Revista de Contabilidade e Organizações
ISSN: 1982-6486
Universidade de São Paulo, Faculdade de Economia, Administração e Contabilidade de Ribeirão Preto

Azevedo, Yuri Gomes Paiva; Gomes, Hellen Bomfim; Nakao, Sílvio Hiroshi
Poison pills and corporate governance: a study in the Brazilian stock market
Revista de Contabilidade e Organizações, vol. 15, e169831, 2021, February
Universidade de São Paulo, Faculdade de Economia, Administração e Contabilidade de Ribeirão Preto

DOI: https://doi.org/10.11606/issn.1982-6486.rco.2021.169831

Available in: https://www.redalyc.org/articulo.oa?id=235267639009

Revista de Contabilidade e Organizações
www.rco.usp.br

DOI: http://dx.doi.org/10.11606/issn.1982-6486.rco.2021.169831

Journal of Accounting and Organizations
www.rco.usp.br

Poison pills and corporate governance: a study in the Brazilian stock market

Poison pills e governança corporativa: um estudo no mercado acionário brasileiro

Yuri Gomes Paiva Azevedo[a], Hellen Bomfim Gomes[b], Sílvio Hiroshi Nakao[a]
[a] *Universidade de São Paulo*
[b] *Universidade Federal do Rio Grande do Norte*

Keywords
Poison pills.
Corporate governance.
Anti-takeover devices.

Abstract

We investigate whether there is an association between the adoption of poison pills and premium corporate governance listing segments in the Brazilian stock market. Our sample consists of 217 non-financial publicly-traded companies listed on Brasil, Bolsa, Balcão (B3) with data available for the period 2010-2017. Through logit and probit regressions, we find that the adoption of poison pills is positively associated with listings in the New Market and Level 2 corporate governance segments. Thus, the adoption of this anti-takeover device by companies that are listed at the highest levels of corporate governance can be useful to current and potential investors since, given the rise of public companies with predominantly dispersed capital in the Brazilian stock market, hostile takeover attempts have been increasingly recurrent. Further, our results contribute theoretically towards a possible convergence between Signaling Theory and the adoption of poison pills, shedding light on the fact that the adoption of this anti-takeover device as a complementary corporate governance mechanism may represent a protection signal issued by companies to the market designed to attract new investors.

Palavras-chave
Poison pills.
Governança corporativa.
Dispositivos anti-takeover.

Resumo

Este estudo tem por objetivo investigar se existe associação entre a adoção de poison pills e os níveis diferenciados de governança corporativa no mercado acionário brasileiro. A amostra é composta por 217 companhias abertas não-financeiras listadas na Brasil, Bolsa, Balcão (B3), com dados disponíveis ao longo do período 2010-2017. A análise de dados realizada por meio de regressões logit e probit evidencia que a adoção de poison pills está positivamente associada à listagem nos segmentos Novo Mercado e Nível 2 de governança corporativa. Assim, a adoção deste dispositivo anti-takeover por companhias que estão listadas nos níveis mais elevados de governança corporativa pode ser útil para atuais e potenciais investidores, ao passo que dado o aumento de companhias abertas com o capital predominantemente disperso no mercado acionário brasileiro, as tentativas de tomada de controle de forma hostil podem ser cada vez mais recorrentes. Além disso, os resultados contribuem teoricamente no sentido de uma possível convergência entre a Teoria da Sinalização e a adoção de poison pills, evidenciando que a adoção desse dispositivo anti-takeover como mecanismo complementar de governança corporativa pode representar um sinal de proteção emitido pelas empresas ao mercado visando a atração de novos investidores.

Article information
Received: May 18, 2020
Approved: August 31, 2020
Published: February 10, 2021

Practical implications

The results may be useful for current and potential investors to the extent that the adoption of poison pills by companies that have higher levels of corporate governance may be seen as a signal that they are seeking to adopt, in a voluntary manner, complementary mechanisms which are designed to protect shareholders.

Corresponding author: Tel. (16) 3315-3919
E-mail: yuri_azevedo@live.com (Y. G. P. Azevedo); hellenbomfim@hotmail.com (H. B. Gomes); shnakao@usp.br (S. H. Nakao)
Universidade de São Paulo, Faculdade de Economia Administração e Contabilidade. Avenida:dos Bandeirantes, 3900 - Monte Alegre, Ribeirão Preto/SP - 14040900, Brazil.

1 INTRODUCTION

Since they were introduced in the American capital markets, poison pills have become a popular mechanism in the defense against hostile takeovers, given that they increase the negotiation power of managers, making these attempts to take control more onerous for potential acquirers (Ryngaert, 1988). Due to the introduction of poison pills in the capital markets, the literature has taken two views of factors that lead to the adoption of these anti-takeover mechanisms.

