The consequences of index membership for financial statement conservatism

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Abstract

The objective of this research is to analyze the relationship between conservative financial statements and information asymmetry in the Brazilian market. The literature claims that conservative reports can be a mechanism for offsetting investors' expropriation risk under high information asymmetry. To test this, we analyze how conservatism reacts to shocks in firms' information asymmetry, represented by their Ibovespa market index membership. Analyzing the composition of Ibovespa from 1999 to 2017, we find that firms included in the index have significantly lower levels of conditional conservatism than firms with similar levels of negotiability not included in the index, according to an RDD approach. Furthermore, when a firm is included in the index, it becomes less conditionally conservative, and when it is deleted, it becomes more conservative, which operates mainly through the increase (decrease) in the number of analysts following firms when they are included (deleted) in (from) the index. These results are consistent with the hypothesis that timely loss recognition follows changes in information asymmetry, indicating its role as a governance mechanism.

Keywords Market index, Accounting conservatism, Information asymmetry, Regression discontinuity design

Paper type Research paper

1 Introduction

We investigate how firms' supply of conservative financial reports responds to Ibovespa membership, the main stock market index on the Brazilian stock exchange. When a firm is included in a stock market index, its information flow is increased because it attracts new shareholders, especially institutional investors, and more attention from financial analysts and the media (Martin et al. 2016). Analogously, when a firm is deleted from the index, its information flow decreases. Cao et al. (2019) use the Russel 2000 to investigate how index membership affects small firms' financing. They find that being added to the index increases the number of institutional shareholders and results in more analyst coverage, stock

liquidity, and elasticity of demand for equity. The authors argue that this is consistent with an improved information environment because of the increased visibility.

The literature on the relationship between accounting conservatism and the quality of the information environment generally considers conservatism a desired characteristic, expected to decrease information asymmetry (Ball et al. 2000, Ball & Shivakumar 2006) and facilitate efficient contracting (Watts & Zimmerman 1986). It is, however, usually hard to detect causal effects in this relationship. If using accounting information for contracting purposes creates demand for conservative reports, conservatism should be more significant in countries with a solid legal regime (Bushman & Piotroski 2006). In this case, conservatism is a consequence of an already good information environment. On the other hand, information asymmetry may promote conservatism in financial reports (LaFond & Watts 2008), reversing the direction of causality.

The inclusion or removal of a firm from a stock index such as Ibovespa represents an exogenous shock to the firm's informational environment. This happens because firms cannot control whether or not they will be part of the index portfolio when the following change occurs. Such shocks allow us to disentangle the direction of the causal relationship between information asymmetry and accounting conservatism. We test whether index membership increases the quality of the informational environment leading to less conservative reporting. We hypothesize that firms belonging to Ibovespa decrease information asymmetry via greater institutional ownership and higher visibility, which attracts greater analyst coverage.

We replicate Ibovespa's (publicly available) inclusion and deletion criteria and calculate for all firms the metric that serves as the membership criteria at each update of the index portfolio. To investigate the effect of index membership on accounting conservatism, we use a regression discontinuity design (RDD) to estimate the difference in the conservatism of the last firms that met the index membership criteria versus the first firms that were left out of the index.

Ibovespa is the most important market index of the Brazilian stock market. The index started being calculated in 1968 and aims to include the most liquid stocks traded on the Brazilian stock exchange and adequately represent the market's performance. The index portfolio is revised every four months. Over its more than 50-year history, the index methodology has only been modified once, effective in 2014. After this change, the index no longer includes penny stocks (stocks worth less than BRL 1.00), among other measures to increase its market representativeness. Although the inclusion rules are clear, firms have no direct or perfect control over them, which is crucial for our identification strategy.

We begin our empirical analysis by estimating Basu (1997)'s general model of conservatism to assess whether its concept and empirical arguments are valid for the Brazilian

market. Next, we follow Khan & Watts (2009), who expands Basu (1997)'s model to generate firm-year measures of conservatism. We then compute the negotiability index for each firm and time period and simulate Ibovespa membership. The negotiability index is the criterion used by the Brazilian stock exchange to determine which firms enter Ibovespa at each portfolio change. This simulation is not perfect because the exchange uses some ineligibility criteria (such as penny stocks, for example).

For this reason, we use a fuzzy RDD specification, in which the actual Ibovespa membership is the endogenous treatment variable (since there are other factors that define membership). The negotiability index is the forcing variable that generates the simulated Ibovespa membership, which in turn is included as an instrumental variable to control the endogenous nature of the index membership.

Next, we test how the firms' conservatism reacts to additions to and deletions from the Ibovespa portfolio. Suppose higher conditional conservatism is indeed a response to higher information asymmetry. In that case, we expect that the financial statements of a firm that has been included in the index will become less conservative once its information asymmetry decreases. Consequently, the demand for conservative reports decreases. Similarly, when a firm is deleted from the index, we expect its financial statements to become more conservative because its information asymmetry increases, increasing the demand for conservative reports.

Our results show that firms become less conditionally conservative after being included in the index and become more conditionally conservative upon deletion. We also evaluate two possible channels through which this information flow occurs: an increase in institutional ownership or an increase in the number of analysts following the firm. We find that firms in Ibovespa have both a higher percentage of institutional ownership and a higher number of analysts following. However, the change in the number of analysts following is more evident around inclusions and deletions. When firms are included in the index, they gain, on average, 0.425 analyst following. And when the firm is deleted from the index it loses, on average, 0.574 analyst following. This is therefore the main channel driving the flow of information and is consistent with our hypothesis that higher information asymmetry leads to higher demand for conservative reports.

As in Martin et al. (2016), our results indicate that the need for conservative financial statements changes according to shocks to the firm's informational environment. This result is important for three main reasons. First, it contributes to the literature studying the direction of the relationship between conditional conservatism and information asymmetry. Our results confirm the findings of LaFond & Watts (2008) on the evidence that conservative reports helps mitigate information asymmetry problems. Second, we add to Martin et al. (2016) by studying an environment with characteristics very different from the U.S. market.

Brazil is an emerging economy with an undeveloped stock market. In addition, we use a more robust methodology for causal inference. Finally, our results highlight the importance of the role of Ibovespa as a market benchmark capable of driving firms' disclosure behavior.

The article is structured as follows. Section 2 briefly reviews the literature on conservatism and information asymmetry. Section 3 describes the data and the research methodology. Section 5 discusses the results and section 6 presents the concluding remarks.

2 Literature review

In accounting, conservatism is historically associated with the rule that says that between two equally valid recognition/measurement alternatives, one should choose the one that assigns lower value to assets and revenues and higher value to liabilities and expenses. Basu (1997) interprets conservatism as the tendency of accountants to require a higher degree of verification in recognizing good news (that results in higher assets or revenues) than bad news (that results in higher amounts for liabilities and expenses) in financial statements. According to Basu, unrealized losses are typically recognized earlier than unrealized gains. To illustrate, he uses the example of a change in the estimate of the productive life of a fixed asset. If it decreases, an impairment expense is recognized. But if it increases, the gain is smoothed over the next few years using a lower future depreciation rate.

Basu (1997)'s rationale was beneficial for positive accounting theory because it provided a market-based measure for an unobserved concept. His paper empirically measured conservatism using annual data to estimate the relationship between firms' accounting earnings and their respective stock returns. While firms' stock prices reflect both good and bad news, thus generating positive or negative returns, accounting earnings are conservative if they reflect bad news more than good news. Therefore, if earnings are conservative, their relationship to stock returns will be stronger under bad news than under good news. Because of this asymmetry, Basu's proposed measure of conservatism is also known as timely recognition of losses, where losses are recognized more quickly than gains.

