Short-Selling and Inside Information[☆]

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This version: November 15, 2013

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 short sellers informed? The answer to the first question is positive, the Brazilian short-seller is informed. Among short-sellers, individual investors are as informed as investment funds. To provide an answer to the third question, our approach is to observe how short-selling behaves around days when relevant corporate news are disclosed. We show that funds are more informed just after the disclosure of news, an indication that these investors short-sell after processing news. On the other hand, individual investors increase short-selling prior to bad news and decrease short-selling prior to good news. Finally, we present arguments why this last result is a strong evidence of inside information trading in the Brazilian short selling market.

JEL classification: G12, G14, G15, G28
Keywords: Asymmetric information; Manipulation; News media; Short sales

1. Introduction

The objective of this paper is twofold. First, we ask whether and which short-sellers are informed. Second, we question what are the sources of this information: do these investors process public information or do they trade on private information? While the first explanation is probably related to a superior investors' skill in interpreting news, the second may be related to insider trading and information leakages to outsiders, since investors appear to anticipate the content of yet unreleased public information. To do so, we 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 firm or the U.S. stock markets (NYSE and NASDAQ). If this does not suffice, our dataset also differentiates stock borrowers into specific groups: individuals, institutions, foreigners, among others. We are able, therefore, to compare the information content of each group of short-sellers. To our knowledge, only one paper, Boehmer et al. (2008), could do the same using U.S. data.

Our conclusion is that stock borrowers are informed, which is not a surprise considering previous literature on the matter. However, we also find that individuals and institutions (mainly hedge and mutual 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, we find that institutions appear to act on public information. On the other hand, the reason why individuals are informed becomes clear: they appear to know ex-ante the sign of a yet unreleased news. Interestingly, foreigners also increase (decrease) short-selling prior to bad (good) news even though in regular days they are not informed. Contrary to our results, empirical evidence in the U.S. short-selling market supports the interpretation hypothesis, while evidence of anticipation is less robust. We are going to show that differences in inside information regulations and law enforcement between Brazil and the U.S. might explain why such behavior is being observed in our data, while they are not clear in U.S. studies on the matter.

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

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[1]Note 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. We focus on the short-selling as being the major factor explaining why an investor borrow a stock.

does help prices to become informative (see 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 and 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 insider 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 is 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 paper is organized as follows. In section 2, we present a literature review on the informational advantage of short-sellers and its possible causes. In section 3, we explain the Brazilian stock loan market highlighting some peculiarities that allows us to use such rich data for our estimations. In section 4, we present our empirical approach, as well as discuss some results. In section 5, we propose to compare the Brazilian and the American legislation and law enforcement on insider trading. Finally, in section 6, we conclude.

2. Literature Review - Short-sellers' information and its possible sources

There appear to be a consensus in the literature that short sellers are informed traders on average. An informed trader is one that trades based on expectations about a firm future valuation 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 et al. (2008), for instance, provide evidence that short-sellers correct positive overreactions by trading after positive returns and, at the same time, by predicting lower future returns. Another piece of evidence is presented by Boehmer et al. (2008), who find that heavily shorted stocks' risk-adjusted returns are 1.16% lower than lightly shorted stocks over the following 20 days. As we, Boehmer et al. (2008) are able to differentiate among different types of short sellers and they find that institutional investors are informed, while individual investors are not.

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[2]Even 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 (see D'Avolio, 2002)

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 processers[3], 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 of 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 et al., 1991), which undermines the advantage of informed in relation to uninformed traders. 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 processers, 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 information. Additionally, Engelberg et al. (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 we have already said, Engelberg et al. (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,

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[3]In 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.

Christophe et al. (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 et al., 2004; Boehmer et al., 2012), while other papers do not concur with this idea (Daske et al., 2005; Blau and Pinegar, 2012). Short-sellers appear to anticipate frauds and misrepresentation of balance sheets (Desai et al., 2006; Karpoff and Lou, 2010). The same is true for insider sales (Chakrabarty and Shkilko, 2013).

3. The Brazilian Stock Loan Market

Our 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 the cleared and registered on the BTC system. Thus, our 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 differentiate the investors' type, i.e., whether it is an individual, fund (mutual and hedge funds), foreigner or others (mainly commercial banks and pension funds). Funds are responsible for 44% of the stock borrowing deals on the database, individuals 33%, foreigners 15% and others 9%.

Apart from providing an unique perspective, our 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.

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

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 our complete data set on lending transactions, we construct variables that measure short-selling activity. By doing so, we implicity assume that short-selling is the major factor explaining why an investor borrow a stock. Investors, however, may borrow a stock for other reasons than short-selling. They may borrow to have voting rights on shareholders 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,

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[5] On 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.

[6] Stocks 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.

[7] This 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.

[8] According 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.

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. We do not consider in our analysis the week (5 trading days) prior to the ex-date of dividends.

There is still another aspect of the data that we need to address in order to improve our short-selling activity proxies. Since we are working with equilibrium variables, the activity on the BTC market is a response to both borrowers and lenders demands and supplies. As we are interested in analyzing if short-sellers are informed and can predict future price declines, we need 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 et al. (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 our same data set, but with a different set of stock equities, **?** 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, we 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. We 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 and Lamont, 2002). As De-Losso et al. (2013) have pointed out for our data set, such constraint occur sometimes with significant effects on asset returns. Thus,

in order to avoid working with illiquid stocks, we restrict the database to stocks that are lent every week, totalizing 60 stocks. We also drop from our data set deals with loan fees higher than 10%. Such high-loan fee deals amounts to only 5% of our data set.

We match our loans data with the Económatica 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, we take risk-factors to adjust returns 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].

