Revista de Educação e Pesquisa em Contabilidade
Journal of Education and Research in Accounting

Periódico Trimestral, digital e gratuito publicado pela Academia Brasileira de Ciências Contábeis | Available online at www.repec.org.br

REPeC, Brasília, v. 16, n. 1, art. 2, p. 14-30, Jan./Mar 2022 | DOI: http://dx.doi.org/10.17524/repec.v16i1.2591 | ISSN 1981-8610

Delisting among Brazilian Companies: an explanatory model from 2013 to 2018

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Abstract

Objective: This study aims to identify the main accounting variables explaining the decision of companies to delist. The number of companies has increased in recent years, and specific investors and the market may be harmed due to decreased liquidity.

Method: This study addresses data from companies traded in the B3, analyzing 126 cancellations of registration between 2013 and 2018 by separating the groups and performing logistic regression to analyze the delisting event.

Results: The results enabled identifying the main determinants for companies to go private: (i) greater ownership concentration, (ii) lower growth, (iii) lower liquidity, (iv) greater cash availability, and (v) larger size, consistent with previous studies.

Contributions: These results contribute to advancing the modeling adopted by Bortolon and Silva Junior (2015), reaching 100% sensitivity for the occurrence of delisting and 88.89% of specificity. The application of modeling can support investors in identifying when a company is likely to delist.

Keywords: Delisting; Going private; Cancellation of registration.

Published in Portuguese and English. Original Version in Portuguese.

Received in 3/20/2020. Ask to Revise on 1/20/2022. Resubmitted on 1/27/2022. Accepted on 3/11/2022 by Dr. José Elias Feres Almeida (Assistant Editor) and by Dr. Gerlando Augusto Sampaio Franco de Lima (Editor). Published on 4/1/2022. Organization responsible for the journal: Abracicon.

1. Introduction

The movement of publicly traded companies has been investigated in recent years, focusing only on stock launching and subsequent offering of shares. A company's first public offering of shares is called Initial Public Offering (IPO). When a company is already publicly traded and has conducted its IPO, new offerings are called Subsequent Share Offerings (follow-on). An IPO is usually seen as a rite of passage in the life cycle of a young and successful company, at which point it reaches its most crucial point in the development of a private company (Bharath & Dittmar, 2006).

Bortolon and Silva Junior (2015) show that IPO processes grew significantly in Brazil between 2004 and 2007, when it reached its peak, four times the volume of inflow of resources from IPOs than the number of delisting. However, based on the analysis of the evidence presented by the previously mentioned authors, a contrary movement was verified from the 2008 crisis on, as the number of delisting was greater than that of IPOs. Moreover, this process continued in the following years and was two and five times greater than IPOs in 2011 and 2012, respectively (B3, 2019).

There is a need to verify the potential factors determining a company's decision to go private. Boot, Gopalan, and Thakor (2008) indicate that negative volatility in the company's ownership leads to uncertainty on the alignment between its management and shareholders. Oliveira and Kayo (2015) verified that when more extended periods are considered (1, 2, or 3 years), relative returns of Brazilian IPOs were negative, indicating the poor performance of IPOs and held in the portfolio until specific periods.

Younesi, Ardekani, and Hashemijoo (2012) conducted a study with Malaysian companies, noting that IPOs returns were positive only on the first day of listing on the stock exchange, losing return value in all the subsequent periods, which mitigates the appeal of the capital market. Thus, based on the studies included in the theoretical framework and increasing delisting, the following study problem stands out: **What are the leading accounting variables explaining delisting among companies listed in Brazil in the B3?**

To answer the research problem, the objective is to analyze the main determinants for a company to withdraw its shares from the stock exchange, considering the period from 2013 to 2018. Hence, we used the economic-financial data available at the Securities and Exchange Commission (CVM), retrieved through the Economatica database.

This study's results can contribute to capital market users, especially investors. The delisting in the capital market decreases the supply of securities, consequently decreasing the market's liquidity (Nóbrega, Loyola, Guedes Filho, & Pasqual, 2000). For the shareholders, it is an opportunity to undo investments, but it can also harm an entire strategy or investment portfolio, especially in times of financial crisis, such as the one faced in the analysis period (Fidanza, Morresi, & Pezzi, 2018). Operationally, this study contributes to the literature because it expands until 2018 the analysis performed by Bortolon and Silva Junior (2015), which investigated delisting between 2001 and 2012. Additionally, this study addresses a period of considerable economic variation in Brazil, leading to the financial year with the highest number of delisting – 2017.

Anticipating knowledge about the delisting of a company from the stock market or identifying the signs of such a move can be relevant to investors. For example, in the Chinese capital market, Zhou, Zhang, Yang, Su, and An (2018) reveal that the pressure to go private directly contributes to fraud. In this sense, Souza, Costa, Almeida, and Bortolon (2013) showed a positive association between delisting and earnings management.