Usually, conservatism is considered a desirable accounting characteristic because of the belief that recognizing losses promptly is useful for investors and helps decrease information asymmetry (André et al. 2015, Ball & Shivakumar 2006, Barth et al. 2008, Lang et al. 2003). According to Ball et al. (2000), timeliness and conservatism together capture much of the concept of transparency because it encourages managers to contain losses more quickly, makes leverage and dividend restrictions binding more quickly, and makes optimistic non-accounting information less credible to users. In short, accounting conservatism facilitates monitoring and is an essential feature of corporate governance (Ball et al. 2000). Similarly,

Bushman & Piotroski (2006) find that timely recognition of losses is more prominent in countries with high-quality judicial systems.

If accounting conservatism facilitates monitoring, we might expect it to decrease information asymmetry. Still, some studies find a positive relationship between conservatism and information asymmetry (Ruch & Taylor 2015). However, assuming that conservatism increases information asymmetry may be a misconception. According to Kim et al. (2013), LaFond & Watts (2008) and Martin et al. (2016), higher conditional conservatism is a response to higher information asymmetry, not a cause.

LaFond & Watts (2008) find that past measures of information asymmetry positively correlate with current and future measures of accounting conservatism, indicating that conservatism is necessary when information asymmetry is higher. This result is consistent with the theoretical view that conservatism can act as a mechanism for efficient contracting (Basu 1997, Watts & Zimmerman 1986). Thus, conservatism can be seen as a mechanism that compensates for external users' difficulty when evaluating their investments. Therefore, conservative reporting reduces the risk of expropriation. Along the same line, conservatism facilitates the relationship between firms and their capital providers (Anagnostopoulou et al. 2021, Beatty et al. 2008, Francis et al. 2013, Lara et al. 2016, Li 2015) and their other stakeholders (Haider et al. 2021, Hsieh et al. 2019, Guo et al. 2020).

Martin et al. (2016) investigate whether managers adjust the level of conditional conservatism in response to an exogenous shock to a firm's informational environment. They argue that additions to and deletions from a market index such as the S&P 500 represent an apparent effect in decreasing and increasing information asymmetry. By being added to the market index, a firm attracts new shareholders and greater attention from financial analysts and the media, increasing its public and private information flow. An example of this mechanism is when a firm is added to the market index and automatically enters the portfolios of investment funds that mimic that market index. Similarly, when a firm is deleted from the index, its information flow is expected to decrease.

Market index membership is often seen in the literature as a mechanism that leads to a greater flow of information to the firm. Liu (2009), for example, finds that stock return series become less predictable when they are added to the Nikkei 225 market index. According to the author, this is consistent with higher market efficiency due to more information being generated and incorporated into the stock prices that are part of the index. Pavlov et al. (2018) also find evidence that index membership improves price efficiency. This improved market information flow around market index inclusions impacts firms' financial choices. Cao et al. (2019) find that index membership causes small firms to transition away from bank financing in favor of seasonal equity offerings, for example. They also find that even

after deletions, the quality of the informational environment remains unchanged as analyst coverage, stock liquidity, and the elasticity of demand for equity stay the same.

3 Research Design

3.1 Measuring Conservatism

We measure conditional conservatism following Basu (1997). According to the author, if accounting earnings are conservative, their correlation with contemporaneous stock returns is stronger under bad news than under good news. Basu (1997) included a dummy variable indicating whether the year's stock returns are negative to proxy for the event of bad news. To measure this conditional correlation, the author estimates the following model:

$$Earn_{it} = \beta_0 + \beta_1 Ret_{it} + \beta_2 Neg_{it} + \beta_3 Ret_{it} \times Neg_{it} + \epsilon_{it}, \tag{1}$$

where $Earn_{it}$ are the accounting earnings of firm i at each year t (scaled by lagged market capitalization), Ret_{it} is the annual log-return over t for firm i and Neg_{it} is the dummy indicating negative returns. If the coefficient of the interaction, β_3, is positive and significant, the partial effect (correlation) of market returns on earnings is stronger under bad news, consistent with the conditional conservatism hypothesis.

Basu (1997)'s measure allows one to infer whether there is accounting conservatism in the sample as a whole. However, for our analyses, we need a firm-level measure of conservatism, so we follow Khan & Watts (2009). Based on Watts (2003), the authors argue conservatism varies with contracts, litigation, taxation and regulation, which in turn, vary with the firm's investment opportunities set. They select a set of variables used as proxies for firms' investment opportunities set, namely the BtM ratio, size, and leverage, and add them to Basu's model to make the partial correlation between earnings and returns conditional not only to bad news but also to these firm-year variables, generating firm-year measures of accounting conservatism. We follow the authors' approach defining β_1 and β_2 in Equation (1) as a linear combination of firms' size, BtM, and leverage:

$$\begin{aligned} Earn_{it} = \beta_0 + (\mu_1 + \mu_2 Size_{it} + \mu_3 BTM_{it} + \mu_4 Lev_{it})\, Ret_{it} + \beta_2 Neg_{it} + \\ + (\lambda_1 + \lambda_2 Size_{it} + \lambda_3 BTM_{it} + \lambda_4 Lev_{it})\, Ret_{it} \times Neg_{it} + \epsilon_{it}. \end{aligned} \tag{2}$$

Therefore, our firm-level measure of conservatism is the incremental partial effect of returns on earnings under bad news ($Neg = 1$) compared to under good news ($Neg = 0$), which depends on the firms' size, book-to-market ratio, and leverage, gauging the *CScore*

measure from Khan & Watts (2009):

$$CScore = \left.\frac{\partial Earn_{it}}{\partial Ret_{it}}\right|_{Neg=1} - \left.\frac{\partial Earn_{it}}{\partial Ret_{it}}\right|_{Neg=0} = \beta_3 = \tag{3}$$
$$= \lambda_1 + \lambda_2 Size_{it} + \lambda_3 BTM_{it} + \lambda_4 Lev_{it}.$$

Using Equation (3), *CScore* can be estimated for each firm at each time period according to its value of size, BtM, and leverage.

3.2 RDD Analysis

At the end of April, August, and December of each year, the Ibovespa portfolio selects the stocks that jointly accounted for at least 80% of the sum of all NI calculated for each stock in the preceding 12-month period:

$$NI = \frac{\sum_{i=1}^{P} \sqrt{\frac{n_i}{N} \times \frac{v_i}{V}}}{P}, \tag{4}$$

where n_i is the volume of trades for round lots of stock i, N is the sum of n_i for all stocks in the market, v_i is the financial value generated by the trades for round lots carried out with stock i in the equity market, V is the sum of v_i for all stocks in the market, and P is the number of trading sessions in the previous 12 months (Castro et al. 2019).

As explained by Castro et al. (2019), this methodology changed from 2014 on, increasing the selected stocks' market share to 85% and modifying the NI formulation to:

$$NI = \frac{\sum_{i=1}^{P} \sqrt[3]{\frac{n_i}{N} \times \left(\frac{v_i}{V}\right)^2}}{P}. \tag{5}$$

This mechanical but difficult to manipulate way in which stocks are selected for Ibovespa membership creates an adequate scenario for the RDD strategy, as Cao et al. (2019) explain for the Russel 2000 Index, since it creates a discontinuity in stocks' NI ranking. It is unlikely that a firm can control its negotiability levels to ensure that its stock ends up in the index, forming a quasirandom index assignment, meaning that firm characteristics are likely to be locally continuous across the NI threshold prior to index reconstitution. Therefore, RDD works as a means of identifying the effect of Ibovespa membership on firms' accounting conservatism.