Place Table B.1 About Here

Table B.1 Panel A shows the cross-section statistics of the time-series averages by ticker (60 in total). First, note that only the largest stocks were considered. The average size, measured by market capitalization[10], is on average R\$ 23.9 billions with the largest value being R\$ 364 millions and the lower R\$ 250.4 billions. The stocks in our data set show great dispersion on the daily trading volume spectrum. The average volume is R\$ 69.3 millions with the smallest being R\$ 30 thousand and the largest R\$ 2.484 billion. The average daily return is 0.09% and the average daily standard deviation across stocks is 2.2%.

Table B.1 Panel B presents some statistics of our short selling proxy, shorting flow, the number of deals closed per day of each stock, and the loan fee charged. In this paper, we employ the shorting flow calculated as the ratio between the amount of shares lent and shares outstanding. Recent papers also focus on this proxy (Diether et al., 2008; Christophe et al., 2004, 2010; Boehmer et al., 2012). On average per day and stock, 0.08% of the shares outstanding are lent and 34.8 lending deals are closed. Note that this market is significantly smaller if compared with the U.S.. Boehmer et al. (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 0.043% of the shares outstanding every day, while individuals trade only

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[9]Available at the NEFIN webpage on http://www.fipe.org.br/

[10]Market capitalization is calculated as the number of outstanding shares for the stock times its unadjusted price.

0.007%. The average loan fee for all investors is 2.6%, being individual and institutions those who seem to pay a higher loan fee, on average.

4. Empirical Analysis

In this section, we explain our methodology and present our results to answer three questions: (i) whether and which stock borrowers are informed; (ii) where dies this information comes from: (a) the processing of public information and/or (b) the anticipation of news events. In (i), we analyze whether abnormal short selling activity is related to lower future returns. Then, in (ii) we study 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. We 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 (See Annex Appendix A.2 for more information). In fact, Table B.2 shows that on days with relevant facts releases, returns' volatility, measured as the absolute stock return, increases. Days with news announcements increases return volatility by 0.238 p.p., which is an increase of approximately 15% of the volatility on non-announcement periods. 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.

Place Table B.2 About Here

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

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trading volume would be observed, which may even after the price volatility returns to its normal value (Beaver, 1968)[11].

4.1. Are Stock borrowers Informed Traders?

Our first question is basically whether stock borrowers target overvalued firms by increasing (reducing) loan contracts when future expected returns are low (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. [12].

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

Since we propose to test whether short-selling and future returns are negatively correlated, our empirical model is as follows:

$$R_{i;t+1,t+k} = \beta_0 + \beta_1 Lending_{it} + \gamma_1 R_{it-1} + \gamma_2 R_{it-2} + \varepsilon_{it} \tag{1}$$

where $R_{i;t+1,t+k}$ represents k-weeks ahead risk-adjusted returns (k= 1, 2), and $Lending_{it}$ is a short selling proxy. We include the lagged returns (R_{it-1} and R_{it-2}) to control for the response of stock borrowers to past returns. Diether et al. (2008) bring evidence that short-sellers appear to trade more after positive returns and, therefore, including these variables as controls might prove useful. Should we find 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

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[11]Price volatility and trading volume, however, might be positively correlated (Karpoff, 1987; Harris and Raviv, 1993). This may make it harder for separating market surprise and differences of opinion as explanations for these two variables.

[12]Remember that we are using 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.

traders.

Table B.3 shows the results for all stock borrowers, and also divided by type: institutional, individual, foreign and other investors. We present the same regressions in Table B.4, but we employ a standardized version of the stock borrowing variable. We believe that this way we can better compare the results, since short selling differ in magnitudes among these groups of investors. All regressions are estimated by fixed-effects and they also include week dummies.

Place Tables B.3 and B.4 About Here

In columns [1] and [2] of Tables B.3 and B.4, we see evidence that stock borrowers are informed traders. The coefficients of Lending$_{it}$ are all negative and only insignificant for 1 week-ahead returns. An increase in 1 p.p. (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 2.9% (almost 0.3%). This is not surprising given the overwhelming empirical evidence that these investors, in fact, know what they are doing.

When we look to the results for different types of investors, we find an intriguing result. Individuals investors are not only informed, which goes against Boehmer et al. (2008) results for the U.S. financial market, but they also appear to be as informed as institutional investors (see Table B.4). Remember that Table B.1 Panel B shows that stock borrowing by individuals is lower than by institutions. Therefore, the higher coefficients of this variable in Table B.3 are purely mechanical. Note that the operations of both individuals and institutions in the Brazilian loan market are also related with lower 1-week ahead, as well. 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 we have found that stock borrowers, especially institutional and individual investors, are informed traders, we move on to answering whether this advantage comes from superior processing abilities of public disclosed news. One hypothesis is that stock borrowers are able to

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interpret public disclosed news efficiently by inferring their sign correctly and acting in the short-selling market accordingly. If this is the case, we expect 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, we run the following regression:

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\begin{aligned}
R_{i;t+1,t+k} \ = \ & \beta_0 + \beta_1 Lending_{it} + \beta_2 Lending_{it} News\ Event_{i,t:t-2} + \beta_3 News\ Event_{i,t:t-2} \\
& + \ \gamma_1 R_{it-1} + \gamma_1 R_{it-2} + \varepsilon_{it}
\end{aligned}
\tag{2}
$$

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 Event$_{i,t:t-2}$" is a dummy variable equal to one if news are disclosed in day t, $t-1$ or $t-2$. As in equation (1), we include the lagged returns (R_{it-1} and R_{it-2}) to control for the response of stock borrowers to past returns (Diether et al., 2008)

A negative coefficient for the interaction between Lending and "News Event", 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 solved due to public announcements. Next section will discuss how we test this alternative hypothesis.

