%	75%	Max.
Panel A: Stock Equities Statistics							
Market Cap. (in USD mil)	13,275	21,721	150.99	2,317	4,761.4	12,350.3	152,131
Trading Volume (in USD mil)	38.29	75.79	0.015	5.71	13.87	36.34	1,387.9
Raw Returns (in %)	0.85	2.273	-24.36	-1.196	0	1.292	14.980
Std. Dev. of Raw Returns (in %)	1.817	0.512	0.842	1.474	1.699	2.060	4.560
Risk Adj. Returns (in %)	0.003	1.802	-24.520	-1.018	-0.047	0.972	14.000
Std. Dev. of Risk Adj. Returns (in %)	1.734	0.461	0.918	1.422	1.623	1.951	4.114
Panel B: Stock Borrowing Statistics by Investor's Type							
All deals							
Stock Lending (in %)	0.078	0.134	0	0.010	0.035	0.094	6.20
Number of Deals	33.63	39.59	0	8	21	45	582
Loan Fee (in %)	2.686	2.220	0	0.925	1.997	3.823	10
Institutional borrowers							
Stock Lending (in %)	0.036	0.080	0	0.002	0.012	0.038	6.140
Number of Deals	12.600	15.841	0	3	8	17	360
Loan Fee (in %) ^a	2.346	2.273	0	0.519	1.753	3.500	10
Individual borrowers							
Stock Lending (in %)	0.005	0.013	0	0.000	0.001	0.004	0.756
Number of Deals	10.776	20.283	0	1	3	12	433
Loan Fee (in %) ^a	2.812	2.272	0	0.963	2.159	4	10
Foreign borrowers							
Stock Lending (in %)	0.024	0.054	0	0.000	0.004	0.022	1.617
Number of Deals	5.148	8.600	0	1	2	6	132
Loan Fee (in %) ^a	2.519	2.293	0	0.700	1.750	3.640	10
Other borrowers							
Stock Lending (in %)	0.014	0.060	0	0	0.002	0.010	4.6251
Number of Deals	4.965	7.401	0	0	2	6	165
Loan Fee (in %) ^a	2.213	2.079	0	0.663	1.476	3.125	10
Number of Stocks: 62		Days: 637			Obs: 36,963		

^a: Conditional on having at least one stock borrowing deal closed.

4 Empirical Results

In this section, I explain the methodology and present the results to answer two questions: (i) whether and which stock borrowers are informed; (ii) where does this information come from: (a) the processing of public information and/or (b) the anticipation of news events. Question (i) analyzes whether abnormal short selling activity is related to lower future returns. Then, question (ii) accesses the short-selling pattern around news events, more specifically “relevant facts”.

We take data regarding this news category from the BOVESPA’s BDI (*Boletim Diario da BOVESPA*), which is released in the end of each session and present detailed information regarding the trading day, such as prices, dividends and the information disclosed to the public in this trading day, as well. News that are disclosed in holidays, Saturdays, Sundays and after the business hours are assumed to be disclosed on the next trading day. I also take into account the legal hour usually between November and February of the next year that changes the closing hour of the Brazilian stock market from 17 PM to 18 PM.

We choose to work with relevant facts, because, according to Instruction 358 of the CVM, these are news that have significant impacts on security prices or on the investor’s decision to trade these securities.¹¹ In fact, Table 2 shows that on days with relevant facts releases, there is an increase on returns’ volatility, measured as the absolute stock return. In fact, days with news announcements increases return volatility by 0.245 p.p., which is an increase of approximately 15% of the volatility on non-announcement periods (which equals the coefficient of the constant in the model).¹² Note also that this effect appear to spillover to the next day as well (significant at 10%). Volume increases significantly from $t - 1$ to $t + 2$, where t is the date of announcement.