2. Theoretical Framework

A downward trend in IPOs was observed in the Brazilian context after an increase in the amount of capitalized resources from 2007 onwards (Bortolon & Silva Junior, 2015). Data from B3 (2019) show these resources remained balanced up to 2011, with new IPOs; however, after this period, there is a strong tendency of delisting, reaching high numbers, 23 and 45 cancelations in 2016 and 2017, respectively. Therefore, an inverse movement is emerging, as we can see in the relationship between these variables.

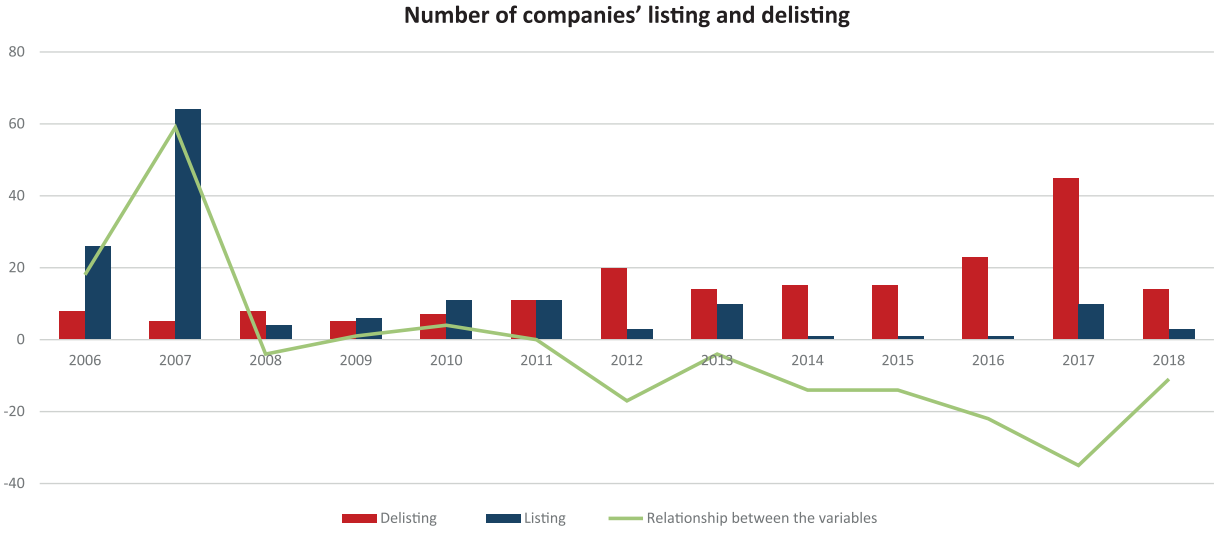

Figure 1. Listing and Closing Flow

These points show a need to verify and understand the factors influencing the decision of companies to delist. This inverse movement has increased significantly in the financial market, as shown by Michelsen and Klein (2011) in Germany, which is in line with Bharath and Dittmar (2006), who believed that when a company goes public, it reaches the final stage of its life cycle.

In part, there is a contradiction in the theoretical reasons reported by the studies presented here when taking into account the financial situation of each country, so it is necessary to verify and estimate the determinants of such a decision. As Sannajust (2010) shows, companies with minor growth prospects, low liquidity, and considerable free cash flow in Europe, the United States, and Asia have more reasons to go private (Public to Private Transactions – PTP).

2.1 Delisting in the Brazilian and International Context

The Brazilian literature is restricted in terms of how extensive the studies are and the parameters on the delisting of publicly traded companies, as few studies address this important topic. However, studies performed in different countries can support the clarification of these aspects, as some report the variables influencing the delisting of companies from the B3.

The determinants of delisting identified by Bortolon and Silva Junior (2015) in the Brazilian context include (i) lower free float; (ii) lower share liquidity; (iii) greater cash availability, and (iv) larger companies. These variables could reflect a company's life cycle, exploring size, structuring and monitoring costs, corporate restructuring, and no need to raise funding (Eid Júnior & Horng, 2005; Michelsen & Klein, 2011).

However, Bortolon and Silva Junior (2015) report that the most important factor concerns the high concentration of ownership and the control of shareholders; the factors previously listed complement this leading factor. The desire to keep a company's control leads to the gradual implementation of the delisting process. The authors also verified that the most relevant factor in companies whose main shareholders are privately-held companies is liquidity, while cash availability has a more significant impact among those companies whose main shareholders are publicly traded companies.

On the other hand, in an international analysis addressing samples from European markets, Thomsen and Vinten (2014) highlight that regulations that impose corporate governance standards – investor protection and corporate governance codes – are associated with a greater likelihood of publicly trade companies delisting, and use only private transactions. According to Thomsen and Vinten (2014), this occurs due to increased bureaucracy and transaction costs that do not add sufficient value to minority investors. Therefore, keeping companies private or merging is more advantageous than distributing governance fixed costs over a greater volume of economic activity.