Table B.5 displays our results of whether stock borrowers, and their types, as well, are processors of "relevant facts". In Table B.6, we present the same regressions, but we employ a standardized version of the stock borrowing variable.

Place Tables B.5 and B.6 About Here

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 marginally significant for 1-week ahead returns and marginally insignificant for

two-week ahead returns. Note, however, 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 p.p. (1 std. dev.) of Lending$_{it}$ decreases 1-week ahead returns in 1.377% (0.190%) on days soon after relevant facts disclosures. This seems to give a weak 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 we divide the stock borrowing by different types of investors from column [3] to [10], we can conclude that institutional investors are actually those that are leading the results. The coefficients are statistically significant and large in size. For individual investors, the same conclusion does not appear to hold. The coefficient of the interaction is positive for 1-week ahead returns (column [5]) and even though it is negative in column [6] it is not statistically significant at a 10% level. For foreign and other investors, coefficients are negative but not significant.

We can take from these results that public information processing, in this case relevant facts processing, explains the cause of why institutional investors 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, as well, not only 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.

Our 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:

$$\text{Std}_i \text{ Lending}_{i,t-k:t-1} \;\; = \;\; \beta_0 + \beta_1 R_{i,t:t+1} + \sum_{w=1}^{p} \gamma_w Controls_{wit} + \varepsilon_t \tag{3}$$

where the dependent variable is standardized for each stock i:

$$\text{Std}_i \text{ Lending}_{it} = \frac{Lending_{it} - E(Lending_{it})}{\sigma_i(Lending)} \tag{4}$$

averaged for $t - k$ to $t - 1$ (k = 10, 5, 2, 1); and Controls$_{wit}$ is a vector of control variables. We include past average returns (Ret$_{it-1:t-k}$), past turnover (TurnOver$_{it-1:t-k}$) 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, we would be giving too much weight to stocks with larger average stock-borrowing, while our 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 B.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 B.7 and B.8 present the results.

Place Tables B.7 and B.8 About Here

On average, we can conclude 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 2.5%. Note that this effect is also significant and negative for the average lending in the 5 days prior to announcement.

Again, when we divide by investors type, we see that the result appears to come from only a part of the investors. In this case, both individual and foreign investors anticipate news, while

institutions do not. Note first that even though foreign investors are not overall informed (see section **??**), they appear to be in the days prior to relevant facts announcements. Second, individual investors supposedly are not as qualified as institutions to acquire information and interpret news. Third, relevant facts are news whose release dates are not predictable and information content is indeed relevant for the market. These three arguments together give a stronger evidence to support the existence 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 our 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 $\text{Ret}_{i,t:t+1}$ in Tables B.7 and B.8.

5. Discussion

The abnormal short-selling activity on days that precede the public disclosure of material information raises questions about the presence of illegal insider trading in Brazil. The theory predicts that the rational criminal makes its decision taking into account costs and benefits. The cost of being caught is measured by the probability of being caught and the punishment if caught. In this section we compare the Brazilian and American cases in these two dimensions by analyzing the law on insider trading and the enforcement of the law.

5.1. Legislation

In the U.S., misconduct cases are investigated by the Security Exchange Commission (SEC), sometimes with the aid of independent regulators such as Financial Industry Regulatory Authority, Inc. (FINRA). The SEC can then file a complaint on a civil court or seek sanctions through the administrative proceeding process, or, as is often the case, the Commission can bring both proceedings. In Brazil, the Comissão de Valores Monetários (CVM), equivalent to the SEC of Brazil, is responsible for the investigations and both civil and administrative processes can take place. In both countries, insider trading is also a criminal offense and can be takes to criminal justice.

The Brazilian and American laws are similar with respect to what consists illegal insider trading. Brazilian Law no. 6,385 of December 7, 1976 regulates the Brazilian security markets and creates the CVM. It was amended by the Federal Law 10.303, of October 31, 2001, that specifies the conduct of "insider trading" as a crime. According to its Art. 27-D, the misuse of inside information is (for insider trading):

"Article 27-D. To use relevant information not yet disclosed to the market, which one may know and which must remain confidential, so as to create undue advantages, for oneself or others, through the negotiation of securities, in one's behalf or on behalf of others. Penalty: Imprisonment for 1 (one) to 5 (five) years and a fine of up to three (3) times the amount of the undue advantage obtained as a result of the crime."

A key difference of the Brazilian legislation resides on a very important element: the definition of who can be considered an insider. The American regulation have a broader concept. Anyone who uses non-public information to transact in securities market, irrespective of their formal or informal relation to the company, can be considered an insider trader and face the criminal law. Brazilian Federal Law 10.303, of October 31, 2001, that specifies the conduct of "insider trading" as a crime, gives a more limited definition of who is to be considered an insider: it covers only those with professional linkage of the firms (also known as "primary insider"). The other insiders, sometimes referred as "secondary insiders", *cannot go to jail* according to Brazilian law.

A broader interpretation of who can be an insider, which is actually similar to the one adopted by American regulation, does exists in Brazilian regulation and is given by instruction 348 of the Brazilian exchange commission (CVM). This instruction, however, only determines administrative and civil sanctions for those shown to be illegally profiting on inside information. Furthermore, the fines that can be imposed are relatively low and by law cannot exceed three times of the illegal profit. We refer the reader to the Appendix for a more detailed analysis of the main aspects of Brazilian regulation on insider trading.