According to the literature on the information content of news events, an increased price volatility usually means a change in agents’ expectations of future returns, i.e. a surprise to the market. However, investors differ in their interpretation of news. Until a consensus is reached, increased trading volume would be observed, which may even after the price

¹¹According to this instruction relevant facts are defined as:

“Art.1 (...) any decisions by majority shareholders, general shareholders’ meetings, or by officers of publicly-held companies, as well as any other acts or facts of a political-administrative, technical, business or financial nature related to the relevant business that may significantly influence:

I –the market price of the securities issued by the relevant corporation or backed on them;

II –investors’ decisions as to buy, sell, or preserve those securities;

III –investors’ decision as to exercise any rights inherent to titleholders of securities issued by the by the relevant corporation or backed on them.”

The instruction is available on the CVM website: http://www.cvm.gov.br/ingl/regu/cvm_358.ASP

¹²In the case of a fixed effects regression, the statistical program employed in this study report the constant as the average of the fixed effects.

volatility returns to its normal value (BEAVER, 1968).¹³

Table 2: The impact of Relevant Facts on stocks returns' volatility

This table shows the results of panel regressions of the absolute risk-adjusted stock returns for stock i and at day t ($|R_{it}|$), squared risk-adjusted returns (R_{it}^2) and standardized volume (Std Vol $_{it}$) against a dummy (News Event $_{it}$) equal to one if at least one relevant fact is disclosed in day t . We vary the timing of the dependent variables from $t-2$ to $t+2$. Returns, measured in %, are risk-adjusted by the three Fama-French risk factors. Std Vol $_{it}$ equals the volume standardized within each stock, i.e., $\text{Std Vol}_{it} = \frac{\text{Volume}_{it} - \overline{\text{Volume}_i}}{\sigma_i(\text{Volume}_{it})}$.

	(1)	(2)	(3)	(4)	(5)
	$ R_{it-2} $	$ R_{it-1} $	$ R_{i,t} $	$ R_{i,t+1} $	$ R_{i,t+2} $
News Event $_{it}$	0.002 (0.964)	0.032 (0.603)	0.245*** (0.009)	0.112* (0.081)	0.050 (0.222)
Constant	1.671*** (0.000)	1.670*** (0.000)	1.666*** (0.000)	1.665*** (0.000)	1.664*** (0.000)
	R_{it-2}^2	R_{it-1}^2	$R_{i,t}^2$	$R_{i,t+1}^2$	$R_{i,t+2}^2$
News Event $_{it}$	0.156 (0.694)	-0.118 (0.804)	2.006*** (0.007)	0.603 (0.212)	0.346 (0.299)
Constant	5.169*** (0.000)	5.171*** (0.000)	5.140*** (0.000)	5.139*** (0.000)	5.127*** (0.000)
	Std $_i$ Vol $_{it-2}$	Std $_i$ Vol $_{it-1}$	Std $_i$ Vol $_{i,t}$	Std $_i$ Vol $_{i,t+1}$	Std $_i$ Vol $_{i,t+2}$
News Event $_{it}$	0.080 (0.132)	0.130** (0.030)	0.328*** (0.000)	0.133** (0.014)	0.099* (0.054)
Constant	-0.003** (0.017)	-0.003*** (0.008)	-0.007*** (0.000)	-0.001 (0.577)	0.001 (0.474)
Observations	36,839	36,901	36,963	36,901	36,839
N. of Stocks	62	62	62	62	62

4.1 Are Stock borrowers Informed Traders?

My first question is basically whether stock borrowers target overvalued firms by increasing (reducing) their demand for loan contracts when future expected returns are low

¹³Price volatility and trading volume, however, might be positively correlated (KARPOFF, 1987; HARRIS; RAVIV, 1993). This may make it harder for separating market surprise and differences of opinion as explanations for these two variables.

(high). The only way a short seller would profit from this strategy is if the future price drop is sufficient to compensate for the taxes it pay to the stock owner. Therefore, another interpretation to this question is whether the short-seller profit from its operations.¹⁴

In addition to analyzing stock borrowers as a whole, I also want to know which group is more informed. I am able to divide investors into funds, individuals, foreigners and others. The disaggregation of investors into groups enrich this paper's analysis, because it allows us to compare the results from each group. To my knowledge, only one paper, Boehmer, Jones and Zhang (2008) was able to divide investors by their type. These authors find that institutional investors are informed, while individuals are not.