2.2 Determining Factors for Companies Delisting

Companies show signs of change even before disclosing any intention to go private. For instance, Shawn, Kim, and Jung (2019) verified that companies intending to delist are more conservative to mitigate higher litigation risks.

Based on Brazilian and international studies and proceeding with the studies using data from B3, seven groups of variables were established. Bortolon and Silva Junior (2015) postulated these seven factors: ownership structure, liquidity, cash availability, dividends, growth, size, and indebtedness.

The ownership structure variable concerns aspects related to the shareholders, deviation of rights, and free-float shares. As shown by Correa, Silva, Pinheiro, and Melo (2015), the companies' ownership structure differs in terms of shareholder concentration, which can be more dispersed or concentrated in terms of the level of control. Dispersed ownership occurs when there is a large number of shareholders, and concentrated ownership occurs when few shareholders are holding a large number of shares, in which there is also a controlling shareholder, a situation when there is a greater propensity to go private (Bessler, Kaen, Kurmann, & Zimmermann, 2012).

Michelsen and Klein (2011) explain that the concentration of company control in Germany had nothing to do with delisting in a sample of 52 companies, though Konno and Itoh (2017) found that shareholder concentration in some sectors in the Tokyo Stock Exchange significantly affect delisting. In turn, Bortolon and Silva Junior (2015) found evidence that greater ownership and control concentration between 2002 and 2012 was one of the factors determining the delisting of companies in Brazil. Later Moreira, Oliveira, Peixoto and Pereira (2017) corroborated these findings. Correa *et al.* (2015) and Caixe, Matias, and Oliveira (2013) report that the profile of publicly traded companies in Brazil is characterized by high ownership concentration, including family structures that usually monitor management.

Free float makes the decision-making process at the shareholders' meeting more difficult because the higher the percentage of shares held by small shareholders – with less than 5% participation – the more complex the process of approving resolutions. Bortolon and Silva Junior (2015) note that this is an additional factor influencing delisting.

The second variable is liquidity. As noted by Sannajust (2010), and corroborated by Balios, Eriotis, Missiakoulis, and Vasiliou (2015), companies with low liquidity are more likely to go private; low liquidity occurs when a company's shares are not traded very quickly.

Michelsen and Klein (2011) consider that low liquidity has adverse effects on the companies' assessment, making it challenging to correct its value in the capital market. Low liquidity may influence a company to withdraw from the stock market (Balios *et al.*, 2015). Bortolon and Silva Junior (2015) note that liquidity in the Brazilian market is the most relevant factor for companies whose main shareholders are privately held controllers.

The third variable concerns cash availability. According to the results reported by Bortolon and Silva Junior (2015), it is the most important factor when the controlling shareholder is a publicly-traded company. In addition, Saito and Padilha (2015) and Jensen (1986) indicate that cash flow problems emerge when a company with a strong generation of free cash flow but low growth prospects tends to retain resources rather than distribute them to shareholders, thus causing agency problems.

In Hong Kong, Du, He, and Yuen (2013) postulated that companies with significant free cash flow and weak corporate governance are associated with delisting. Pour and Lasfer (2013) found evidence in the British market that companies with significant free cash flow and low growth prospects are more likely to go private voluntarily. According to Tutino, Panetta, and Laghi (2013), no evidence was found in the Italian market of any relationship between excess cash flow and going private.

These studies' findings suggest that cash availability favors delisting, the higher the cash availability, the more likely a company is to start a delisting process. The reason is that companies with high cash availability do not need third-party resources; hence, they no longer need to remain public. Perobelli *et al.* (2014) and Aslan and Kumar (2011) state that the most important reason for a company to go public is that it is a cheap financing option (depending on its structural set) to invest in the company's growth options.

Djama, Martinez, and Serve (2014) note that the decision to delist results from weighing between costs and benefits; in most cases, the companies experienced a performance problem before choosing to go private. Moreira *et al.* (2017) also indicate that by going private, companies will not have to deal with the costs of keeping their registration, such as regularly disclosing results. The fourth variable refers to dividend payout, measured by dividend yield. Bortolon and Silva Junior (2015) and Michelsen and Klein (2011) found concrete evidence that dividend payout interferes in a company's decision to go private. While shareholders are highly interested in high dividends, the companies' managers want to keep the money to finance investments. Michelsen and Klein (2011) note that going private is a way for the owner to restore, at least in part, the division between ownership and control because shareholders and managers do not necessarily have the same goals; it is easier to focus on long term strategies and objectives without dealing with the pressure to obtain high profits and pay dividends to shareholders.