5.2. Enforcement of the Law

As Bhattacharya and Daouk (2002) point out, the mere existence of the insider trading regulation does not suffice and the enforcement element is crucial in deterring insider trade information. As we will see, there are clear differences in the Brazilian and American cases on this dimension.

As shown in Table B.9 there were a total of 739 enforcement actions by CVM during the years from 2000 to 2012. Of those, only 34 were related to illegal insider trading. The number of individuals and institutions accused on those 34 cases sum up to 141. Of all those accused of illegal insider trading, only 2 were criminally convicted and given a penal sentence. They were a director and a member of the board of Sadia SA, a foodmaker acquired by BRF Brasil Foods SA, the world's biggest poultry exporter, and were sentenced and fined for illegal use of inside information to profit by trading ADRs [13] in February of 2011. So far, this is the only case in Brazil of a criminal conviction for insider trading [14].

On the other hand, Table B.10 shows that the number of enforcement actions by the SECs during those years was proportionally larger. From 2000 to 2012 there were a total of 7,341 enforcement of actions, of which 657 were related to insider trading cases. The total number of individuals and institutions accused was 1,455. Of the number of accused, 133 were criminally charged with illegal insider trading. As shown in Table B.11, insider trading cases account for about 9% of SEC enforcement actions, while only 4.6% of CVM actions. Furthermore, of the total number of individual or institutions charged with insider trading in the U.S., about 9% ended up being criminally convicted. In Brazil, we had only one case that ended with a criminal conviction, which represented only 1.4% of the total number of individual or institutions charged with insider trading.

There is yet another dimension where the Brazilian and American case differ. The lower panel of Table B.10 shows some statistics on the penalties imposed by the Department of Justice on those criminally charged. The average imprisonment time was around 3 year, with a maximum of 11 years given to Raj Rajatnam, a former hedge fund manager and founder of the Galleon Group. Other penalties applied include house arrest and probation times. In Brazil, the directors of Sadia S.A. were given sentences of 2 years and 6 months and 2 years and 1 months. Because of Brazilian law, since this was their first criminal conviction, the sentence was converted to house arrest instead.

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[13] American Depositary Receipts of the Brazilian stock that are traded in the NYSE stock market.

[14] One interesting fact about this case is the SEC provided CVM with evidence of illegal insider trading that was used in the proceedings.

6. Conclusion, Issues and Further Research

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 et al. (2008) for the U.S. market who find that only institutions are informed.

This result made us wonder the source of short-sellers information. We answer 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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Appendix A. Brazilian Regulation

To analyze Brazilian law on insider trading it is important to separate the insider into primary and secondary insiders. The primary insider refers to the person who, in exercise of his or her duty, has access to a company's inside information not yet disclosed to the public. The secondary insider refers to the person who does not have access to the inside information due to his or her duty, but has received the information from the primary insider.

Insider trading cases can be prosecuted in 3 different spheres: Administrative, Civil and Criminal. Each one has different laws as guidelines that diverges in some points: i) which agent can be prosecuted; ii) penalties authorities can impose; iii) if the offender has to profit or not from the use of the inside information; iv) proof mechanisms; v) authority responsible for the judgment.

The first sphere, the administrative, is part of the CVM liability. Any person trading in the capital market, independently of the results obtained from the use of inside information, can be targeted by the commission and will be subject to the following penalties: warning, fine up to R\$ 500000.00 and disqualification to operate in the market up to 20 years.

The second domain a person can be prosecuted is the civil sphere, as specified by the Brazilian civil code and the "Lei das Sociedades Anonimas" or "Lei das SA" (the Brazilian law that regulates public companies). Concerning the scope of the "Lei das SA", there is a divergence in the doctrine in relation to whether the applicability of the law is restricted to individuals that obtained the inside information due to his or her duty or if anyone trading in the possession of the information is object of punishment.

However, the "Lei das SA" is clearer when establishes that when the use of inside information causes loss or damage to the injured part, the counterpart must compensate it, which means that a penalty is imposed only when the side possessing the inside information derives a monetary gain from the transaction. The reimbursement depends on the loss or damaged suffered by the counterpart.

Regarding the criminal domain, since 2001, insider trading is considered crime. To be sentenced, the simple fact of using information not yet disclosed to the market is sufficient; however, the legislation exempted the tippee when required from the insider the obligation of secrecy when he or she is in possession of inside information. The sentence imposed may be an up to 5 years reclusion and a fine in an amount of 3 times the advantages earned.

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Concerning the insider trading proof mechanisms, the most common is the evidence, since they are sufficient to verify the violations and can be utilized to verify administrative, civil and criminal offenses. It's noteworthy that if managers, third parties and subordinates negotiate assets, when there is information not yet disclosed to the public, it's assumed they traded aiming to get illegal profit. Moreover, in the case of the manager, there is the presumption that he or she had knowledge of the information. In the case of the third parties and subordinates, a proof they had knowledge is necessary.

The legislation sometimes exempts some insiders. In the civil sphere, for example, there is no condemnation if the insider don't profit with the information and, what is more severe, the legislation exempted the tippee from the conviction. Moreover, in some cases, one can't be prosecuted in all spheres, because the different legislation diverge when determining who can be accused of insider trading. In the administrative domain, all types of insiders can be prosecuted, while in the criminal sphere, the tippee is exempted.