Since this paper proposes to test whether short-selling and future returns are negatively correlated, the empirical model is as follows:

$$(1) \quad \begin{aligned} R_{i;w+1:w+k} &= \beta_0 i + \beta_1 Lending_{iw} + \beta_2 LoanFee_{iw} + \gamma_1 R_{i,w-1} + \gamma_2 R_{i,w-2} \\ &+ \text{Week Dummies}_w + \varepsilon_{wt} \end{aligned}$$

where $R_{i;w+1:w+k}$ represents k -weeks ahead risk-adjusted returns ($k= 1, 2$), and $Lending_{iw}$ is a short selling proxy for stock i and week w . I employ the Loan Fee to control for the difficulty in shorting the stock in a specific period. I also include the lagged returns (R_{iw-1} and R_{iw-2}) to control for the response of stock borrowers to past returns. Diether, Lee and Werner (2008) bring evidence that short-sellers appear to trade more after positive returns and, therefore, including these variables as controls might prove useful. Should one finds a negative coefficient for Lending, i.e. $\beta_1 < 0$, then a greater (lower) short selling at week t predicts lower (greater) future returns. This means that stock borrowers are informed traders.

Table 3 shows how raw returns react to short short selling for all stock borrowers, and also divided by type: institutional, individual, foreign and other investors. I present the same regressions in Table 4, but employing Fama-French risk-adjusted returns. In both tables, I employ a standardized version of the stock borrowing variable. It is believed that this way one can better compare the results, since short selling differ in magnitudes and variability among these groups of investors. All regressions are estimated by fixed-effects and they also include week dummies.

In columns [1] and [2] of Tables 3 and 4, one can see evidence that stock borrowers are informed traders. The coefficients of Std. $Lending_{it}$ are all negative and only insignificant for 1 week-ahead returns. An increase in 1 std. dev. in the shares lent to shares outstanding ratio is related with an decrease of the 2-week ahead risk-adjusted returns in approximately 0.15%.

¹⁴Remember that this paper uses stock borrowing variables to proxy for short-selling. This question, therefore, can be reinterpreted as trying to answer whether the investor, on average, would profit if she sells short the borrowed stock.

This is not surprising given the overwhelming empirical evidence that these investors, in fact, know what they are doing.

When one looks to the results for different types of investors, one finds an intriguing result. Individuals investors are not only informed, which goes against Boehmer, Jones and Zhang (2008) results for the U.S. financial market, but they also appear to be as informed as institutional investors. On the other hand, foreigners and other investors do not appear to be informed, overall. On average, these investors may borrow stocks for other reasons than to short them, because if they sell short the stocks they borrow, they would not get any profit from it.

4.2 Do Stock borrowers Process Information Better?

Now that I have found that stock borrowers, especially institutional and individual investors, are informed traders, this paper moves on to answering whether this advantage comes from superior processing abilities of public disclosed news. One hypothesis is that stock borrowers are able to interpret public disclosed news efficiently by inferring their sign correctly and acting in the short-selling market accordingly. If this is the case, one expects that short selling may predict even lower future expected returns on news days with news events.

To test if short sellers derive their informational advantage from information processing, one must run the following regression:

$$(2) \quad \begin{aligned} R_{i,t+1:t+k} &= \beta_0 + \beta_1 Lending_{it} + \beta_2 Lending_{it} News_{i,t:t-2} + \beta_3 News_{i,t} \\ &+ \gamma_1 R_{i,t-1:t-5} + \gamma_2 R_{i,t-6:t-10} + \text{Week Dummies} + \varepsilon_{it} \end{aligned}$$

where $R_{i,t+1:t+k}$ represents k -days ahead risk-adjusted returns ($k = 5, 10$), $Lending_{it}$ is a short selling proxy, “ $News_{i,t:t-2}$ ” is a dummy variable equal to one if news are disclosed in day t , $t - 1$ or $t - 2$. As in equation (1), I include the one- and two-week lagged returns ($R_{i,t-1:t-5}$ and $R_{i,t-6:t-10}$) to control for the response of stock borrowers to past returns (DIETHER; LEE; WERNER, 2008)