The fifth variable concerns the company's growth. Bortolon and Silva Junior (2015) defend the existence of an inversely proportional relationship between growth and delisting. Pour, and Lasfer (2013) found evidence that voluntary delisting occurs when growth prospects and returns are low, generating negative results during the period. Michelsen and Klein (2011) also support this thesis because their analyses showed that sectors with low growth and need for capital dominated delisting in Germany. Tutino *et al.* (2013) also found evidence in Italy corroborating these results.

The sixth variable is size; the smaller the company, the smaller the volume of information generated and disclosed. Consequently, investors will pay less attention to it, and fewer analysts will monitor them, which affects the stock's liquidity (Bortolon & Silva Junior, 2015), though Bortolon and Silva Junior (2015) found results contrary to those reported by other authors. For example, differently from what Boot *et al.* (2008) reported in the United States, Michelsen and Klein (2011) in Germany and Tutino *et al.* (2013) in Italy that small companies are more likely to go private, Bortolon and Silva Junior (2015) verified that the companies that went private were larger or more mature firms in a sector with few growth opportunities.

Finally, the seventh variable refers to indebtedness. Thus, companies with low indebtedness would be more likely to delist because they have a high potential for financing via debt and the expected value of tax benefits is profitable (Bortolon & Silva Junior, 2015). In addition, indebtedness is a widespread means for companies to finance their operations, make investments, and even have liquidity while assets have not been converted into cash. Hence, a negative relationship is expected between indebtedness and delisting.

Therefore, this study hypothesizes that ownership structure, liquidity, cash availability, dividend payout, growth, size, and indebtedness affect the decision of Brazilian companies to delist.

3. Methodological Procedures

This study is characterized as a quantitative study based on analytical and descriptive precepts. All data presented here were collected from secondary and complementary databases such as CVM, and B3, while the Economática (2019) database was specifically accessed to collect the companies' data.

The population comprised companies that delisted in six years, from 2013 to 2018, together with a group of comparable companies that remained publicly traded whose data were available at B3. The variables concerned the seven previously presented factors discussed in the theoretical review. See details in Table 1.

Table 1
Study's variables

Variable	Acronym	Description	Database	Relationship
Factor: 1 Ownership Structure				
Share of the largest shareholder in Common Stock	MADV	Average percentage of shares with voting rights	Economática	
Share of the largest shareholder in total shares	MATA	Average percentage of total shares	Economática	+
Misappropriation of the largest shareholder's rights	DDMA	Average ratio between shares in CS and total shares	Economática	+
Free float of voting shares	FFDV	Average percentage of CS	Economática	
Free float of total shares	FFTA	Average of the total percentage of shares held by "Other" shareholders	Economática	-
Factor 2: Liquidity				
Liquidity	LIQU	Average liquidity of the most liquid share calculated by Economática	Economática	
Presence in the stock market	PBOL	Average percentage of days of the year on which the stock was traded.	Economática	+
Factor 3: Cash availability				
Ebitda	EBIT	Average Ebitda.	Economática	
Ebitda / Revenue	EBRE	Average Ebitda / Revenue ratio	Economática	+
Factor 4: Dividends				
Dividend Yield	DIVY	Average of the ratio between dividend paid and the share's value	Economática	
Factor 5: Growth				
Revenue growth	CREC	Average of the two revenue growth percentages	Economática	
Fixed Asset Growth	CIMO	Average of the two percentages of fixed asset growth	Economática	
Market value growth	CVME	Average of two percentages of market value growth	Economática	-
Market Value / Net worth	VMPL	Average market value/equity ratio	Economática	
Factor 6: Size				
Revenue logarithm	LNRC	Revenue log average	Economática	
Market Value logarithm	LNVM	Average market value log	Economática	+
Factor 7: Indebtedness				
Liabilities / Net worth	EXPL	Average of the ratio between total liabilities and net worth	Economática	-

Source: developed by the authors

The variables were collected in the last three sequential years available at the Economática, both for the companies that went private and the control group, to perform the tests and estimates. The average of each company in the previous three years was calculated for the variables described in Table 1 to minimize the effects of outliers or the influence of momentary variations.

This paper was structured with two types of samples: (i) companies that went private from 2013 to 2018; and (ii) "comparable" companies or the control group. According to data available at B3, 126 registrations were canceled in the period. Of these, 20 companies were excluded due to information missing in the Economática database; hence, 106 companies with data available comprised the first sample.

The control group included "comparable" firms based on the model in which the companies were assigned to 20 Economática sectors. When "comparable" companies were not found in the same selector, we selected the companies from the same sector or a similar sector that had canceled their registrations.

To implement the tests, this procedure verified 108 new comparable companies to compose the control group, which varied according to each test and the limitation imposed by data available at the Economática. The database of the companies that canceled their registrations was initially analyzed according to two aspects: the first concerning the sector in which they belonged and whether it impacted their choices, while the second aspect refers to the main differences in the companies' results that favor delisting.