As we further detail in Section 4, we work with yearly data measured at each date on which the Ibovespa portfolio changes. We consider a firm to be an Ibovespa firm in a given 12-month period if it appeared in all three portfolios of that period. The NI, which works as

a cutoff for Ibovespa, varies considerably over the years. For instance, the lowest NI for an Ibovespa firm in 2010 is $1 \exp -06$, while this number in 2015 is 0.000131. To bring all years to the same scale, we create the variable Relative NI (*RelNI*) by defining the Ibovespa firm with the lowest NI in each year as zero, and then we recalculate all other firms' negotiability index, now called *RelNI*, as the deviation (log difference) from this value.

Therefore, RDD identifies the effect of Ibovespa membership by comparing the level of accounting conservatism (measured by the *CScore*) for the smallest positive *RelNI* (firms that just entered the index) with those with the smallest negative *RelNI* (firms that just missed the index). As explained by Castro et al. (2019), there are other factors determining Ibovespa membership in addition to the negotiability index. Therefore, Ibovespa membership is only partially determined by the NI rules. However, since crossing the *RelNI* zero cutoff increases the probability of Ibovespa membership, we follow a fuzzy RDD strategy, in which the running variable is *RelNI* with a zero cutoff and the treatment status is a dummy indicating the Ibovespa firms for each period (i.e., firms that appeared in all three Ibovespa portfolios for each period).

3.3 Analyses Around Inclusions and Deletions

To understand the mechanism behind the effect identified by the RDD analysis, we investigate how accounting conservatism and firms' information environment changes around inclusions and deletions from the Ibovespa, similar to the analyses conducted by Martin et al. (2016) and Cao et al. (2019).

First, we expand Basu (1997)'s model by adding dummy variables indicating firms' inclusions in/deletions from the index:

$$\begin{aligned} Earn_{it} = \beta_0 + \beta_1 Ret_{it} + \beta_2 Neg_{it} + \beta_3 Inc_{it} + \beta_4 Del_{it} + \beta_5 Ret_{it} \times Neg_{it} + \\ + \beta_6 Ret_{it} \times Inc_{it} + \beta_7 Neg_{it} \times Inc_{it} + \beta_8 Ret_{it} \times Del_{it} + \beta_9 Neg_{it} \times Del_{it} + \\ + \beta_{10} Ret_{it} \times Neg_{it} \times Inc_{it} + \beta_{11} Ret_{it} \times Neg_{it} \times Del_{it} + \epsilon_{it}. \end{aligned} \tag{6}$$

If when a firm is included in the index and its information asymmetry decreases, we expect its conditional conservatism to also decrease, so we expect the partial effect of returns on earnings under bad news ($Neg = 1$) to be smaller when firms are included in the Index ($Inc = 1$). Analogously, when a firm is deleted from the index and its information asymmetry increases, we expect its conditional conservatism to also increase, so we expect the partial effect of returns under bad news ($Neg = 1$) to be higher when firms are deleted from the index ($Del = 1$).

For that purpose, the partial effect of returns, considering Equation (6) is:

$$\frac{\partial Earn_{it}}{\partial Ret_{it}} = \beta_1 + \beta_5 Neg_{it} + \beta_6 Inc_{it} + \beta_8 Del_{it} + \beta_{10} Neg_{it} \times Inc_{it} + \beta_{11} Neg_{it} \times Del_{it}. \quad (7)$$

To evaluate the effects of firms' inclusion in the Index, we compare the values of Equation (7) for the scenario where firms faced bad news and were included ($Neg = 1$ and $Inc = 1$) with the scenario where firms faced bad news but were not included ($Neg = 1$ and $Inc = 0$). We expect Equation (7) to have a significantly smaller value when $Inc = 1$. The same procedure is followed for deletions, that is, we compare Equation (7) when $Neg = 1$ and $Del = 1$ with when $Neg = 1$ and $Del = 0$, and we expect it to have a significantly higher value when $Del = 1$.

Next, we rerun the analysis considering the firm-level conservatism measure from Khan & Watts (2009), the *CScore*. Therefore, we estimate Equation (8):

$$CScore_{it} = \beta_0 + \beta_1 Inc_{it} + \beta_2 Del_{it} + \epsilon_{it}, \quad (8)$$

to evaluate whether stocks' inclusions in (deletions from) Ibovespa decrease (increase) the firm-level measure of accounting conservatism, so that β_1 (β_2) is negative (positive) and statistically significant.

4 Data

The data on Ibovespa composition comes from Comdinheiro database. The index portfolio changes every four months (January, May, September), and the information is available from January 1999 to September 2017. Therefore, the index has three different portfolios in each year. In our analysis, we consider 12-month rolling windows referring to each portfolio to match the accounting data, which are available at different time intervals, quarterly or yearly, following the frequency of financial statement disclosure. Therefore, our data are yearly but at a four-month period frequency. Consider, for instance, the 12-month period refers to the first portfolio of a given year, which starts on January 1. We consider the Ibovespa data for the interval from January 1 of year t to January 1 of year $t + 1$. The accounting data for this period are composed by data on the four quarters of year t, ending on March 31, June 30, September 30, and December 31. The market returns used to estimate accounting conservatism are dislocated by three months, following the previous literature, to ensure that the accounting numbers of the period are already available to the market. Therefore, the market data run from April 1 of year t to April 1 of year $t + 1$.

Now, consider the 12-month period referring to the second portfolio of a given year from May 1 of year t to May 1 of year $t+1$. The accounting data used for this period refer to the second, third, and fourth quarter of year t (April 1 to December 31) plus the first quarter of year $t+1$ (January 1 to March 31). The market data refer to July 1 of year t to July 1 of year $t+1$. Finally, let us consider the 12-month period referring to the third portfolio of a given year from September 1 of year t to September 1 of year $t+1$. The accounting data used for this period refer to the fourth quarter of year t (September 1 to December 31) and the first, second, and third quarters of year $t+1$ (January 1 to September 30). The market data refers to January 1 of year $t+1$ to January 1 of year $t+2$.

Since there are several cases of merges, acquisitions, privatizations and delistings, we followed stocks and firms over the period, searching for their history in the market, so we were able to appropriately identify inclusions and deletions from the index that form our interest for the paper. That is, without such care, we could mark deletions that happened because a firm simply changed its ticker, merged or went private, for instance.

During these 19 years of the sample, 136 different firms appear in the index. On average, in each year (considering the three portfolios), there is an average of 57 different firms in the index, the minimum is 46 in 2003, and the maximum is 70 in 2014. A firm may have more than one stock with different classes in the index. Of these 136 firms, 12 (Bradesco, Banco do Brasil, Braskem, Cemig, Copel, Itausa, Itaú-Unibanco, Klabin, Petrobras, CSN, Usiminas and Vale) are in the index for all 19 years, while 57 appear in the index for up to five different years (18 appear only once).

Figure 1 shows the sample distribution of Ibovespa (treated) and non-Ibovespa firms over the period of analysis. Mean weights are calculated as the average of the weights of each firm in the three Ibovespa portfolios in each 12-month period. The figure shows firms by Industry and highlights those with larger mean weights in the index, where one can see that Ibovespa firms have larger values.

Figure 2 shows how our criteria to identify stocks eligible to be in the index for each portfolio based on how the NI matches the actual portfolio compositions. The 57 portfolios have 2,867 observations listed in the index and 2,690 observations considered to be eligible to be in the index according to our NI criterion. Of the 2,690 eligible stocks, 534 were not actually listed in the index (18.63%), while of the 2,867 Ibovespa stocks, 711 were not considered to be eligible (24.80%). The eligibility criterion predicts 59% of the actual membership.