A negative coefficient for the interaction between $Lending$ and “ $News$ ”, i.e. $\beta_2 < 0$, means that, in days soon after news announcements, short selling predicts even lower returns than in days without news announcements. To put it differently, the profitability of short selling increases when new information is released and the market is still digesting this information. On the other hand, $\beta_2 \geq 0$ means that profitability from selling short remains the same, or even decreases, in days with news announcements. Then, it might be that stock borrowers advantage comes from information asymmetry, that is temporarily solved in periods after public announcements. Next section will discuss how to test this alternative hypothesis.

Table 5 displays the results of whether stock borrowers, and their types, as well, are processors of “relevant facts” employing raw returns as the dependent variable. In Table 6, I present the same regressions, but employing risk-adjusted returns as the dependent variable.

One can see by the interaction between short selling and the news dummy in columns [1] and [2] in both Tables that future returns predictability is enhanced on days with relevant facts releases. Coefficients are significant at 10% level for both 1- and 2-week ahead returns. Note, also, that the coefficients are economically significant, since the relationship between lending and future returns is several times stronger on news announcement days. An increase in 1 std. dev. of $Lending_{it}$ decreases 1-week ahead returns in 0.205% on days soon after relevant facts disclosures. This seems to give some evidence to corroborate the hypothesis that stock borrowers can interpret news more efficiently and, thus, enhance their profits by operating in response to them.

When I divide the stock borrowing by different types of investors from column [3] to [10], one can conclude that both institutional and other borrowers are actually those that are leading the results. The coefficients are statistically significant and large in size with the exception of one-week ahead returns for the other borrowers’ specification. For individual and foreign borrowers, the same conclusion does not appear to hold. Even though the coefficients of the interactions are negative in columns [5] to [10], they are not statistically significant at a 10% level.

We can take from these results that public information processing, in this case relevant facts processing, explains the cause of why investment funds and banks are informed. This reason, however, does not appear to be the case of other investors, for instance, individuals. One idea is that short sellers may be good at interpreting other types of news, and not those that are considered relevant. Another explanation, however, is that there may be other sources of short-sellers information that are not public. Next section will present the results of whether these investors have private information, i.e., whether they can anticipate the content of yet unreleased news.

4.3 Do Stock borrowers Anticipate News?

Another reason for short sellers' being informed is the possessing of private information, which may enable them to even anticipate news content. The literature has pointed out some reasons why these investors might be able to "foresee" future news: (i) superior monitoring of the firm situation; (ii) inside information, i.e., the stock borrowers are people connected to the firm (insiders) or they are getting tips from insiders. The possibility of inside information by itself is worrisome and has implications for regulators.

The paper's empirical approach to test news anticipation is to analyze how short selling behaves around news disclosures through the following regression, conditional on t being a news announcement day:

$$(3) \quad \text{Std}_i \text{ Lending}_{i,t-k:t-1} = \beta_0 + \beta_1 R_{i,t:t+1} + \sum_{z=1}^p \gamma_z \text{Controls}_{z,it} + \varepsilon_{it}$$

where the dependent variable is standardized for each stock i , i.e.:

$$(4) \quad \text{Std}_i \text{ Lending}_{it} = \frac{\text{Lending}_{it} - E_i(\text{Lending}_{it})}{\sigma_i(\text{Lending}_{it})}$$

and then averaged for $t - k$ to $t - 1$ ($k = 10, 5, 2, 1$); and $\text{Controls}_{z,i,t}$ is a vector of control variables. I include past average returns ($\text{Ret}_{i,t-1:t-k}$), past turnover ($\text{TurnOver}_{i,t-1:t-k}$) defined as trading volume over market capitalization and 1-year price momentum.