On the one hand, the hypothesis of the alignment of shareholder interests envisions that the adoption of poison pills may be influenced by factors which seek to reduce agency conflicts between managers and shareholders (Heron & Lie, 2006; Heron & Lie, 2015), such as mechanisms related to corporate governance. On the other hand, it is also possible that its adoption is not influenced by aspects that seek to benefit shareholders (notably minority shareholders), but rather to maintain the current managers in their positions, as demonstrated by the managerial entrenchment hypothesis (Arikawa & Mitsusada, 2011).

Based on these two views, various empirical studies have been made to identify the factors associated with the adoption of poison pills by publicly-traded companies (Davis, 1991; Mallette & Fowler, 1992; Loh, 1994; Heron & Lie, 2006; Harris & Madura, 2010; Arikawa & Mitsusada, 2011; Heron & Lie, 2015; Bhojraj, Sengupta, & Suning, 2017; Dah, Michael, & Dixon, 2017). However, the evidence reported in previous studies does not converge in terms of corporate governance aspects as well as economic-financial aspects which are associated with the adoption of poison pills in publicly-traded companies.

To complement the inexistence of this consensus, we have verified that previous studies have been conducted in developed capital markets such as Japan and the United States, and that there are significant differences between these developed markets and emerging markets such as Brazil (Claessens & Yurtoglu, 2013).

The ownership structure is one of these differences, bearing in mind that unlike more developed economies, the Brazilian scenario is characterized mainly by companies with a high level of ownership concentration (Silva, Lana, & Marcon, 2018). However, as a result of an evolutionary process of capital markets, it has been verified that companies with dispersed control or reasonably dispersed control of shares have now appeared in the Brazilian stock market (Gorga, 2009; Sternberg, Leal, & Bortolon, 2011; Portulhak, Theiss, Kühl, & Colauto, 2017; Crisóstomo, Freire, & Freitas, 2019), making it possible for potential acquirers to try to take over a company.

This evidence has been corroborated by hostile takeovers which have occurred in Brazil such as the offer of Sadia for control of Perdigão (Vieira, Martins, & Fávero, 2009), of Cromossomo Participações II for control of Diagnósticos da América (Diagnósticos da América S. A., 2014), of Sapore for control of the International Meal Company (International Meal Company S. A., 2018), and of Energisa for control of Eletropaulo (Eletropaulo Metropolitana Eletricidade de São Paulo S. A., 2018), among others. Thus, it is considered relevant that Brazilian publicly-traded companies, which have higher levels of dispersion in terms of their ownership structure, have sought to adopt poison pills to protect their investors from possible hostile takeover bids.

In parallel to this, the Brazilian capital market is different from developed markets since it has a lower shareholder's level of legal protection (Claessens & Yurtoglu, 2013; Silva & Martins, 2018). Thus, in this environment characterized by weak shareholder protection, it is to be expected that the Brazilian publicly-traded companies wish to protect their minority shareholders (Carvalho & Pennacchi, 2012), and that the BM&FBovespa and later the B3 stock market have created differentiated segments of corporate governance (New Market, Level 2 and Level 1), which are focused on a gradual difference in levels of investor protection.

However, despite the fact that differentiated levels of corporate governance have contributed to an increase in investor protection (Leal, Carvalhal, & Iervolino, 2015), these levels can also make companies more prone to hostile takeovers attempts, mainly in terms of companies listed in the New Market, which need to maintain 25% of their shares with voting rights in free float. Thus, in line with the perspective that corporate governance mechanisms can have complementary effects, in which it is recommended that companies combine various governance mechanisms to reduce agency conflicts (Schepker & Oh, 2013), this study aims to investigate whether there is an association between the adoption of poison pills and the differentiated levels of corporate governance in the Brazilian stock market.

To investigate whether poison pills have been adopted by companies listed in the differentiated segments of corporate governance as a complementary device to protect their investors, we have implemented logit and probit regressions. The data was obtained from the Bloomberg® database, as well as company statutes and reference forms on the CVM stock value commission website, with 217 Brazilian publicly-traded companies being analyzed during the period of 2010-2017.

The main results demonstrate that publicly-traded companies listed in the New Market and Level 2 segments are positively associated with the adoption of poison pills in Brazil. This finding suggests that in order to attract new investors, as well as maintain current investors, it is possible that companies listed in corporate governance segments which have greater minority shareholder protection mechanisms have sought to adopt poison pills as a complementary device related to investor protection, given that it provides benefits to shareholders by impeding hostile takeovers.

In this manner, this article fills a gap in studies that analyze poison pills within the Brazilian context, because despite the existence of evidence related to the theoretical-conceptual aspects and legal dispositions applicable to their adoption (Vieira et al., 2009), and their quantity and peculiarities in the Brazilian context (Ambrozini, Pimenta, & Gaio, 2015), as well as the effects of anti-takeover devices (Portulhak et al., 2017; Azevedo & Nakao, 2019), until now, this is the first study to investigate the aspects associated with the adoption of poison pills by Brazilian publicly-traded companies.