In the RDD analyses, a firm is included in the treatment group in a given 12-month period if it appears in all three portfolios from that period. For the inclusion and deletion analyses, a firm is considered included in the index in year t if it appears in all three portfolios

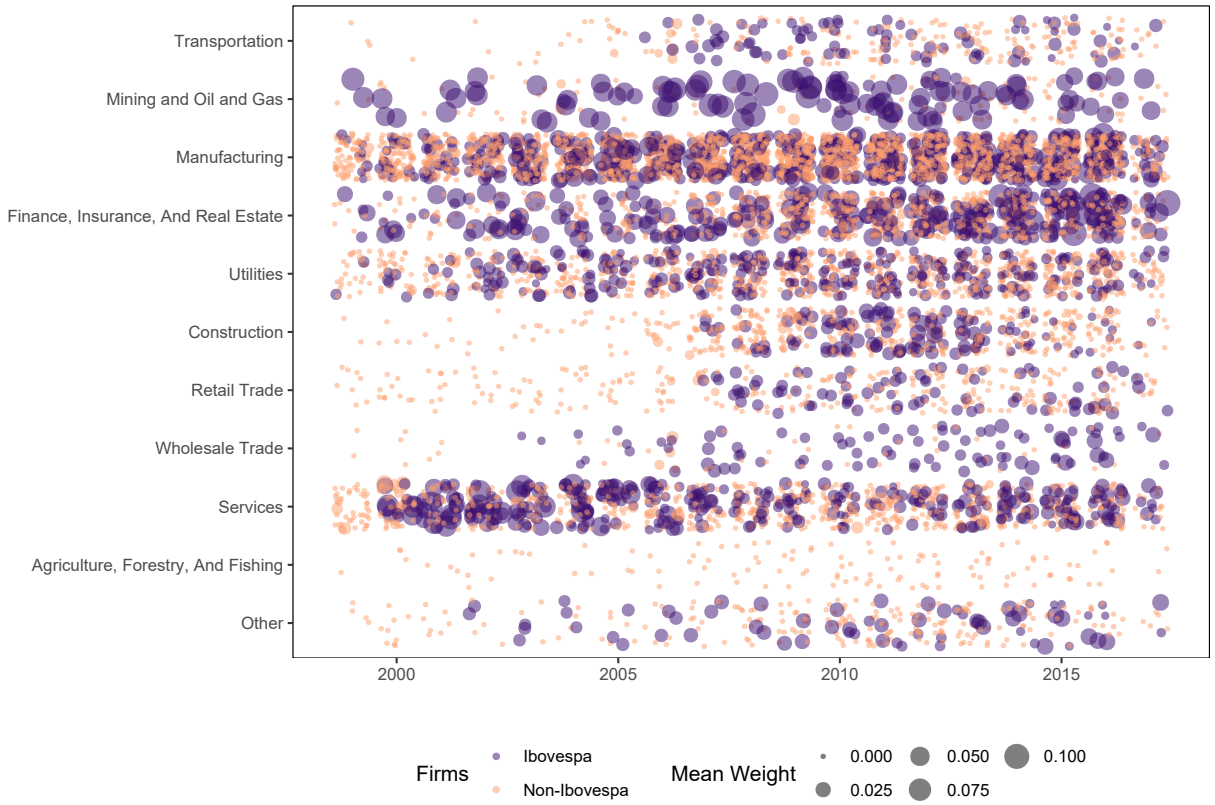


Figure 1: Distribution of Firms

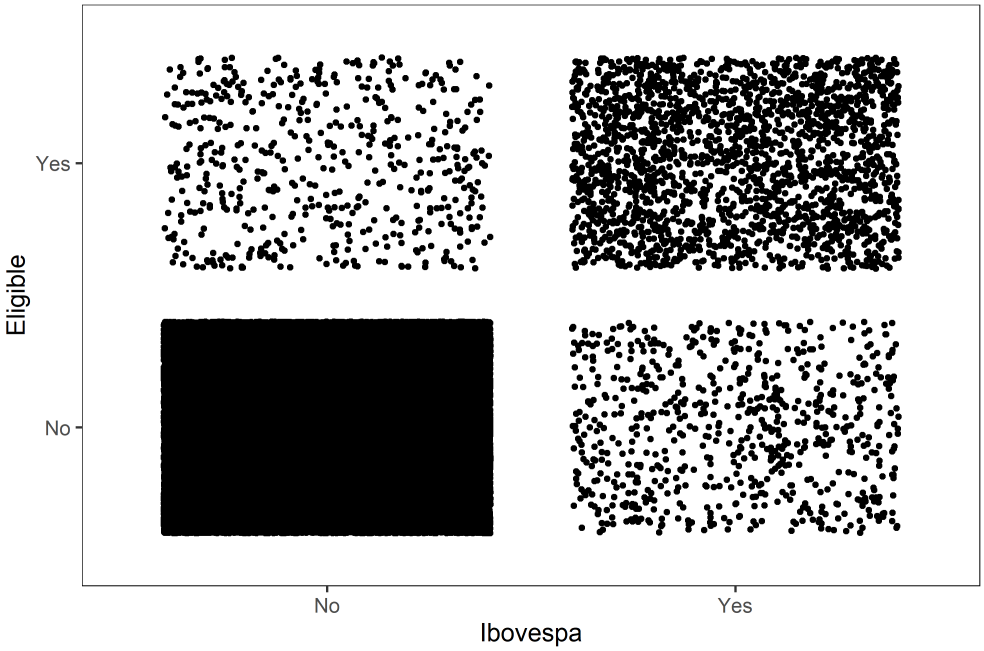


Figure 2: Eligible and Ibovespa Firms

of that year but did not appear in any or in only one or two of the three portfolios in the previous period. Similarly, a firm is considered deleted from the index in a given period if in that period it appears in none or in only one or two of the three portfolios but appeared in all three portfolios in the previous period.

Figure 3 shows the number of inclusions and deletions from Ibovespa for each four-month period. Only in some periods were there no inclusions, while for several periods, there were no deletions. Considering both inclusions and deletions, the average turnover of the index is 10%. For comparison, in the data from Martin et al. (2016), the turnover of the S&P 500 over the period 2000 to 2011 varies from 1% to 9%, with 155 inclusions and 80 deletions.