We standardize the dependent variable within each stock so as to give the same weight to variations of stock borrowing. Otherwise, one would be giving too much weight to stocks with larger average stock-borrowing, while the interest is to know whether news are anticipated regardless of differences in the cross-sectional characteristics of stocks.

We assume that $R_{i,t:t+1}$ (the cumulated return on the day of announcement and the day after) reflects the quality of the news. The use of this variable is justified by the increased volatility on these two days, as seen in Table 2, which means that it takes two days for the market to not consider the average relevant fact a surprise anymore.

The hypothesis that short sellers do possess private information is confirmed if $\beta_1 < 0$, i.e., if abnormal short-selling increases (decreases) before a negative (positive) news. Tables 7 and 8 present the results. On average, it can be concluded that short-sellers also appear to anticipate the content of relevant facts. An decrease in 1% of the cumulated return on day t and $t + 1$ increases the average lending 10 days prior to the announcement in 2.2% of its standard deviation. When one does not add the control variables this effect is also significant and negative for the average lending in the 5 days prior to announcement..

Again, when I divide by investors type, one can see that the result appears to come from only a part of the investors. In this case, both individual and foreign investors anticipate news 10-days prior to disclosure, while institutions do not. Even though foreign investors are not overall informed (see section 4.1), they appear to be in the days prior to relevant facts announcements. Note that individual investors supposedly are not as qualified as institutions to acquire information and interpret news. In addition, relevant facts are news whose release dates are not predictable and information content is indeed relevant for the market. These arguments together give a stronger strengthen the evidence of the practice of inside information in the Brazilian stock loan market.

Some other considerations must be made regarding these results. First, it is probable that only a few individual investors have inside information, thus the results pointing to the direction of inside information might be underestimated. Second, information leakages are not likely to take place in all relevant facts disclosures, again underestimating the inside information. These two considerations might explain the apparently small coefficients of the variable $Ret_{i,t:t+1}$ in Tables 7 and 8.

Table 7: Do Short-Sellers Anticipate News Events? All Investors

This table presents the regression (conditional on t being a relevant fact announcement day) of the average short selling in the days prior to news announcement against the cumulated returns on the day t and the day after t . We standardize the short-selling proxy within each stock as in equation 4. We include uncontrolled and controlled specifications. The controls are: cumulated past returns; average past turnover, calculated as the ratio of trading volume to market capitalization; and 1-year price momentum.

Var. Dep.: $Std_i Lending_{i,t-k:t-1}$								
All deals								
VARIABLES	(1) k = 10	(2)	(3)	(4) k = 5	(5)	(6) k = 2	(7)	(8) k = 1
$Ret_{i,t:t+1}$	-0.022** (0.009)	-0.023** (0.009)	-0.019* (0.012)	-0.019 (0.012)	-0.009 (0.017)	-0.011 (0.017)	-0.005 (0.020)	-0.010 (0.020)
Constant	0.001 (0.019)	-0.795** (0.404)	0.018 (0.022)	-1.197** (0.468)	0.047 (0.029)	-1.843*** (0.670)	0.068* (0.036)	-1.805** (0.719)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	666	648	696	677	708	689	719	700
R-squared	0.007	0.035	0.004	0.023	0.001	0.020	0.000	0.019

Robust Standard-Errors in parentheses

**** p<0.01, ** p<0.05, * p<0.1

Table 8: Do Short-Sellers Anticipate News Events? Investors disaggregated by type 22

This table presents the regression (conditional on t being a relevant fact announcement day) of the average short selling in the days prior to news announcement against the cumulated returns on the day t and the day after t . We standardize the short-selling proxy within each stock as in equation 4. We include uncontrolled and controlled specifications. The controls are: cumulated past returns; average past turnover, calculated as the ratio of trading volume to market capitalization; and 1-year price momentum.