The company's sector of activity is an essential variable to analyze why a company decides to go private because certain aspects may not necessarily affect the entire capital Market, only affecting a specific sector at certain times. Thus, a preliminary analysis was performed considering the sectors of the 108 companies that went private from 2013 to 2018. The sectors were classified according to the 20 sectors available at Economática, enabling data grouping (Table 2).

Table 2
Sectors of the Delisting Companies

Sector	Number	Frequency
Manufacturing industry	33	30.56%
Financial services and insurance	23	21.30%
Business and enterprise administration	13	12.04%
Transport and storage	8	7.41%
Electricity, gas, and water company	7	6.48%
Information	7	6.48%
Construction	4	3.70%
Arts, entertainment, and recreation	2	1.85%
Medical and social assistance	2	1.85%
Mining, exploration, and extraction of oil and gas	2	1.85%
Agriculture, livestock, forestry, fishing, and hunting	1	0.93%
Retail business	1	0.93%
Education	1	0.93%
Hotel and restaurant	1	0.93%
Real estate and other property leasing	1	0.93%
Other services (except public administration)	1	0.93%
Waste management and remediation support services	1	0.93%
Total	108	100.00%

Source: developed by the authors

Based on preliminary results, three economic sectors comprise more than 60% of the companies delisted from the Brazilian stock exchange in the period analyzed. These findings show a need to investigate potential differences in these sectors and determinants influencing delisting.

Comparing the means enables identifying the characteristics of the different groups, i.e., the companies that delisted and the control group. The logistic regression is helpful to explain dichotomous variables, in this case, whether a company decides to delist or not, using logistic models. Logistic regression is a specialized procedure to foresee and explain a dichotomous variable, in this case, non-metric variables, by coding a series of explanatory variables (Field, 2009; Hair Jr., Black, Babin, Anderson, & Tatham, 2009; Fávero, Belfiore, Takamatsu, & Suzart, 2014).

Maximum likelihood estimation was used for this binary choice model. According to a binomial distribution, each observation is treated as a single choice (Greene & Hensher, 2010). The binary choice logistic modeling yields predicted probabilities for the occurrence of the 'delisting' event for each observation. Because the values are restricted between 0 and 1, the logistic regression did not estimate the values of the dependent variable but the likelihood of one of the two values assumed by the dependent value, forming an 'S' curve. The fit of the model is evaluated by the likelihood ratio test (LR test), which uses a statistic with a chi-square distribution to analyze the model's joint significance, considering that all parameters are equal to zero under H_0 and the existence of at least one non-zero parameter as H_1 (Favero *et al*., 2014).

The "delisting" variable is a dichotomous variable; it assumes a value of 1 if the company had its registration canceled and 0 otherwise. To eliminate problems with missing data, we proceeded with the logistic regression analysis, with the winsorization of the missing data by the mean of the companies segmented by variable and group of companies, to eliminate distortions and calculation errors that might affect the variables.

4. Presentation, Discussion, and Analysis of Results

This topic aims to present the results with the statistical procedures based on data collected from B3 and the remaining secondary sources, comparing Brazilian and international studies. Furthermore, this topic is subdivided into another two to facilitate understanding and analysis of the results: (i) descriptive statistics and t-tests for means differences and logistic regression analysis.

4.1 Descriptive Statistics and t-tests of differences in means

The group of companies was classified into the respective sectors, and the largest group, with 31%, comprises manufacturing companies, followed by financial services, with 21%, totaling 52% of the delisting set. These were the sectors most affected by the context and stage of the country's economic development in the last decade.

Between 2000 and 2015, the industry decreased its share in the GPD by 40% due to bureaucratic obstacles, low innovation, and technology compared to international competitors, among other reasons (Botelho, Sousa, & Avellar, 2016). In addition, the financial segment was severely affected by the economic crisis from 2014 to 2017, which originated from strong political reasons and supply and demand shocks that affected economic and financial indicators (Barbosa Filho, 2017). These factors represented problems for some institutions but opportunities for others and favored the national deindustrialization process and the grouping of the financial segment in Brazil, which are also reasons for many companies in the other segments to go private.

Note that among the results presented in Table 3, the companies in Panel A, the ones that went private, presented greater ownership concentration (73.91%) and control (77.40%) compared to the companies in Panel B, the control group, with 52.44% and 60.06%, respectively. Statistical significance was established at 5%. These findings corroborate the results reported by Bortolon and Silva Junior (2015) and Moreira *et al.* (2017).