Appendix A.1. Insider Trading

Brazilian Law no. 6,385 of December 7, 1976 regulates the Brazilian security markets and creates the Comissão de Valores Mobiliários (CVM), the Securities and Exchange Commission of Brazil. It was amended by the Federal Law 10.303, of October 31, 2001, that specifies the conduct of "insider trading" as a crime. According to its Art. 27-D, the misuse of inside information is (for insider trading) is:

"Article 27-D. To use relevant information not yet disclosed to the market, which one may know and which must remain confidential, so as to create undue advantages, for oneself or others, through the negotiation of securities, in one's behalf or on behalf of others. Penalty: Imprisonment for 1 (one) to 5 (five) years and a fine of up to three (3) times the amount of the undue advantage obtained as a result of the crime."

Brazilian Law no. 6,404 of December 15, 1976, determines characteristics and nature of publicly held corporation. On Article 155 about "Duty of Loyalty", it writes:

" 4 of Art. 155. Any officer who may receive any confidential information not yet revealed to the public shall not make use of such information to obtain any advantages for himself or for third parties by purchasing or selling securities."

According to the law, there are other subjects that have access to privilege information that can also be of insider trading:

a) members of the administrative council and directors (Art.145);

b) members of any body created by the bylaws with specialist functions or appointed as consultants to the corporation's officers (Art. 160);

c) members of the finance committee (Art. 165);

d) controlling shareholders (art. 22, item V, of Law No. 6.385/76).

What characterizes relevant information is also defined by the Law 6.404/76. Art. 157, 4, combined with the Art. 155, 1:

'emph(...) information pertaining to facts that occurred in the company's business, which may affect, in a measurable way, the decision of investors to buy or sell securities issue'

The prompt disclosure of relevant information by administrators is determined in Art. 157, 4 of Law 6.404/76, unless expressly authorized otherwise by CVM (art. 157, 5).

Appendix A.2. Relevant Facts

CVM Instruction n 358, dated January 3, 2002, defines what relevant facts are, determines how they should be disclosed, and establish the conditions for shares negotiation when non-disclosed relevant facts to the market are pending. For further details, the reader is referred to CVM website[15].

According 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."

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[15]http://www.cvm.gov.br/ingl/regu/cvm_358.ASP

Moreover, according to the instruction, the disclosure of relevant facts should be done by the company and made public:

"Art. 3 The Director of Relations with Investors shall publish and inform the CVM and also the stock exchange and entities of the organized over-the-counter market where the securities issued by the company are traded, as the case may be, as well as any material events occurred or related to their business, as well as to provide for their wide simultaneous publicity, to all markets in which such securities are traded.

The instruction determines that all relevant facts should be disclosed immediately, with only few exceptions:

"Art. 6 The material events may, exceptionally, not be disclosed if the controlling shareholders or the managers understand that their revelation will risk the company's legitimate interest.

Sole paragraph. The persons mentioned above are under the obligation, directly or through the Director of Relations with Investors, to immediately release the material events, in the case information becomes public or if there is an atypical oscillation in the quotation, price, or negotiated quantities of the securities issued by publicly-held companies or those related to them".

That is, even in for the few cases of exemptions if immediate release, if atypical oscillation in stock prices is observed, relevant facts should be immediately disclosed.

Appendix B. Tables and Graphs

Table B.1: Descriptive Statistics

This table presents summary statistics on some stock specific variables about the securities in our database (Panel A) and on short selling proxies for each stock (Panel B). 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 R$ mil)	23,908	38,196	364	4,288	8848	22,227	250,439
Trading Volume (in R$ mil)	69.27	135.30	0.03	10.86	25.51	65.85	2,484
Momentum (1-year, in %)	55.850	1,077.995	-98.797	-21.736	6.697	35.620	31,405.86
Returns (in %)	0.091	2.282	-24.36	-1.190	0	1.292	14.98
Std. Dev. of Returns (in %)	2.224	0.515	1.272	1.810	2.221	2.574	3.37
Panel B: Stock Borrowing Statistics by Investor's Type							
All types of Short-Sellers							
Stock Lending (in %)	0.081	0.138	0	0.011	0.036	0.097	6.203
Number of Deals	34.822	40.471	0	9	22	46	582
Loan Fee (in %)	2.707	2.225	0	0.933	2.020	3.862	10
Institutional investors							
Stock Lending (in %)	0.043	0.089	0	0.003	0.016	0.048	6.140
Number of Deals	15.047	17.691	0	3	10	20	347
Loan Fee (in %)[a]	2.516	2.218	0	0.779	1.78	3.642	10
Individual investors							
Stock Lending (in %)	0.007	0.019	0	0.000	0.002	0.007	1.047
Number of Deals	11.537	20.78	0	1	4	13	428
Loan Fee (in %)[a]	2.805	2.268	0	0.964	2.16	3.983	10
Foreign investors							
Stock Lending (in %)	0.023	0.054	0	0.000	0.004	0.022	1.619
Number of Deals	5.336	8.397	0	1	2	6	130
Loan Fee (in %)[a]	2.557	2.284	0	0.750	1.800	3.700	10
Other investors							
Stock Lending (in %)	0.007	0.054	0	0	0.000	0.003	4.602
Number of Deals	2.902	5.496	0	0	1	3	132
Loan Fee (in %)[a]	2.363	2.181	0	0.680	1.650	3.350	10
Number of	Stocks:	60	Days:	637	Obs:	35295	

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

Table B.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^2_{it}) 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., Std Vol$_{it} = \frac{Volume_{it} - \overline{Volume}_i}{\sigma_i(Volume_{it})}$.