In a complementary manner, this study fills in a gap in the Brazilian literature concerning corporate governance to the extent that — despite the existence of empirical studies that examine the association between differentiated levels of governance and aspects such as the institutional image of companies (Nardi & Nakao, 2008), the costs of auditing (Bortolon, Sarlo, & Santos, 2013), the accuracy of analyst predictions (Dalmácio, Lopes, Rezende, & Sarlo, 2013), and the market value of publicly-traded companies (Caixe & Krauter, 2014), among others — until now it has not been explored how the differentiated levels of corporate governance may be associated with the adoption of anti-takeover devices.

2 THEORETICAL REFERENCES

2.1 Poison pills

Even though poison pills can assume different forms — which may vary in accordance with the specific characteristics of each capital market — in general, they are projected to substantially increase the amount that a potential acquirer needs to spend to take over a target company (Dowen, Johnson, & Jensen, 1994). However, despite the fact that anti-takeover devices have been examined by the literature since their creation at the end of the 1980s, it has been verified that there is no consensus about the effects of their implementation (Gine, Moussawi, & Sedunov, 2017).

On the one hand, the managerial entrenchment hypothesis envisions that poison pills may promote the entrenchment of inefficient managers, thus leading to the destruction of shareholder wealth (Malatesta & Walkling, 1988; Arikawa & Mitsusada, 2011). From this point of view, these managers will feel protected from the market for corporate control and will feel secure to make decisions to obtain personal benefits to the detriment of shareholder interests (DeAngelo & Rice, 1983; Jensen & Ruback, 1983).

On the other hand, the hypothesis of the alignment of shareholder interests considers that poison pills can maximize the wealth of shareholders by being associated with greater negotiation premiums in the alienation of shareholder control (Heron & Lie, 2006; Heron & Lie, 2015). Thus, in a hostile takeover, this anti-takeover device gives greater negotiating power to the company's board, making it necessary for a potential acquirer to make an offer which is of interest to the company's shareholders (Comment & Schwert, 1995; Gine et al., 2017).

From this perspective, it has been verified that poison pills make it possible to ensure a more egalitarian treatment of all company shareholders in the acquisition of control, and with this, avoid isolated negotiations with varying prices and the loss of advantages that block negotiations may entail (Maestri, 2011).

Poison pills also can offer company managers benefits that may be aligned with shareholder interests, such as a focus on a long-term view. In providing greater protection against the market for corporate control, these devices may make managers feel less pressured to deliver short-term results, and thus prioritize long-term projects which maximize shareholder value (Knoeber, 1986).

Besides being useful to explain the effects of the adoption of poison pills, the hypotheses of managerial entrenchment and the alignment of shareholder interests are also used to examine the factors that determine the adoption of this anti-takeover device (Datta & Iskandar-Datta, 1996). However, we have also verified that there is no consensus among previous studies in relation to the alignment of shareholder interests view and managerial entrenchment view.

On the one hand, we have verified that aspects related to the best practices of corporate governance, such as the presence of a staggered board, an independent board, and board interlocking (Davis, 1991; Heron & Lie, 2006; Heron & Lie, 2015), are not only related to company performance (Harris & Madura, 2010; Heron & Lie, 2015), but also positively influence the adoption of poison pills, thus being in line with the alignment of shareholder interests perspective.

However, some evidence has also been found in consonance with the managerial entrenchment perspective, bearing in mind the positive influence of the duality of a CEO (Dah et al., 2017) and ownership concentration (Harris & Madura, 2010; Bhojraj et al., 2017) in the adoption of this anti-takeover device.

In this sense, considering the gap between empirical studies which investigate factors associated with the adoption of poison pills in emerging markets, as well as keeping in mind that these markets are different from developed markets in terms of aspects of corporate governance (e.g., their weaker protection of minority shareholders), it is relevant to examine the factors that lead Brazilian publicly-traded companies to adopt shareholder protection mechanisms such as poison pills.

2.2 Research hypothesis

In an environment in which there is low investor protection, it is not surprising that Brazilian publicly-traded companies wish to better protect their minority shareholders (Carvalho & Pennacchi, 2012). Thus, considering that poison pills offer benefits to shareholders given that they impede hostile takeovers by potential investors (Rhee & Fiss, 2014), it is possible that companies listed in differentiated segments of corporate governance have a greater tendency to adopt poison pills.

Bearing in mind the existence of asymmetries of information, Signaling Theory (Spence, 1973) proposes that one party (e.g., company) may voluntarily emit a signal to another party (e.g., investors) to transmit relevant information about their intentions. Thus, the differentiated mechanisms and practices of corporate governance can represent signals from the company, because they are signaling to the market that they represent good investment opportunities, and can also assure stakeholders of their quality and informational credibility (Dalmácio et al., 2013).