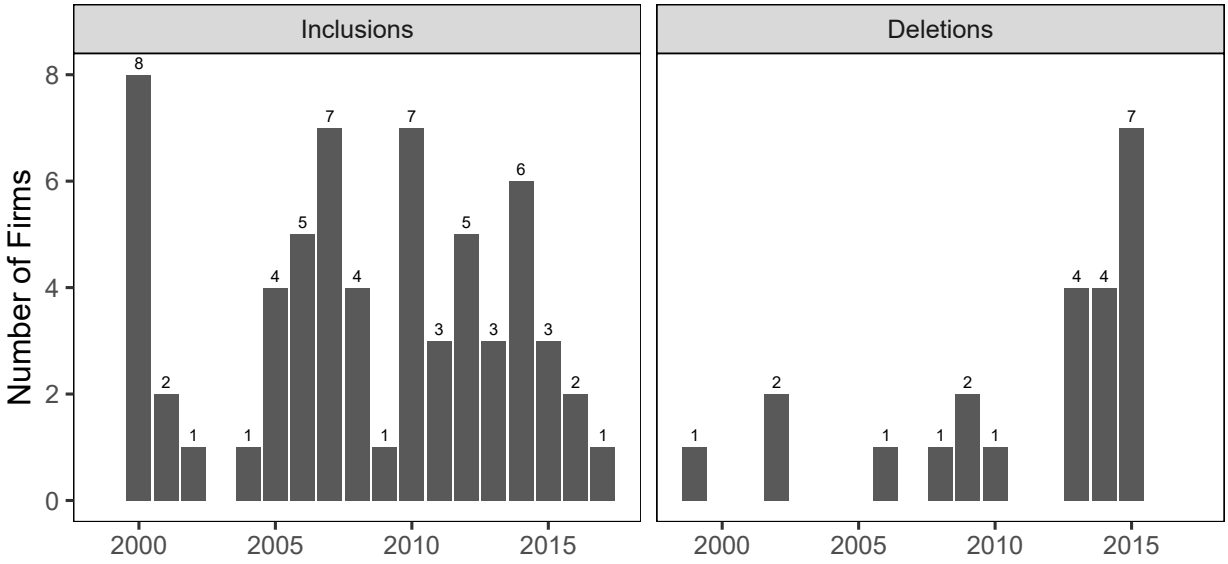


Figure 3: Number of Firms' Inclusions and Deletions in/from Ibovespa

Table 1 shows the mean and standard error for earnings, annual returns, size, BTM, leverage, firm-level conservatism, relative negotiability index, institutional ownership, and the number of analyst following for four different groups of observations: (i) all, (ii) observations of firms in the Ibovespa, and observations of firms (iii) included and (iv) deleted from the index. From the table, institutional ownership and analyst following seem to vary the most among the groups. While on average firms have 24.82% of institutional ownership and 5.98 analysts following, when in the Ibovespa, the means are 31.35% and 9.14.

The market and accounting data are from Economatica. We have 9,037 firm-year observations from 1999 to 2017 (rolling 12-month for each 4-month period). From the total of 9,037 observations, 2,043 are for firms in Ibovespa, of which only 63 refer to inclusions and 23 to deletions. Ibovespa firms tend to be larger, more leveraged, and have lower BtM. The

Table 1: Descriptive Statistics

Variable	Group	N	Mean	SD
Earnings	All observations	9,037	0.017	0.288
	Ibovespa firms	2,043	0.033	0.213
	Inclusions	63	0.068	0.091
	Deletions	23	−0.394	0.779
	All observations	9,037	0.007	0.512
Returns	Ibovespa firms	2,043	0.002	0.448
	Inclusions	63	−0.063	0.494
	Deletions	23	−0.267	0.666
Size	All observations	9,037	15.483	1.774
	Ibovespa firms	2,043	17.460	1.473
	Inclusions	63	16.623	1.168
	Deletions	23	16.101	1.042
BTM	All observations	9,037	1.085	1.121
	Ibovespa firms	2,043	0.810	0.853
	Inclusions	63	0.629	0.535
	Deletions	23	2.072	1.874
Leverage	All observations	9,037	0.588	0.218
	Ibovespa firms	2,043	0.634	0.192
	Inclusions	63	0.587	0.180
	Deletions	23	0.566	0.229
Firm-level Conservatism	All observations	9,037	0.023	0.280
	Ibovespa firms	2,043	−0.070	0.226
	Inclusions	63	−0.098	0.217
	Deletions	23	0.066	0.366
Relative Negotiability Index	All observations	9,037	1.880	3.309
	Ibovespa firms	2,043	5.096	1.989
	Inclusions	63	4.826	2.009
	Deletions	23	3.681	1.162
Institutional Ownership	All observations	4,739	24.823	19.837
	Ibovespa firms	1,179	31.351	19.159
	Inclusions	28	36.771	18.989
	Deletions	13	34.190	16.770
Number of Analysts Following	All observations	4,878	5.980	4.192
	Ibovespa firms	1,621	9.143	4.269
	Inclusions	50	8.720	4.208
	Deletions	20	7.075	3.436

negative values for firm-level conservatism suggest that Ibovespa firms are less conservative, especially when included, but when deleted they are more conservative than the average. The institutional ownership data come from the S&P Capital IQ database, and the analyst following data come from the IBES database. The data for these variables are substantially more restricted. Of the 9,037 observations, only 4,878 have data on analyst following, and 4,739 have data on institutional ownership, for which data are available only from 2004.

5 Results

5.1 Basu's Conservatism

Initially, we report the results for the conservatism measure. Table 2 shows the results of the estimation of Equation (1) for the traditional conservatism model from Basu (1997). We estimate three different models, the first via ordinary least squares without individual or time effects, while the next two are estimated via a fixed-effect panel data regression, with the last model including time dummies. Since the interaction is positive and significant in all models, they all yield the same conclusion, indicating the presence of conditional conservatism for Brazilian firms for the period from 1999 to 2017.

As seen in Section 3, firm-level conservatism is measured from Basu (1997)'s model, adding interactions with firms' size, BTM, and leverage in each year, generating the $CScore$ measure (Khan & Watts 2009). We estimate firm-level conservatism using time and firm fixed effects.

5.2 RDD Analysis

Figure 4 shows the visualization of the fuzzy RDD estimation of the effect of Ibovespa membership on firm-level accounting conservatism. Figure 4 shows that, in general, conservatism falls as the Relative NI grows, consistent with the idea that conservatism is positively related to information asymmetry. More important, firms that had just crossed the zero threshold, which increases their probability of being included in the Ibovespa, have lower conservatism than those that just missed the threshold. This is consistent with the hypothesis that Ibovespa membership increases the quality of firms' information environment, leading to a decrease in accounting conservatism.

In addition to the visual inspection, we estimate the effect using a variety of fuzzy RDD model specifications, namely using different procedures in the literature for bandwidth selection and corrections for undersmoothing biases (Calonico et al. 2014), as Table 3 shows. All models use nonparametric local linear regressions, estimating a LATE. Models (1) and

Table 2: Traditional Conservatism Model

	Dependent variable:		
	Earnings		
	(1)	(2)	(3)
Ret	0.029*	0.060***	0.048***
	(0.017)	(0.017)	(0.019)
Neg	0.020*	0.027***	0.025**
	(0.011)	(0.010)	(0.010)
Ret× Neg	0.300***	0.166***	0.198***
	(0.036)	(0.033)	(0.033)
Intercept	0.064***		
	(0.006)		
Individual Fixed Effects	No	Yes	Yes
Time Fixed Effects	No	No	Yes
Clustered Std. Errors	Yes	Yes	Yes
Observations	9,037	9,037	9,037
R^2	0.129	0.068	0.111
Adjusted R^2	0.129	0.021	0.065
F Statistic	445.346***	208.722***	50.997***
Note:			*p<0.1; **p<0.05; ***p<0.01

(4) use the bandwidth selection criteria from Imbens & Kalyanaramang (2009), but Model (4) includes the correction for the undersmoothing bias. Both models yield a negative and significant result, while Model (4) shows a stronger effect.

Model (2) from Table 3 follows Calonico et al. (2015) to define the bandwidths, which are slightly lower than those defined according to Imbens & Kalyanaramang (2009). The effect is also negative and significant. Model (3), however, relies on Imbens & Kalyanaramang (2012) for bandwidth selection, yielding a considerable larger bandwidth, using two-thirds of the total observations. This model generates a negative but not significant coefficient. This is consistent with the higher variation of the data far from the cutoff (Figure 4). If not correcting for undersmoothing, however, the Imbens & Kalyanaramang (2012) bandwidths generate a smaller but statistically significant coefficient, as in Model (5). In general, therefore, the results in Table 3 indicate that firms whose NI places them in Ibovespa have lower accounting conservatism than those whose NI was not high enough to make them Ibovespa firms, consistent with the hypothesis that market index membership decreases information asymmetry and, therefore, accounting conservatism.