Table 3
Descriptive Statistics t-tests of Differences

	Ownership Structure					Liquidity		Cash	
	Major shareholder % Total	Major shareholder % SC	Misappropriation of rights	Free Float% Total	Free Float % CS	Líq.	Presence stock market	Ebitda	Ebitda/ RL
PANEL A – Delisted									
Number	89	89	89	47	47	53	53	80	63
Mean	73.91	77.40	1.10	66.22	53.38	0.06	51.53	381.635.	0.27
Median	78.00	86.85	1.00	65.05	46.91	0.00	57.53	23.220.	0.15
Stand dev	26.34	24.78	0.30	36.67	41.52	0.15	31.94	1.242.211.	1.02
Max	100.00	100.00	2.90	100.00	100.00	0.61	100.00	9.362.727.	6.58
Min	13.14	15.38	0.71	0.00	1.37	0.00	2.69	-783.149.	-3.29
PANEL B – Control Group									
Number	108	108	108	91	91	89	108	79	77
Mean	52.44	60.06	1.24	42.31	32.38	0.25	54.63	1.082.208.	0.01
Median	50.00	57.59	1.00	39.34	27.71	0.00	69.97	90.897.	0.14
Stand dev	29.57	29.84	0.46	30.40	32.38	0.70	43.67	3.041.511.	0.82
Max	100.00	100.00	3.00	100.00	100.00	4.18	100.00	20.553.891.	1.91
Min	7.17	9.78	0.6	0.00	0.00	0.00	0.00	-497.381.	-4.98
PANEL C – Total									
Number	197	197	197	138	138	142	161	159	140
Mean	62.14	67.89	1.18	49.09	39.54	0.18	53.61	729.718.	0.13
Median	60.11	68.73	1.00	44.22	30.04	0.00	60.40	63.685.67	0.15
Stand dev	30.06	28.92	0.40	33.89	36.98	0.57	40.11	2.337.062.	0.92
Max	100.00	100.00	3.00	100.00	100.00	4.18	100.00	20.553.891.	6.58
Min	7.17	9.78	0.66	0.00	0.00	0.00	0.00	-783.148.67	-4.98
t statist	-5.8149	-4.7814	2.7738	-5.6138	-5.2237	3.03	0.6515	2.5689	-2.60
p-value	0.0000	0.0000	0.0060	0.0000	0.0000	0.003	0.5154	0.0109	0.01
Estat. t	-5.8149	-4.7814	2.7738	-5.6138	-5.2237	3.03	0.6515	2.5689	-2.60
p-valor	0,0000	0,0000	0,0060	0,0000	0,0000	0,003	0,5154	0,0109	0,01

	Dividend	Growth				Size		Indebtedness
	Div. Yield	Net Revenue	Fixed assets	Market value	VM/ PL	LN RL	Log VM	Liabilities / NW
PANEL A – Delisted								
Number	52	74	69	51	49	75	51	96
Mean	2.29	0.09	0.15	0.12	2.42	11.68	12.76	86.35
Median	0.35	0.06	-0.02	0.11	1.05	12.24	13.42	76.71
Stand dev	3.94	0.42	0.63	0.38	4.38	3.37	2.68	634.60
Max	21.28	1.82	3.87	1.39	25.76	17.16	17.39	3.844.63
Min	0	-0.89	-0.60	-0.63	-1.29	3.49	6.66	-2.470.58
PANEL B – Control Group								
Number	76	75	89	78	74	75	78	100
Mean	1.52	0.06	0.15	0.36	1700.78	13.15	13.40	204.43
Median	0.33	0.05	-0.01	0.28	978.63	13.42	12.97	131.94
Stand dev	2.31	0.22	1.50	0.64	2.441.32	2.51	2.38	1.078.36
Max	10.60	0.76	14.05	4.16	12.263.85	17.76	19.43	1.908.49
Min	0	-0.39	-0.51	-0.49	-2.732.06	3.65	7.74	-9.346.98
PANEL C – Total								
Number	128	149	158	129	123	150	129	196
Mean	1.84	0.07	0.15	0.27	1.024.20	12.42	13.15	146.59
Median	0.33	0.06	-0.01	0.18	263.92	13.08	13.07	99.86
Stand dev	3.09	-0.34	1.20	0.56	2.064.76	3.05	2.51	888.86
Max	21.28	1.82	14.05	4.16	12.263.85	17.76	19.43	3.844.63
Min	0	-0.89	-0.60	-0.63	-2.732.06	3.49	6.66	-9.346.98
t statist	-2.3651	-0.6880	-0.0188	4.1486	8.6710	4.3278	2.4155	0.9857
p-value	0.0189	0.4922	0.9850	0.0000	0.0000	0.0000	0.0166	0.3254

Source: developed by the authors.

Liquidity was a significant variable, with a mean of 0.06 for the companies that delisted and 0.25 for the control group, suggesting that liquidity is a factor related to the companies going private. Centrality measures are also in line with Sannajust (2010) and Michelsen and Klein (2011).