From this perspective, previous studies have shown that through the adoption of corporate governance mechanisms, companies seek to signal their concern with protecting their investors (La Porta, Lopez-de-Silanez, Shleifer, & Vishny, 2002; Klapper & Love, 2004), with the adoption of poison pills being one of these signals which has received considerable attention over the years (Straska & Waller, 2014).

Poison pills are considered to be mechanisms related to the protection of shareholder rights (Gine et al., 2017) and are even included in indexes that measure the quality of corporate governance such as the G-index proposed by Gompers, Ishii and Metrick (2003). In this sense, the quality of corporate governance in Brazil is considered to have been determined by various aspects, with one of them being the participation of differentiated segments of corporate governance (Almeida, Scalzer, & Costa, 2008; Bortolon et al., 2013; Dalmácio et al., 2013; Collares, 2020) which have a gradual focus on the levels of investor protection, and it is expected that companies listed in these segments have a greater propensity to voluntarily adopt devices that seek to protect their shareholders such as poison pills.

According to Martes (2014), the increase in the number of companies listed in special segments (Level 1, Level 2 and the New Market) have caused a greater dispersion in the Brazilian capital market (bearing in mind the minimum requirement of 25% free float), meaning the existence of companies with an elevated degree of shareholder dispersion which as a result make the possibility of hostile takeovers a reality in Brazil.

Considering that poison pills tend to be implemented in situations in which a potential investor can acquire a given percentage of the outstanding common shares of a target company in a hostile takeover until the total acquired sum makes it the controlling shareholder (Sikes, Wilson, & Tian, 2014), it is believed that the implementation of poison pills is even more important for companies listed in the New Market segment.

This occurs due to the fact that companies listed in this segment can just issue common shares. Thus, the 25% of free float composed only of shares with voting rights gives them a greater propensity to be the targets of hostile takeovers by potential acquirers, which can acquire a given sum of common shares which will make them the controlling shareholders of the company.

However, companies listed in Level 2 also may possess incentives for the voluntary adoption of poison pills bearing in mind that this segment also has discussions related to aspects of operations which may affect the control of the company. This view is based on the fact that in Level 2, preferred shareholders (originally without voting rights) may possess voting rights in the event of a merger or acquisition (Darosi, 2014), which are operations in which anti-takeover devices may provide a strategic advantage in the negotiation of greater premiums, thus maximizing shareholder wealth (Jiraporn, 2005).

In this sense, considering that better corporate governance offers more egalitarian treatment for all stakeholders (Claessens & Yurtoglu, 2013), it is expected that companies listed in special segments of corporate governance are adopting poison pills voluntarily as a complementary device to protect investors as proposed in Hypothesis H_1.

H_1: Companies listed in differentiated levels of corporate governance have a greater propensity to adopt poison pills.

3 SAMPLE SELECTION AND THE RESEARCH DESIGN

3.1 Sample selection

The sample in this study consists of Brazilian publicly-traded companies whose shares are negotiated in the B3, with data available for the period of 2010-2017. This period was considered due to the mandatory adoption of the International Financial Reporting Standard in Brazil in 2010, which provided an increase in the quality of accounting information (Pelucio-Grecco, Geron, & Grecco, 2014), thus affecting the economic-financial data which is of interest to this investigation.

The economic-financial data was obtained from the Bloomberg® database, with information about poison pills and executive compensation being obtained from the CVM website. Thus, the poison pill data collection was based on the Alienation of Shareholder Control of company statutes, as well as the amounts of executive compensation based on the Total Compensation of the Board section of the reference forms.

The initial sample was composed of 412 companies. However, we excluded financial companies due to the particular characteristics of their financial and operational structures. In addition, we excluded companies for which we were missing data. After the exclusions, the final sample consisted of 1,377 observations of 217 companies as shown in Table 1.

Table 1. Sample selection procedure

	Companies
Total of Brazilian publicly-traded companies	412
(-) Financial companies	(78)
(-) Lacking executive compensation data	(83)
(-) Lacking data for the market-to-book calculation	(34)
Final Sample	217

Source: research data.

In order to avoid survival bias, we did not require companies to have data during the entire analyzed time window to be included in the sample. That being so, the analyses were conducted based on unbalanced data. Furthermore, as a way to mitigate the outlier effect in the sample, we winsorized the quantitative data at a level of 1%.

3.2 Research design

To investigate the factors associated with the probability of adopting poison pills, we estimated the model presented in Equation 1 by using logit and probit regressions.

$$Poison\ Pill_{(i,t)} = \beta_0 + \beta_1 New\ Market_{(i,t)} + \beta_2\ Level\ 2_{(i,t)} + \beta_3\ Level\ 1_{(i,t)} + \sum_{(j=4)}^{10} \beta_j Controls_{(i,t)} + \mu_{(i,t)}$$

In which Poison Pill is a binary variable which is 1 if the company *i* has adopted a poison pill during period *t*, and 0 if it has not.