A key assumption for the RDD analysis is that the subjects cannot manipulate their own results to access the treatment. In our analysis, it is very unlikely that firms can manipulate their negotiability index since it is calculated relative to other firms. It is impossible to predict what level of negotiability it must achieve to enter the index, since it depends on

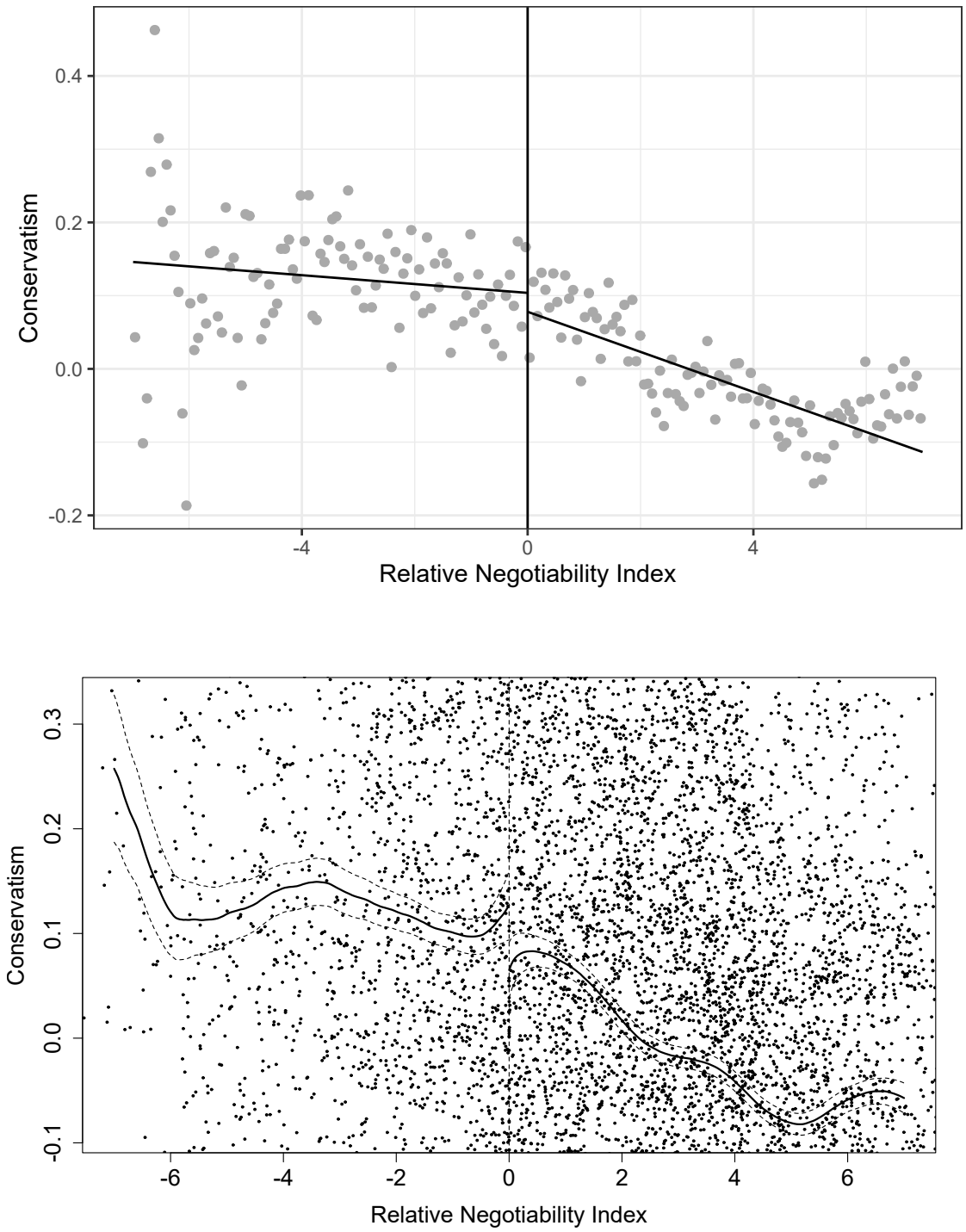


Figure 4: Regression Discontinuity Design

other firms' results. In addition to theoretical arguments, the literature relies on the McCrary (2008) test to evaluate the running variable density around the cutoff. The rationale is that if

Table 3: RDD estimation results

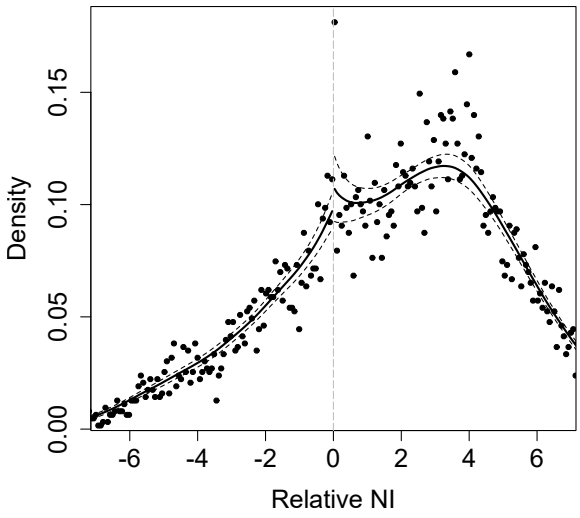
Model	Bandwidth Selection	Bandwidth	N	Estimate	Estimate New
(1)	IK (2009)	1.264	2,051	-0.247^{**}	-1.836^{*}
				(0.105)	(0.062)
(2)	CCT (2015)	1.139	1,878	-0.283^{***}	-0.129^{*}
				(0.108)	(0.060)
(3)	IK (2012)	4.819	7,062	-0.761	-0.351
				(0.767)	
(4)	IK (2009)	1.264	2,051	-0.379^{***}	
				(0.144)	
(5)	IK (2012)	4.051	6,107	-0.152^{***}	
				(0.016)	
(6)	IK (2009)	1.264	2,051	-0.331^{***}	
				(0.028)	

Note: Models (4) and (5) are robust to undersmoothing, according to Calonico et al. (2014). IK (2009) refers to Imbens & Kalyanaramang (2009), CCT (2015) refers to Calonico et al. (2015), IK (2012) refers to Imbens & Kalyanaramang (2012).

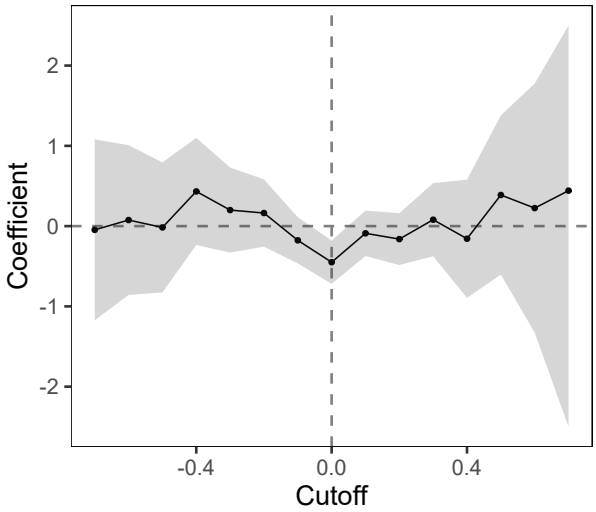
the density is higher right after the cutoff, this is evidence that the subjects are manipulating their results to be treated. With a p-value of 0.260, we do not reject the null hypothesis of no discontinuity of our running variable *RelNI* around the cutoff point, indicating that there is no abnormal concentration of firms at the right of the cutoff, which reiterates our argument that firms cannot manipulate their negotiability to enter the index. Figure 5a shows the visual result of the McCrary (2008) test.