The proxy Ebitda/RL was statistically significant at 5% and obtained a mean of 0.27 in Panel A against 0.01 in Panel B, suggesting that companies with higher cash availability based on their size are more likely to go private than those in the control group. These findings corroborate the results reported by Du *et al.* (2013) in Hong Kong and by Pour and Lasfer (2013) for the British market. On the other hand, the revenue and fixed asset growth variables did not show significant differences, unlike the 12% growth in market value for the companies that went private compared to 36% of the control group. This finding suggests that the companies' growth may negatively affect the likelihood of going private.

The companies' size, calculated by the natural logarithm of revenue and market value, was also a factor that presented a statistically significant difference of means, 11.68 and 12.76 for the companies that went private, against 13.15 and 13.40 for the control group. Even though data did not confirm the results of Bortolon and Silva Junior (2015) for the period between 2000 and 2012, these findings corroborate studies conducted in the United States, Germany, and Italy, respectively Boot *et al.* (2008), Michelsen and Klein (2011), and Tutino *et al.* (2013), which suggest that smaller companies are more likely to go private. Finally, indebtedness did not present statistical significance in the preliminary results.

4.2 Data analysis using logistic regression

After the descriptive analysis, analyses were conducted with logit models to verify the impact of the variables specified in Table 1 on the decision to go private, in which delisting assumes the value of 1. First, all the 17 variables previously explained were applied in the stepwise procedure, and nine variables were deleted (DDMA, LIQU, CIMO, LNRC, EXPL, CRLI, EBIT, FFDV, and DIVY), with statistical significance established at 5%. Hence, eight variables with explanatory capacity remained, and the results are presented in Table 4, in which the odds ratio of each variable to impact this decision is explored.

The results presented in Table 4 concerning the application of the Logistic Regression model were obtained using STATA and resulted in the following outputs.

Table 4.
Outputs of the Logistic Regression and Marginal Effects

Factor	Variables	Coefficient	Odds Ratio	Std. Err.	P> |z|	Mg. Effects	P> |z|
Structure	MADV	-0.0558	0.9457	0.0269	0.050	-0.0068	0.065
	MATA	0.0832	1.0867	0.0303	0.003	0.0101	0.020
	FFTA	0.0504	1.0517	0.0138	0.000	0.0061	0.013
Growth	CVME	-3.3148	0.0363	0.0421	0.004	-0.4039	0.011
	VMPL	-0.0048	0.9952	0.0008	0.000	-0.0006	0.000
Liquidity	PBOL	-0.0479	0.9532	0.0150	0.002	-0.0059	0.000
Cash	EBRE	1.5029	4.4948	2.6738	0.012	0.1831	0.044
Size	LNVM	0.5927	1.8090	0.4085	0.009	0.7222	0.018
Others	Const.	-6.3060	0.0018	0.0044	0.009	-	-

Source: developed by the authors.

A graph with a ROC curve was generated to test the model's quality. According to Fávero *et al.* (2014), it shows the model's ability to discriminate the categories of the dependent variable. With a cutoff point equal to 0.25, the area under the ROC curve is 0.9836, indicating that the model presents a high discriminatory power.

It is important to note that the applied model resulted in 100% of sensitivity and 88.89% of specificity. Sensitivity concerns the total hits a model obtains concerning a given event (i.e., delisting), correctly classifying 100% of the companies that canceled their registrations. On the other hand, correct answers reached 89% due to the model's specificity, which refers to the total number of hits concerning the non-event of interest (i.e., when the company does not go private).

The model proved to be appropriate, with maximum values of the log-likelihood function after interaction of -38.18. The likelihood ratio test (LR test) used to verify the model's fit presented a result equal to 220.29 (0.0000), which enables validating the existence of variables with statistical significance. McFadden's pseudo-R^2 of the logistic regression concerning the model used is 0.7426, which is used to verify the model's explanatory power. Thus, the model used in Table 4 explains 74.26% of the companies' decisions to go private.

The preliminary results confirm some of the results obtained in the difference of means tests. The fact that the company has a strong ownership structure was statistically significant, in which the largest shareholder with a large number of shares is expected to increase the likelihood of a company going private, corroborating the results reported by Bortolon and Silva Junior (2015), Moreira *et al.* (2017), Bessler *et al.* (2012) and Konno and Itoh (2017).

This factor was statistically significant with the variables concentration of common stocks (negative) and stocks in general (positive) and with free float of total shares. In the Brazilian market, which already shows high ownership concentration (Caixe *et al.*, 2013; Correa *et al.*, 2015), the investment in the percentage of ownership would be smaller than in markets with low concentration, which, in theory, would make the Brazilian market more susceptible to go private. Hence, after delisting, controllers would be able to make more tempestuous decisions without the inconvenience of meetings with high free float. Additionally, it may be a good possibility for investors because delisting offers would need to be advantageous to acquire complementary participation.