In line with previous studies which have used the listing in special B3 segments as a proxy for the quality of corporate governance (Almeida et al., 2008; Bortolon et al., 2013; Dalmácio et al., 2013; Caixe & Krauter, 2014; Manoel, Moraes, Nagano, & Sobreiro, 2018; Collares, 2020), we used the dummies New Market, Level 2 and Level 1 as explanatory variables.

Our choice to use this proxy is based on the view that, based on the four pillars of corporate governance (a concern with the equal treatment of investors, legal compliance, a responsible presentation of accounts, and transparency in information and accounting demonstrations), the segmentation of various levels of corporate governance is designed to generate a more secure environment for shareholders, users and other related parties (Nardi & Nakao, 2008).

In a complementary manner, this proxy also makes it possible to capture various levels of investor protection, in line with the view that the extent to which mechanisms that ensure greater quality in corporate governance practices are adopted by companies through voluntary listings in premium segments, they will make actions that are designed to protect investors more effective (Collares, 2020).

In Table 2, we find the listing of variables included in the econometric model, its forms of measurement, as well as previous studies related to the adoption of poison pills (or anti-takeover devices) which complement their inclusion.

Table 2. Description of the variables

Variable	Description	Previous studies	Expected sign
Poison pill	Binary variable, with 1 being for companies that have poison pills in their company statute, and 0 if they do not.	Davis (1991); Mallette e Fowler (1992); Loh (1994); Heron and Lie (2006); Harris and Madura (2010); Arikawa and Mitsusada (2011); Heron and Lie (2015); Bhojraj et al. (2017); Dah et al. (2017).	Dependent variable
New Market	Binary variable, with 1 being for companies listed in the New Market, 0 for companies which are not.	-	+
Level 2	Binary variable, with 1 being for companies listed in Level 2, 0 for companies which are not.	-	+
Level 1	Binary variable, with 1 being for companies listed in Level 1, and 0 for companies which are not.	-	+
Ownership concentration	Accumulated percentage of shares with voting rights held by the largest shareholder in relation to all shares with voting rights.	Heron and Lie (2006).	-
Board size	Number of members in the company's board.	Loh (1994); Dah et al. (2017).	-
Firm size	Natural logarithm of the company's total assets.	Dah et al. (2017).	-
Performance	Ratio between net income and total assets.	Mallette and Fowler (1992); Heron and Lie (2006); Arikawa and Mitsusada (2011); Bhojraj et al. (2017).	-
Executive compensation	Sum of fixed and variable compensation and stock options received by managers.	Heron and Lie (2006); Dah et al. (2017).	+
Leverage	Ratio between debts and total assets.	Bhojraj et al. (2017); Dah et al. (2017).	+
Growth opportunities	Ratio between the market value and book value.	Heron and Lie (2006); Harris and Madura (2010); Arikawa and Mitsusada (2011).	+

Source: prepared by the authors.

4 RESULTS

4.1 Descriptive analysis

In the descriptive analysis, we find that approximately 25% of the sample companies have poison pills in their statutes, which corresponds to 55 publicly-traded companies, as demonstrated in Panel A of Table 3. This evidence is in line with Portulhak et al. (2017), and also demonstrates that over the years there has been an increase in the adoption of this anti-takeover device in Brazil, given that in 2006, just seven Brazilian publicly-traded companies had poison pills, as indicated by Vieira et al. (2009).

Table 3. Descriptive analysis

Panel A – Descriptive statistics					
	Obs.	Avg.	Std. Dev.	Min.	Max.
Poison pill	1377	0.251	0.433	0	1
New Market	1377	0.477	0.499	0	1
Level 2	1377	0.055	0.228	0	1
Level 1	1377	0.116	0.320	0	1
Traditional	1377	0.351	0.477	0	1
Ownership concentration	1377	47.437	25.255	7.342	99.924
Board size	1377	7.448	3.111	3	18
Firm size*	1377	14.418	2.311	6.979	18.317
Performance	1377	0.008	0.146	-0.942	0.247
Compensation*	1377	12.022	12.565	0.000	89.881
Leverage	1377	0.697	0.467	0.058	3.526
Growth opportunities	1377	2.756	11.027	-0.312	81.649
Panel B – Distribution of companies in different levels of corporate governance					
	Adopt poison pills		Do not adopt poison pills		
	Obs.	Percentage (%)	Obs.	Percentage (%)	
New Market	314	91.014	343	33.236	
Level 2	6	1.739	70	6.783	
Level 1	4	1.159	156	15.116	
Traditional	21	6.087	463	44.864	
Panel C – Distribution of companies with different ownership concentrations					
	Adopt poison pills		Do not adopt poison pills		
	Obs.	Percentage (%)	Obs.	Percentage (%)	
Disperse	127	36.812	89	8.624	
Dominant	131	37.971	376	36.434	
Concentrated	87	25.217	567	54.942	

Source: research data.
Note: *Variables in natural logarithms.