Var. Dep.: Std _{<i>i</i>} Lending _{<i>i,t-k:t-1</i>}								
Institutional borrowers								
VARIABLES	(1) k = 10	(2)	(3)	(4) k = 5	(5)	(6) k = 2	(7)	(8) k = 1
Ret _{<i>i,t:t+1</i>}	-0.013 (0.010)	-0.014 (0.011)	-0.014 (0.014)	-0.014 (0.014)	0.002 (0.020)	0.000 (0.020)	0.011 (0.030)	0.002 (0.029)
Constant	0.030 (0.019)	-0.300 (0.412)	0.047** (0.023)	-0.618 (0.498)	0.086** (0.033)	-1.450** (0.714)	0.115** (0.046)	-1.152 (0.792)
R-squared	0.003	0.010	0.002	0.008	0.000	0.012	0.000	0.010
Individual borrowers								
VARIABLES	(1) k = 10	(2)	(3)	(4) k = 5	(5)	(6) k = 2	(7)	(8) k = 1
Ret _{<i>i,t:t+1</i>}	-0.017** (0.008)	-0.016* (0.009)	-0.021** (0.010)	-0.021** (0.011)	-0.006 (0.014)	-0.009 (0.014)	0.002 (0.014)	-0.004 (0.013)
Constant	-0.013 (0.019)	-0.924** (0.376)	-0.016 (0.020)	-1.347*** (0.383)	-0.011 (0.026)	-0.863* (0.493)	-0.012 (0.032)	-0.719 (0.631)
R-squared	0.005	0.023	0.006	0.029	0.000	0.011	0.000	0.007
Foreign borrowers								
VARIABLES	(1) k = 10	(2)	(3)	(4) k = 5	(5)	(6) k = 2	(7)	(8) k = 1
Ret _{<i>i,t:t+1</i>}	-0.020** (0.008)	-0.021** (0.008)	-0.017 (0.010)	-0.017 (0.011)	-0.005 (0.013)	-0.007 (0.013)	-0.006 (0.017)	-0.007 (0.018)
Constant	-0.013 (0.018)	-0.712* (0.366)	0.002 (0.022)	-1.117** (0.442)	-0.007 (0.027)	-1.760*** (0.615)	0.005 (0.035)	-2.259*** (0.717)
R-squared	0.007	0.024	0.003	0.017	0.000	0.018	0.000	0.022
Other borrowers								
VARIABLES	(1) k = 10	(2)	(3)	(4) k = 5	(5)	(6) k = 2	(7)	(8) k = 1
Ret _{<i>i,t:t+1</i>}	-0.011 (0.009)	-0.012 (0.009)	-0.010 (0.011)	-0.007 (0.011)	-0.028 (0.018)	-0.028 (0.018)	-0.031 (0.019)	-0.033* (0.019)
Constant	-0.012 (0.017)	-0.640 (0.434)	-0.001 (0.020)	-0.632 (0.435)	0.027 (0.028)	-0.430 (0.630)	0.030 (0.036)	-0.205 (0.817)
R-squared	0.002	0.030	0.001	0.022	0.005	0.014	0.004	0.009
Observations	666	648	696	677	708	689	719	700
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Robust Standard-Errors in parentheses

**** p<0.01, ** p<0.05, * p<0.1

5 Conclusion

We conclude that short-sellers are informed since higher short-selling is related to lower future returns. Surprisingly, both Brazilian individual and institutional investors have a similar degree of information in the sense that short-selling by both groups predict lower future returns in a similar magnitude. This result goes against the results of Boehmer, Jones and Zhang (2008) for the U.S. market who find that only institutions are informed.

This result made us wonder the source of short-sellers information. This paper answers this question by analyzing how short-selling behaves around specific news events, known as “relevant facts”. The evidence points out that institutions have the ability to process public information disclosures better, a result consistent with the American case. Brazilian individuals, on the other hand, seem to anticipate news releases, by increasing their short-selling activities prior to the release of negative relevant facts.

The fact that individuals are anticipating the content of relevant facts, which are news that move prices and whose disclosure is unpredictable, strengthen the argument in favor of information leakages. If confirmed, this evidence should be used to motivate a discussion on the Brazilian insider trading regulations and of the enforcement of the law.

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