Following the same vein of the British context reported by Pour and Lasfer (2013), the growth variable shows that the higher a company's growth, the fewer its chances to go private. Hence, it has an inversely proportional relationship, resulting in marginal effects of -0.4039, the highest marginal effects coefficient, which indicates that growth decreases the likelihood of a company to delist by 40%. The weak growth in the Brazilian market impacts a company's chances to remain publicly traded. Other studies such as Michelsen and Klein (2011) in Germany, and Tutino *et al.* (2013) in Italy, also found evidence that slow-growing companies dominated the delisting process.

This factor was significant for the growth and market value variables and its equity ratio. Lack of growth in market value decreases the investors' perception of attractiveness, reducing the incentives for major shareholders to remain in the capital market.

Liquidity is also a determinant factor for going private, which, as expected, presented a negative relationship. With low liquidity, a company loses its orientation in the stock market because it would have extra maintenance costs to disclose reports and adapt to the market standards without the corresponding appreciation of its shares (Sannajust, 2010). The results corroborate other studies indicating an inverse probability of going private (Balios *et al.*, 2015; Bortolon & Silva Junior, 2015).

Following Saito and Padilha (2015) and Jensen (1986), cash availability was measured considering the relationship between Ebitda and Revenue. It was one of the factors with the highest significant results for companies going private, with a 14% higher likelihood of going private. As Table 4 shows, the higher the cash availability, the higher the likelihood of a company going private, adopting a positive relationship between the variables. These findings corroborate with the results previously found in the test of differences and with the results reported by Du *et al.* (2013) in Hong Kong, Pour and Lasfer (2013), in the British market, Tutino *et al.* (2013), in Italy, and Bortolon and Silva Junior (2015), in Brazil.

The possibilities of going private are in line with the factors suggested by Perobelli *et al.* (2014) and Aslan and Kumar (2011), that IPO would be one of the ways to decrease the cost of financing; having much cash would reduce the incentives and the appeal for keeping governance costs. Hence, going private would be an alternative to decrease costs (Moreira *et al.*, 2017). Furthermore, the variable size, measured by the logarithm of market value, validates the results reported by Bortolon and Silva Junior (2015). The results were statistically significant and presented a positive relationship, indicating that the larger a company, the greatest the likelihood of going private. Even though this result aligns with Bortolon e Silva Junior (2015), this is a controversial matter because other authors, such as Boot *et al.* (2008), Michelsen and Klein (2011), and Tutino *et al.* (2013), report diverging results, stating that the smaller the company, the more likely to delist.

These differences may be explained by the sample for which the statistical analyzes were performed. A positive relationship was found in Brazil, while a negative relationship was found in Germany and Italy. As noted by Bortolon and Silva Junior (2015), the fact that large businesses are more mature and, for this reason, require fewer investments may explain their results. This would decrease the appeal of the capital market as a source of financing; hence, the positive relationship with the likelihood of going private.

5. Conclusions

This study, which intended to analyze the main determinants of a company to the withdrawal of its shares from the Brazilian stock exchange between 2013 and 2018, enabled identifying the eight variables related to five factors proposed in the empirical literature; two factors did not present significant variables in the period.

Among the variables that can affect the decision of a company to go private, the ones found in this study to influence the most were: (i) greater cash availability; (ii) lower growth; (iii) lower liquidity; (iv) greater ownership concentration; and (v) larger size. Most of the results found here corroborate the existing literature and, to a greater degree, the results reported in the international literature, except for size, in which differences were found among countries. In the Brazilian context, the explanatory factors remained similar to those presented by Bortolon and Silva Junior (2015) for the period between 2001 and 2012.

Based on the previous discussion, the most important accounting variables related to the decision of companies to go private are lower growth and greater cash availability. These factors mitigate the advantages of going public to access capital, considering that the company would have the resources necessary for self-financing.

The results can support the capital market users in predicting future delisting, which can affect investment strategies. Additionally, shareholders and investors could use a share purchase offer to achieve superior gains. In the academic context, these results complement the results reported by Bortolon and Silva Junior (2015).

Hence, in general, this study achieved its objective of analyzing accounting factors related to the decision of companies to go private. There are some limitations though, such as some companies' lack of data, especially in the group of companies that went private. This caused the need to exclude them from the sample. Another limitation concerns the fact that the companies often do not report the results of the same year when they go private; hence, we had to consider the last data available for these companies.

We highlight this study's relevance as the model was adjusted with a cutoff point of 0.25, which in the period reaches 100% sensitivity for hits in the occurrence of delisting. Inherent to an explanatory model, specificity did not achieve the same results; a small number of companies (11%) indicated by the model had not gone private.

These results are expected to encourage investors and researchers to study delisting in more detail, a subject seldom discussed in Brazil. Therefore, comparisons in the Brazilian context are restricted, while researchers in the international context have been addressing this topic for some time. Regarding research suggestions, it would be interesting to verify whether the market sector is a factor influencing the decision of companies to go private.

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