The percentage of companies listed in the New Market (47.7%) is in line with Bortolon et al. (2013), and also signals that approximately half of the non-financial publicly-traded companies in the B3 have sought in a voluntary manner to be listed in the highest level of corporate governance. This aspect can be considered a signal that public companies have voluntarily sought to adopt mechanisms that seek to align the interests of managers and shareholders given that to be listed in the New Market, these companies need to meet a series of requirements designed to protect shareholders such as tag along provisions.

In terms of ownership concentration, we have verified that the main shareholder holds, on average, 47% of a company's shares, which is in line with the view that publicly-traded Latin American companies are characterized by high ownership concentration in which sometimes the controlling shareholder assumes the role of managing the company (Saona & Muro, 2018).

In a complementary manner, we observe that the average size of the board is seven members, with this being a possible influence for the predominance of companies listed in the New Market segment, which includes in its rules the requirement of at least five members on the administrative board (Machado & Famá, 2011).

On average, we have verified that these firms present low performance (0.008) and high leverage (0.697), which may be related to the 2014-2017 crisis as demonstrated by Barbosa (2017). However, despite this period of economic crisis, we can observe that the companies in the sample present growth opportunities, with an average market-to-book ratio of 15.4769.

Through Panel B of Table 3, we can verify that most of the companies who adopt poison pills (91%) are listed in the New Market segment, which is in line with the view that companies listed in this segment have a greater propensity for being targets of hostile takeover attempts due to their maintenance of a 25% free float composed of common shares. This result corroborates Portulhak et al. (2017), who describe poison pills as having a greater propensity to be adopted by companies listed in the New Market.

In terms of the ownership structure, Panel C in Table 3 shows that most of the companies that adopt poison pills have a dispersed or dominant ownership structure which makes companies more susceptible to hostile takeover attempts. The classification of dispersed, dominant or concentrated ownership is based on Anjos, Tavares, Monte and Lustosa (2015), who classify these three categories in the following form: (i) dispersed – equal or inferior to 20%; (ii) dominant – above 20% and below 50%; and (iii) concentrated – above 50%.

Finally, we verified that companies which have concentrated capital have adopted poison pills, which has already been pointed out by Vieira et al. (2009), who observe that this adoption possibly occurs due to the intention of the controller to maintain a certain degree of ownership dispersion in the market, conserving with this the liquidity of the company's share. However, it is important to emphasize that this aspect deserves greater scrutiny, mainly in terms of the effects of the adoption of poison pills by companies with a concentrated ownership structure.

4.2 Econometric model

To investigate the association between the adoption of poison pills and the differentiated levels of corporate governance in the Brazilian stock market, we used logit and probit models, considering the binary nature of the dependent variable. Table 4 shows that the significance of the variables converges between the logit and probit links. However, it should be emphasized that the logit link presents a better fit because it has a lower Akaike Information Criterion (AIC).

Furthermore, seeking to qualify the goodness of fit, we performed the Hosmer-Lemeshow test, which has a null hypothesis that the observed and expected frequencies are equal. The results presented at the end of Table 4 indicate that the null hypothesis was not rejected in the estimated values (p-values > 5%), and thus, we verified that the estimated models do not present problems in relation to goodness of fit.

Also in relation to the fit of the models, we verified that the R2 Count, which report the probability of the correct classification of the models, indicates that models are classified correctly approximately 82% of the time to the extent that McFadden's Adjusted R2 indicates that the model explains 32% of the total variability in the dependent variable. Finally, we verified that the estimated model does not present multicollinearity problems, given that there is not a strong correlation between the independent variables inserted in the econometric model, as demonstrated by the correlation matrix presented in Appendix A.

Based on Table 4, we show that there is a positive association between the levels of corporate governance and the adoption of poison pills by Brazilian publicly-traded companies. However, this association is restricted only to companies listed in the New Market and Level 2 segments. The coefficients indicate that the New Market listing is associated with an average increase of approximately 19% in the probability of the adoption of poison pills, in comparison with the base group (traditional segment), with companies listed in the Level 2 segment presenting a 6% greater probability of adoption.

The greater probability of the adoption of poison pills by companies listed in the New Market corroborates the view that these companies, because they emit only common shares and need to maintain a 25% free float, are more susceptible to hostile takeovers. That being so, the adoption of poison pills is relevant as a complementary device to corporate governance in regard to shareholder protection.