A second key assumption is that the treatment occurs only at the cutoff. If significant coefficients are found at different cutoffs, it is difficult to argue the effect is indeed due to the treatment. To evaluate this, we conduct placebo tests, running our analysis considering different cutoffs. Figure 5b shows the coefficients and their respective 95% confidence intervals. Due to the extreme variation in estimates farther from the zero cutoff, we trimmed the results to not compromise visualization. The figure shows that a negative and significant effect is found only at the zero cutoff, reinforcing our result of the negative effect of Ibovespa membership on firms' accounting conservatism.

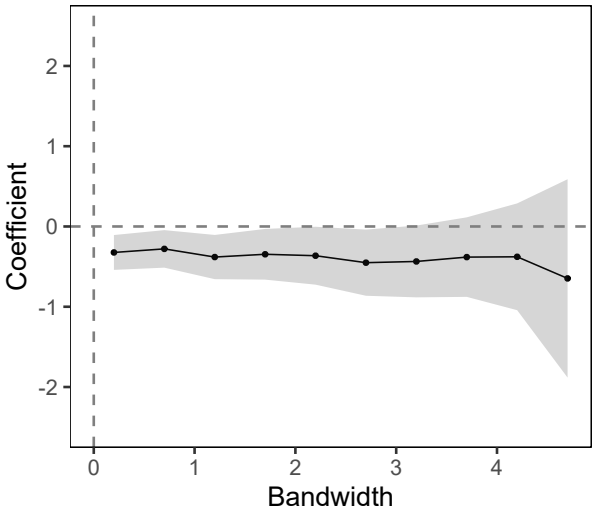
The third assumption we test is whether *RelNI* affects only the outcome variable (conservatism) and does not affect other covariates. We rerun the RDD analysis on firms' ROA, annual returns, and cash stock and find no significant effect for those variables at the zero cutoff. Finally, we also consider the sensitivity of the results to bandwidth selection. Figure 5c shows that the effect remains negative and significant for bandwidths up to 3.2. Higher bandwidths yield nonsignificant treatment effects, which is expected considering the high variation in the data far from the zero cutoff.



(a) McCrary (2008) test



(b) Placebo Tests



(c) Sensitivity to Bandwidth Selection

Figure 5: Testing RDD Assumptions

5.3 Inclusions and Deletions

Table 4: Conservatism Model: Inclusions and Deletions

(a) Regression Results

	Dependent variable:
	Earnings
Ret	0.051**
	(0.020)
Neg	0.027**
	(0.011)
Inclusions	−0.059
	(0.046)
Deletions	−0.283
	(0.253)
Ret× Neg	0.201***
	(0.036)
Ret× Inc	0.202
	(0.150)
Neg× Inc	0.016
	(0.052)
Ret× Del	−0.254
	(0.480)
Neg× Del	0.406
	(0.283)
Ret× Neg× Inc	−0.468***
	(0.160)
Ret× Neg× Del	0.944*
	(0.490)
Individual Fixed Effects	Yes
Time Fixed Effects	Yes
Clustered Std. Errors	Yes
Observations	8,443
R^2	0.123
Adjusted R^2	0.076
F Statistic	38.652***
Note:	*p<0.1; **p<0.05; ***p<0.01

(b) Partial Effects

Scenario	$\partial Earn/\partial Ret$	Estimations
$Neg = 0$, $Inc = 0$, $Del = 0$	β_1	0.051***
$Neg = 1$, $Inc = 0$, $Del = 0$	$\beta_1 + \beta_5$	0.251***
$Neg = 1$, $Inc = 1$, $Del = 0$	$\beta_1 + \beta_5 + \beta_6 + \beta_{10}$	−0.015
$Neg = 1$, $Inc = 0$, $Del = 1$	$\beta_1 + \beta_5 + \beta_8 + \beta_{11}$	0.941***

Panel (a) of Table 4 shows the estimation results for Equation (6), which is Basu (1997)'s model with interactions to evaluate inclusions and deletions. The interaction $Ret \times Neg$ is still

positive and significant, indicating the presence of conservatism. The interactions between $Ret \times Neg$ and Inc and between $Ret \times Neg$ and Del are also significant. Panel (b) of Table 4 shows the partial effects (correlation) of earnings and returns, and their significance according to an F-test, under four different scenarios: (i) when all dummies are zero, so it indicates a general association between earnings and returns; (ii) the association between earnings and returns under bad news, without considering either inclusions or returns, so that $Neg = 1$ but both Inc and Del are zero; (iii) the association between earnings and returns under bad news when firms are included in the Ibovespa, so that Neg and Inc equal one; and (iv) the association between earnings and returns under bad news when firms are deleted from the Ibovespa (Neg and Del equal one).

The results in Panel (b) of Table 4 show that the general partial correlation between earnings and returns is 0.051, and it rises to 0.251 under bad news. However it declines to null (not significant at the usual levels) when firms are included in the Ibovespa. When firms are deleted, the partial correlation rises again, to 0.941.

If being included (deleted) in (from) the Ibovespa represents a shock to the firms' information asymmetry, the results from Table 4 are consistent with our hypothesis that conservatism is a response to higher information asymmetry, indicating its role as a contracting mechanism. When a firm is included in (deleted from) all three Ibovespa portfolios in a certain period, it is suddenly exposed to (excluded from) a broader set of investors, mainly through investment fund portfolios mimicking the index, and to (from) a broader scrutiny of financial analysts and the media. With this greater (lesser) monitoring, the need for a more timely recognition of losses than gains to generate lower earnings during that period, so that managers have less room to expropriate the firm, e.g., via their compensation schemes, becomes less (more) important because it is compensated for by this greater (lesser) scrutiny. Therefore, the decrease (increase) in conservatism after firms are included in (deleted from) the index is consistent with the idea that investors demand more conservative reports when they have less information on the firm to reduce their expropriation risks.

Table 5 shows the estimation results of Equation (8), also yielding a negative effect of Ibovespa inclusions, again indicating a decrease in conservatism after inclusions in the index.

5.4 The role of Institutional Ownership and Analyst Following

The results thus far indicate that Ibovespa membership decreases the need for conservative accounting reports. We hypothesize that this happens because of the information flow around the index. When a firm is included (deleted), its information flows increases (decreases) so that information asymmetry declines, and consequently, there is less (more) need

Table 5: Firm-level Conservatism Model: Inclusions and Deletions

	Dependent variable:
	Firm-level Conservatism
Inclusions	-0.036^{***}
	(0.013)
Deletions	0.045
	(0.043)
Individual Fixed Effects	Yes
Time Fixed Effects	Yes
Clustered Std. Errors	Yes
Observations	8,443
R^2	0.151
Adjusted R^2	0.103
F Statistic	26.301^{***}
Note:	*p<0.1; **p<0.05; ***p<0.01

for conservative reports. Now, we investigate the channels through which such changes in information asymmetry occur. Specifically, we analyze whether there is variation in both institutional ownership and analyst following between Ibovespa and non-Ibovespa firms and around inclusions and deletions.

Table 6: Mean Tests: Percentage of Institutional Ownership and the Number of Analysts

(a) Observations in Ibovespa *versus* observations out of Ibovespa				
	Institutional Ownership (%)		Number of Analysts Following	
	Cohort (A)	Cohort (B)	Cohort (A)	Cohort (B)
N	1,179	3,560	1,621	3,257
Mean	31.35	22.66	9.14	4.41
Test Stat.	13.42^{***}		39.69^{***}	
(b) Observations of Ibovespa firms when in Ibovespa *versus* observations of Ibovespa firms when out of Ibovespa				
	Institutional Ownership (%)		Number of Analysts Following	
	Cohort (A)	Cohort (C)	Cohort (A)	Cohort (C)
N	1,179	430	1,621	612
Mean	31.35	28.35	9.14	6.21
Test Stat.	2.93^{***}		16.45^{***}	

Note: Cohort (A) identifies observations pertaining to the index at each period in time. Cohort (B) identifies firms that are not listed in the index in each period of time. Cohort (C) identifies the observations for a subsample of firms that are included in Ibovespa at some point in time but only for periods of time when they are not present in the index.