	(1)	(2)	(3)	(4)	(5)
	$|R_{it-2}|$	$|R_{it-1}|$	$|R_{it}|$	$|R_{it+1}|$	$|R_{it+2}|$
News Event$_{it}$	-0.002	0.017	0.232**	0.111*	0.050
	(0.976)	(0.788)	(0.014)	(0.090)	(0.227)
Constant	1.672***	1.671***	1.667***	1.664***	1.662***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	R^2_{it-2}	R^2_{it-1}	R^2_{it}	R^2_{it+1}	R^2_{it+2}
News Event$_{it}$	0.081	-0.211	1.908**	0.591	0.365
	(0.842)	(0.656)	(0.011)	(0.234)	(0.284)
Constant	5.207***	5.208***	5.177***	5.157***	5.133***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
	Std$_i$ Vol$_{it-2}$	Std$_i$ Vol$_{it-1}$	Std$_i$ Vol$_{it}$	Std$_i$ Vol$_{it+1}$	Std$_i$ Vol$_{it+2}$
News Event$_{it}$	0.085	0.136**	0.333***	0.137**	0.101*
	(0.114)	(0.024)	(0.000)	(0.013)	(0.054)
Constant	-0.003**	-0.004***	-0.007***	-0.001	0.001
	(0.014)	(0.006)	(0.000)	(0.544)	(0.494)
Observations	36,138	36,198	36,258	36,198	36,138
N. of Stocks	60	60	60	60	60

Robust Pvals in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.3: Are Short-Seller Informed Traders?

This table presents the regression of one-, two-weeks ahead returns on a proxy of short-selling at week t, equal to the ratio between share lent and shares outstanding (known as shorting flow). We present the results for the aggregation of investors (columns [1] and [2]) and also disaggregated by investor's type: institutional, individual, foreigners and others (columns [3] to [10]). Returns, measured in %, are adjusted by risks employing a Fama-French specification. We estimate the regressions by fixed effects and we also include time dummies as additional controls. We compute standard errors clustered by stocks, which controls for cross-section effects

VARIABLES	All		Institutional		Individual		Foreign		Others	
	(1) R_{it+1}	(2) R_{it+2}	(3) R_{it+1}	(4) R_{it+2}	(5) R_{it+1}	(6) R_{it+2}	(7) R_{it+1}	(8) R_{it+2}	(9) R_{it+1}	(10) R_{it+2}
Lending$_{it}$	-0.774	-2.919***	-2.171**	-5.557***	-12.413***	-24.517***	0.832	-1.166	2.746	2.206
	(0.307)	(0.002)	(0.033)	(0.000)	(0.008)	(0.001)	(0.708)	(0.695)	(0.114)	(0.344)
Constant	0.736	1.290**	0.362	0.777	0.358	0.727	0.281	0.609	0.285	0.590
	(0.100)	(0.039)	(0.572)	(0.446)	(0.571)	(0.473)	(0.659)	(0.551)	(0.653)	(0.563)
Controls for R_{it-1} R_{it-2}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,858	6,772	6,858	6,772	6,858	6,772	6,858	6,772	6,858	6,772
R-squared	0.301	0.336	0.302	0.337	0.302	0.336	0.301	0.335	0.301	0.335
N. of Stocks	60	60	60	60	60	60	60	60	60	60

Robust Pvals in parenthesis
*** p<0.01, ** p<0.05, * p<0.1

Table B.4: Are Short-Seller Informed Traders? Standardized Variable

Note: this table presents the regression of one-, two-weeks ahead returns on a standardized proxy of short-selling at week t, equal to the ratio between share lent and shares outstanding (known as shorting flow). We present the results for the aggregation of investors (columns [1] and [2]) and also disaggregated by investor's type: institutional, individual, foreigners and others (columns [3] to [10]). Returns, measured in %, are adjusted by risks employing a Fama-French specification. We estimate the regressions by fixed effects and we also include time dummies as additional controls. We compute standard errors clustered by stocks, which controls for cross-section effects

VARIABLES	All		Institutional		Individual		Foreign		Others	
	(1) R_{it+1}	(2) R_{it+2}	(3) R_{it+1}	(4) R_{it+2}	(5) R_{it+1}	(6) R_{it+2}	(7) R_{it+1}	(8) R_{it+2}	(9) R_{it+1}	(10) R_{it+2}
Std Lending$_{it}$	-0.077	-0.291***	-0.135**	-0.344***	-0.147***	-0.290***	0.029	-0.041	0.080	0.065
	(0.307)	(0.002)	(0.033)	(0.000)	(0.008)	(0.001)	(0.708)	(0.695)	(0.114)	(0.344)
Constant	0.674	1.056*	0.704	1.127*	0.704	1.109*	0.301	0.582	0.305	0.606
	(0.126)	(0.084)	(0.111)	(0.065)	(0.113)	(0.072)	(0.634)	(0.568)	(0.630)	(0.552)
Controls for R_{it-1} R_{it-2}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6,858	6,772	6,858	6,772	6,858	6,772	6,858	6,772	6,858	6,772
R-squared	0.301	0.336	0.302	0.337	0.302	0.336	0.301	0.335	0.301	0.335
N. of Stocks	60	60	60	60	60	60	60	60	60	60

Robust Pvals in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.5: Do Short-Sellers Process Public Information?