Table 4. Econometric model

Dependent variable: Poison pill	Model 1	
	Logit	**Probit**
New Market	19.119***	1.612***
	(5.116)	(0.132)
Level 2	6.103***	0.974***
	(3.250)	(0.276)
Level 1	-0.031	-0.019
	(0.595)	(0.279)
Ownership concentration	-1.964***	-0.011***
	(0.004)	(0.002)
Board size	-13.8810***	-0.083***
	(0.036)	(0.024)
Firm size	-13.612***	-0.080***
	(0.039)	(0.026)
Performance	-59.5485**	-0.498*
	(0.182)	(0.256)
Compensation	1.041***	0.023***
	(0.008)	(0.004)
Leverage	1.001	0.001
	(0.002)	(0.001)
Growth opportunities	-0.2348	-0.001
	(0,002)	(0.001)
Constant	-78.0487*	-0.919**
	(0.181)	(0.464)
Year	Included	Included
Sector	Included	Included
AIC	989.213	990.554
LR chi2	537.61***	536.27***
Goodness-of-fit	1268.07	1275.04
Count R^2	0.824	0.825
McFadden's Adjusted R^2	0.326	0.325

Source: research data.
Note: Logit link coefficients are presented as odds ratios. Standard errors are reported between parentheses. ***, **, * indicate significance at levels of 1%, 5% and 10% respectively.

Based on Table 4, we show that there is a positive association between the levels of corporate governance and the adoption of poison pills by Brazilian publicly-traded companies. However, this association is restricted only to companies listed in the New Market and Level 2 segments. The coefficients indicate that the New Market listing is associated with an average increase of approximately 19% in the probability of the adoption of poison pills, in comparison with the base group (traditional segment), with companies listed in the Level 2 segment presenting a 6% greater probability of adoption.

The greater probability of the adoption of poison pills by companies listed in the New Market corroborates the view that these companies, because they emit only common shares and need to maintain a 25% free float, are more susceptible to hostile takeovers. That being so, the adoption of poison pills is relevant as a complementary device to corporate governance in regard to shareholder protection.

In a complementary manner, the positive and statistically significant association between Level 2 and the adoption of poison pills could be explained due to the companies listed in this segment (like those listed in the New Market) having to adopt a broader group of governance rules than Level 1, prioritizing the rights of minority shareholders as demonstrated by Almeida et al. (2008). In this perspective, the greater level of protection for investors in higher levels of governance is corroborated by Bortolon et al. (2013) and Collares (2020), who just use Level 2 and the New Market as premium segments to capture the quality of corporate governance.

The non-significance of the Level 1 segment with the adoption of poison pills may be related to the fact that the companies of this segment are not required to adopt practices related to protecting minority shareholders. An example of this is the right to vote for those with preferred shares (originally without the right to vote) in operations that have to do with the configuration of the company's control, such as merger or acquisition events, which is only required beginning with Level 2 of corporate governance.

Another aspect that signals greater concern with protecting minority shareholders, however, which is only required beginning with Level 2 is that in the case of the alienation of the control of the company, it is assured that holders of common and preferred shares will be treated in the same manner by the controlling shareholder (Soares, Peters, & Ciasca, 2017). In this sense, due to the main characteristics of Level 1 being practices related to the disclosure of information and share liquidity (Dalmácio et al., 2013), it is possible that the companies listed in this segment do not have a prerogative in their corporate governance action aspects related to the protection of shareholders such as the adoption of poison pills.

In terms of ownership concentration, it may be noted that the more concentrated a firm is, the lower the probability that it will adopt poison pills. This evidence is in line with the perspective that companies with higher concentrations of shares tend to have a lower propensity to adopt poison pills because the concentration of common shares naturally makes it difficult to alter control of the company.

Thus, considering that poison pills can be adopted by companies that also have concentrated control (Vieira et al., 2009), this negative relationship between ownership concentration and the adoption of poison pills shows that these anti-takeover devices may not be adopted within the Brazilian context due to the focus of managerial entrenchment, a situation which could occur when ownership concentration exerts a positive influence on the adoption of poison pills, thus indicating the search for, or maintenance of, managerial entrenchment.

In terms of the board size, the results indicate that larger boards are associated with a lower probability of companies adopting poison pills, which is in line with the view that an increase in the number of board members results in more diffuse decision-making (Hermalin & Weisbach, 2003), making it difficult to implement a protection device such as a poison pill.

In this sense, the negative relationship indicates that companies with smaller boards may have a greater propensity to adopt this anti-takeover device, in line with the perspective that smaller boards may be more participative in the managerial process, which leads to more effective decisions (Dah et al., 2017).

Regarding the firm size, the results indicate that larger firms have a smaller probability of adopting poison pills. In this way, the complexity and high operational costs which are involved in modifying the majority control of companies may make them less susceptible to hostile takeovers, thus reducing the need for the adoption of this anti-takeover device (Dah et al., 2017).