Panel (a) of Table 6 shows the results for mean tests (Student's t) for the difference in means of the percentage of institutional ownership and the number of analysts following between two cohorts of observations: cohort (A) identifies observations pertaining to the index in each period of time, and cohort (B) identifies firms that are not listed in the index in each period of time. It shows that Ibovespa observations have an average of 31.35% institutional ownership against only 22.66% for non-Ibovespa firms. Similarly, Ibovespa firms have an average of 9.14 analysts following them, and the non-Ibovespa firms average only 4.41.

Now, one may argue that firms that appear in the index are inherently different from those that do not make it into the index, so the Ibovespa firms naturally have larger institutional ownership and analyst following than the non-Ibovespa firms. To test this, we conduct the analysis in Panel (b) of Table 6. We test the difference in means of the percentage of institutional ownership and the number of analysts following between two different cohorts of observations, now considering a subsample of firms that make it into Ibovespa at some point in time: the first cohort identifies observations when this subsample of firms are present in the index (coinciding with cohort (A)), and cohort (C) identifies the observations for this same subsample but for periods of time when they are not present in the index. Therefore, Panel (b) tests the same firms but at different moments (when in Ibovespa and when not in Ibovespa). The results show that these firms do present lower institutional ownership and analyst following when out of the index (28.35% and 6.21, respectively) than when in the index (31.35% and 9.14).

The results in Table 6 also hold when controlling for other variables, namely size, ROA, BtM, leverage and trading volume, plus firm and year fixed effects, via a panel regression analysis. Table 7 shows these results, where the dummy variable indicating Ibovespa observations (the same as cohort (A) in Table 6) is positive and significant in explaining the percentage of institutional ownership and the number of analysts following after controlling for firm characteristics and year effects.

Next, we investigate whether the difference in the percentage of institutional ownership and in the number of analysts following can be felt around inclusions (deletions) to be strong enough to drive the decrease (increase) in conservatism. Therefore, we analyze the variation in the two variables around these events. We calculate the variations in both institutional ownership and analyst following from before and after firms are included and deleted. We first test whether these variations are significantly different from zero in a Mann-Whitney nonparametric means test. Next, we analyze whether inclusion and deletion events can explain these variations in a regression analysis under firm and time controls.

The results of the Mann-Whitney tests are shown in Table 8. The average variation

Table 7: Regressions: Ibovespa versus non-Ibovespa firms

	Dependent variable:	
	% Institutional Ownership	Analysts Following
	(1)	(2)
Ibovespa	3.485*	1.695***
	(2.069)	(0.325)
Size	4.878*	1.510***
	(2.499)	(0.331)
ROA	8.830	−0.589
	(7.423)	(1.131)
MTB	1.141**	−0.151*
	(0.527)	(0.084)
Leverage	3.030	−2.387**
	(6.427)	(1.045)
Trading Volume	1.248**	0.559***
	(0.505)	(0.079)
Individual Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
Clustered Std. Errors	Yes	Yes
Observations	4,739	4,878
R^2	0.226	0.407
Adjusted R^2	0.185	0.371
F Statistic	69.183***	131.459***
Note:		*p<0.1; **p<0.05; ***p<0.01

in both variables is positive around inclusions and negative around deletions. However, for inclusions, only the variation in the number of analysts following is significant. For deletions, both are significant. In the regression analysis, the results hold only for deletions regarding the variation in institutional ownership, while both inclusions and deletions are significant in explaining the variation in analysts following. After controlling for the other variables, when firms are included in the index they have, on average, 0.405 more analysts following them, and when they are deleted they lose, on average, 0.529 analysts.

Table 8: Mean Tests: Variation in the Percentage of Institutional Ownership and the Number of Analysts

(a) Following Inclusions		
	Δ Institutional Ownership (%)	Δ Analysts Following
N	25	50
Mean	0.072	0.503
Test Stat.	158	903.5^{**}
(b) Following Deletions		
	Δ Institutional Ownership (%)	Δ Analysts Following
N	13	20
Mean	-3.199	-0.588
Test Stat.	0^{***}	26^{***}

Thus, the last analyses show that while firms have both more analysts following and institutional ownership when they are listed in the Ibovespa, immediately after being included and deleted, their information flow changes mainly because of the increase and decrease in the number of analysts following them. When included in the index, with this additional scrutiny, there is less need to provide conservative accounting reports, since there are other mechanisms, i.e., the increase in analysts following, to decrease information asymmetry and minimize the risk of expropriation.

6 Concluding Remarks

This research sought to evaluate whether the supply of conservative financial statements acts as a response to changes in firms' information asymmetry in the Brazilian stock market. The literature argues that conservatism may act as a mechanism for efficient contracting (Basu 1997, Watts & Zimmerman 1986) as a way to offset firms' poor information environment to decrease expropriation risk (LaFond & Watts 2008, Martin et al. 2016). Testing this hypothesis, Martin et al. (2016) found that firms' conservatism, as defined by Basu (1997),

Table 9: Regressions: Around Inclusions and Deletions

	Dependent variable:	
	Δ Institutional Ownership	Δ Analysts Following
	(1)	(2)
Ibovespa	-1.078^{**}	-0.306^{***}
	(0.500)	(0.072)
Inclusions	-0.102	0.408^{***}
	(0.417)	(0.157)
Deletions	-3.308^{***}	-0.529^{***}
	(0.885)	(0.137)
Size	0.295	-0.019
	(0.276)	(0.060)
ROA	0.829	1.226^{***}
	(1.289)	(0.313)
MTB	-0.221	-0.034
	(0.140)	(0.026)
Leverage	-0.711	-0.159
	(1.052)	(0.173)
Trading Volume	-0.093	0.063^{***}
	(0.101)	(0.024)
Individual Fixed Effects	Yes	Yes
Time Fixed Effects	Yes	Yes
Clustered Std. Errors	Yes	Yes
Observations	4,444	4,575
R^2	0.044	0.129
Adjusted R^2	-0.009	0.075
F Statistic	9.252^{***}	24.637^{***}
Note:		*p<0.1; **p<0.05; ***p<0.01

decreases when information asymmetry is reduced following their inclusion in the S&P 500 market index and increases when information asymmetry rises following their deletion from the S&P 500.

We conduct a similar analysis for the Brazilian market, following the methodology of both Martin et al. (2016) and an RDD similar to Cao et al. (2019), motivated by the clear methodology forming the main Brazilian market index (Ibovespa) portfolios. Analyzing the composition of Ibovespa from 1999 to 2017, we found that firms included in the index have significantly lower levels of conditional conservatism than firms with similar levels of negotiability that were not included in the index, according to the RDD approach. Additionally, we found that when firms are included (deleted) in (from) the index, their conservatism decreases (increases), mainly due to an increase (decrease) in the number of analysts following them. The evidence we provide is consistent with the hypothesis that inclusions and deletions in/from the market index represent shocks to firms' information asymmetry that are followed by lower and higher conservatism, respectively. This indicates that conservatism follows changes in firms' information asymmetry to balance investors' expropriation risks. Furthermore, we found that analyst following seems to be the main channel that drives the information flow around the Ibovespa in the Brazilian market.

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