This table presents the regression of 5-, 10-days ahead returns on a proxy of short-selling at day t, equal to the ratio between share lent and shares outstanding (known as shorting flow), a dummy equal to one if a relevant fact was released on day t, $t-1$ and $t-2$ and their interaction. We present the results for the aggregation of investors (columns [1] and [2]) and also disaggregated by investor's type: institutional, individual, foreigners and others (columns [3] to [10]). Returns, measured in %, are adjusted by risks employing a Fama-French specification. We estimate the regressions by fixed effects and we also include time dummies as additional controls. We compute standard errors clustered by stocks, which controls for cross-section effects

VARIABLES	All		Institutional		Individual		Foreign		Others	
	(1) R_{it+1}	(2) R_{it+2}	(3) R_{it+1}	(4) R_{it+2}	(5) R_{it+1}	(6) R_{it+2}	(7) R_{it+1}	(8) R_{it+2}	(9) R_{it+1}	(10) R_{it+2}
Lending$_{it}$	-0.018	-0.509	-0.188	-0.828*	-1.725	-4.372**	0.094	-1.104	0.523*	0.923*
	(0.935)	(0.111)	(0.600)	(0.070)	(0.230)	(0.040)	(0.879)	(0.241)	(0.091)	(0.086)
Lending$_{it}$*News Event$_{i,t:t-2}$	-1.377*	-2.272	-1.897*	-3.331**	1.686	-6.015	-2.571	-1.669	-1.813	-4.235
	(0.098)	(0.101)	(0.052)	(0.039)	(0.752)	(0.518)	(0.243)	(0.693)	(0.585)	(0.283)
News Event$_{i,t:t-2}$	0.062	-0.081	0.031	-0.121	-0.077	-0.240	0.002	-0.249	-0.051	-0.261
	(0.672)	(0.737)	(0.817)	(0.595)	(0.565)	(0.272)	(0.986)	(0.264)	(0.711)	(0.239)
Constant	-0.098	-1.788*	-0.094	-1.788*	-0.088	-1.794*	-0.095	-1.787*	-0.096	-1.804*
	(0.825)	(0.067)	(0.832)	(0.066)	(0.842)	(0.066)	(0.830)	(0.067)	(0.827)	(0.063)
Controls for R$_{it-1}$ R$_{it-2}$	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,268	33,970	34,268	33,970	34,268	33,970	34,268	33,970	34,268	33,970
R-squared	0.040	0.057	0.040	0.057	0.040	0.057	0.040	0.057	0.040	0.057
N. of Stocks	60	60	60	60	60	60	60	60	60	60

Robust Pvals in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.6: Do Short-Sellers Process Public Information? Standardized Variable

This table presents the regression of 5-, 10-days ahead returns on a standardized proxy of short-selling at day t, equal to the ratio between share lent and between share lent and shares outstanding (known as shorting flow), a dummy equal to one if a relevant fact was released on day t, $t-1$ and $t-2$ and their interaction. We present the results for the aggregation of investors (columns [1] and [2]) and also disaggregated by investor's type: institutional, individual, foreigners and others (columns [3] to [10]). Returns are adjusted by risks employing a Fama-French specification. We estimate the regressions by fixed effects and we also include time dummies as additional controls. We compute standard errors clustered by stocks, which controls for cross-section effects

	All		Institutional		Individual		Foreign		Others	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	R_{it+1}	R_{it+2}	R_{it+1}	R_{it+2}	R_{it+1}	R_{it+2}	R_{it+1}	R_{it+2}	R_{it+1}	R_{it+2}
Std Lending$_{it}$	-0.002	-0.070	-0.017	-0.074*	-0.032	-0.081**	0.005	-0.059	0.028*	0.050*
	(0.935)	(0.111)	(0.600)	(0.070)	(0.230)	(0.040)	(0.879)	(0.241)	(0.091)	(0.086)
Std Lending$_{it}$*News Event$_{i,t;t-2}$	-0.190*	-0.314	-0.169*	-0.296**	0.031	-0.111	-0.138	-0.090	-0.098	-0.229
	(0.098)	(0.101)	(0.052)	(0.039)	(0.752)	(0.518)	(0.243)	(0.693)	(0.585)	(0.283)
News Event$_{i,t;t-2}$	-0.050	-0.265	-0.051	-0.266	-0.065	-0.283	-0.057	-0.287	-0.064	-0.291
	(0.704)	(0.223)	(0.696)	(0.219)	(0.615)	(0.185)	(0.658)	(0.178)	(0.622)	(0.176)
Constant	-0.099	-1.829*	-0.102	-1.824*	-0.101	-1.825*	-0.093	-1.812*	-0.092	-1.797*
	(0.820)	(0.060)	(0.816)	(0.061)	(0.819)	(0.061)	(0.833)	(0.062)	(0.834)	(0.064)
Controls for R_{it-1} R_{it-2}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Week Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	34,268	33,970	34,268	33,970	34,268	33,970	34,268	33,970	34,268	33,970
R-squared	0.040	0.057	0.040	0.057	0.040	0.057	0.040	0.057	0.040	0.057
N. of Stocks	60	60	60	60	60	60	60	60	60	60

Robust Pvals in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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Table B.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 Investors | | | | | | | |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
VARIABLES	k = 10		k = 5		k = 2		k = 1	
$Ret_{i,t:t+1}$	-0.027***	-0.025***	-0.024**	-0.021*	-0.015	-0.014	-0.015	-0.013
	(0.003)	(0.005)	(0.046)	(0.083)	(0.377)	(0.445)	(0.472)	(0.523)
Constant	0.002	-0.822*	0.017	-1.186**	0.048	-1.803***	0.065*	-1.795**
	(0.927)	(0.057)	(0.450)	(0.014)	(0.104)	(0.009)	(0.078)	(0.016)
Controls	No	Yes	No	Yes	No	Yes	No	Yes
Observations	655	641	684	669	695	680	706	691
R-squared	0.010	0.033	0.006	0.025	0.001	0.019	0.001	0.019

Robust Pvals in parentheses
*** p<0.01, ** p<0.05, * p<0.1

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

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.: $Std_i\ Lending_{i,t-k:t-1}$

				Institutional Investors				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	k = 10		k = 5		k = 2		k = 1	
$Ret_{i,t:t+1}$	-0.014	-0.014	-0.011	-0.009	-0.001	0.002	-0.005	-0.002
	(0.174)	(0.200)	(0.418)	(0.539)	(0.968)	(0.920)	(0.850)	(0.953)
Constant	0.022	-0.427	0.040	-0.659	0.088**	-1.280*	0.116**	-0.775
	(0.290)	(0.357)	(0.102)	(0.208)	(0.010)	(0.092)	(0.012)	(0.343)
R-squared	0.003	0.013	0.001	0.006	0.000	0.009	0.000	0.007

				Individual Investors				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	k = 10		k = 5		k = 2		k = 1	
$Ret_{i,t:t+1}$	-0.022**	-0.020**	-0.025**	-0.024**	-0.022	-0.020	-0.017	-0.016
	(0.013)	(0.023)	(0.016)	(0.025)	(0.109)	(0.145)	(0.280)	(0.324)
Constant	-0.005	-0.856**	-0.009	-1.351***	-0.014	-0.960	-0.006	-0.454
	(0.817)	(0.043)	(0.695)	(0.002)	(0.643)	(0.109)	(0.865)	(0.539)
R-squared	0.007	0.035	0.006	0.040	0.003	0.017	0.001	0.008

				Foreign Investors				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	k = 10		k = 5		k = 2		k = 1	
$Ret_{i,t:t+1}$	-0.026***	-0.025***	-0.025**	-0.024**	-0.020	-0.020	-0.019	-0.019
	(0.002)	(0.003)	(0.024)	(0.034)	(0.202)	(0.204)	(0.342)	(0.353)
Constant	-0.008	-0.732*	0.008	-1.041**	0.009	-1.652**	0.020	-2.087***
	(0.655)	(0.054)	(0.709)	(0.026)	(0.741)	(0.013)	(0.586)	(0.006)
R-squared	0.011	0.025	0.006	0.019	0.003	0.016	0.001	0.017

				Other Investors				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	k = 10		k = 5		k = 2		k = 1	
$Ret_{i,t:t+1}$	-0.011	-0.012	-0.009	-0.010	-0.013	-0.014	-0.008	-0.012
	(0.229)	(0.158)	(0.400)	(0.360)	(0.394)	(0.376)	(0.603)	(0.417)
Constant	-0.015	-0.944***	-0.016	-0.957**	-0.011	-1.110**	-0.010	-1.761***
	(0.355)	(0.009)	(0.391)	(0.013)	(0.669)	(0.010)	(0.721)	(0.000)
R-squared	0.002	0.024	0.001	0.019	0.001	0.019	0.000	0.022
N. of News Events	655	641	684	669	695	680	706	691
Controls	No	Yes	No	Yes	No	Yes	No	Yes

Robust Pvals in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table B.9: CVM Enforcement Actions and Criminal Convictions

The Table below shows the number of administrative proceedings, number of individuals prosecuted and the number of individuals criminally convicted. The data on CVM enforcement actions was obtained from the Comissão de Valores Mobiliários (CVM) website and refer to administrative proceeding judgments (Processos Administrativos Sancionadores, PAS) that were already concluded.

| Year | CVM Enforcement Actions | | | Criminal |
	Total Number of Actions	Insider Trading Cases	Individuals Accused	Convictions
2000	36	0	0	0
2001	56	1	14	0
2002	37	2	5	0
2003	44	0	0	0
2004	70	1	5	0
2005	85	4	10	0
2006	136	3	6	0
2007	73	3	36	0
2008	43	3	7	0
2009	57	2	3	0
2010	47	7	17	0
2011	26	2	2	2
2012	29	6	36	0
Total	739	34	141	2

Table B.10: SEC Enforcement Actions and Criminal Convictions

The top panel of this table shows the number of enforcement actions and crime convictions in the U.S. from 2000 to 2012. The number of enforcement actions include both Civil Actions and Administrative Proceedings by the Security Exchange Commission (SEC). The number of criminal convictions represent the number of individual sentenced to prison, house arrest or probation/supervised release. From 2000 to 2008, only cases from the Eastern District and Southern District of New York were included in the Criminal Convictions statistics. The lower panel of this table shows some detailed statistics of the sentences on the insider trading cases judged by the Department of Justice. Probation sentences include Supervised Released. The sources are the SEC and the Wall Street Journal.

Year	SEC Enforcement Actions			Criminal Convictions
	Total Number of Actions	Insider Trading Cases	Number of Accused	
2000	333	40	116	7
2001	333	57	115	0
2002	397	59	144	4
2003	451	50	104	9
2004	546	42	95	0
2005	532	50	94	4
2006	534	46	94	10
2007	562	47	110	10
2008	687	61	103	9
2009	635	37	85	8
2010	742	53	138	7
2011	842	57	126	39
2012	747	58	131	26
Total	7341	657	1455	133

	Prison	House Arrest	Probation	Total
Number of Cases	80	16	77	133
Average Time (in months)	32.8	5.9	30.3	37.9
Maximum Time (in months)	132	12	60	156
Minimum Time (in months)	2	3	3	3

Table B.11: SEC and CVM Comparision

This Table shows some descriptive statistics summarizing the enforcement actions by the Securities Exchange Commission (SEC) and its Brazilian counterpart, Comissão de Valores Mobiliários (CVM), as well as criminal convictions in Brazil and in the U.S.. during the years from 2000 to 2012.

Enforcement Actions

	Total Cases	Insider Cases	Proportion
SEC	7341	657	8.9%
CVM	739	34	4.6%

Insider Trading Investigations

	Total Charged	Criminal Convictions	Proportion
SEC	1455	133	9.14%
CVM	141	2	1.42%