In terms of performance, the evidence points to a negative relationship between this variable and the probability of adopting poison pills, which is thus in line with evidence that firms with better performance make less attractive targets, and for this reason, they are less likely to adopt poison pills (Mallette & Fowler, 1992).

In terms of executive compensation, it has been verified that the level of compensation is positively associated with the adoption of poison pills, corroborating the view that managers are more likely to adopt defenses against acquisition, such as poison pills, when they have higher salaries (Dowen et al., 1994; Heron & Lie, 2006).

Thus, the adoption of this anti-takeover device by Brazilian companies may be influenced by factors that do not always benefit the shareholders. This perspective is based on the view that compensation may be seen as a factor which makes managers more likely to protect themselves against hostile takeovers, in that this event normally involves turnover in management and as a result the loss of compensation for these individuals (Dah et al., 2017).

Finally, in line with the findings of Dowen et al. (1994), the variables related to leverage and growth opportunities did not present significant statistics. Therefore, it is not possible to infer that these economic-financial factors have a relationship with the adoption of poison pills in Brazilian publicly-traded companies.

4.3 Sensitivity analysis

After the winsorization of the data at a 1% level, we verified through a boxplot that some outliers remained in the sample, which may bias the coefficients of the estimated models. In this sense, in line with Markle, Mills and Williams (in press), new regressions were estimated with winsorization of quantitative data at a 3% level to confirm whether the results converge with the evidence presented in Table 4.

The new estimates considering winsorization at a 3% level are presented in Model 2 in Appendix B, which demonstrates that the only variable which had its significance altered was the control variable Firm Size. Thus, we can confirm that the results converge with the findings reported in Table 4, considering the positive and statistically significant association with the New Market and Level 2 segments in the adoption of poison pills.

In a complementary manner, as a way to verify the robustness of the findings, we included proxies for alternative controls to examine whether the results remain constant in specific alternatives. The results of this robustness test are presented in Model 3 of Appendix B.

We used the cumulative percentage of voting shares held by the three top shareholders in relation to all of the voting shares as a proxy for ownership concentration (Crisóstomo et al., 2019), the natural logarithm of revenues as a proxy for firm size (Mallette & Fowler, 1992; Klapper & Love, 2004), return on equity as a proxy for performance (Mallette & Fowler, 1992; Darosi, 2014), the sum of fixed and variable compensation (without including stock options) as a proxy for executive compensation (Heron & Lie, 2006; Heron & Lie, 2015) and the ratio between total debt and total equity as a proxy for leverage (Comment & Schwert, 1995; Silva et al., 2018).

The results of the robustness test (Model 3) converge with the previous evidence that the adoption of poison pills is positively associated with the listing in New Market and Level 2 segments of corporate governance. However, we should pay attention to the influence of Performance on the adoption of poison pills to the extent that this variable was the only one whose statistical significance was altered, thus suggesting that the finding presented in Table 4 is susceptible to the utilized proxy.

5 FINAL CONSIDERATIONS

Considering that companies with higher levels of corporate governance could be adopting, in a complementary manner, mechanisms that provide greater protection for minority shareholders, this study has sought to verify whether there is an association between the adoption of poison pills and the differentiated levels of corporate governance in the Brazilian stock market.

The main results demonstrate that publicly-traded companies listed in the New Market and Level 2 segments, which have stronger protection mechanisms for minority shareholders, are positively associated with the adoption of poison pills in Brazil. However, it is not possible to confirm the hypothesis that companies listed in all differentiated levels of corporate governance have a greater propensity to adopt poison pills, bearing in mind that a statistically significant relationship was not observed for companies listed in Level 1.

This finding may be useful to current and potential investors to the extent that given the increase in publicly-traded companies with predominantly dispersed capital in the Brazilian stock market, attempted hostile takeovers may become more frequent. Thus, the adoption of poison pills by companies with high levels (New Market) or intermediate levels (Level 2) of governance can be seen as a signal that they have voluntarily sought to adopt complementary mechanisms that will protect minority shareholders.

In this sense, the results contribute theoretically to a possible convergence between Signaling Theory and the adoption of poison pills, complementing the discussion that adopting this anti-takeover device as a complementary corporate governance mechanism could represent a protection signal emitted by market companies seeking to attract new investors.

However, it should be emphasized that this discussion cannot be considered conclusive, and future studies investigating the effect of the adoption of poison pills on the wealth of shareholders of Brazilian publicly-traded companies will still be of interest, given that the adoption of this anti-takeover device can also imply harm to minority shareholders by perpetuating the current managers in their positions, considering the possibility of a combination of eternity clauses that impede its alteration or removal.

In a complementary manner, we would like to emphasize that the adoption of poison pills does not by itself imply a fundamental protection of minority investors, given that it is necessary for this adoption to be accompanied by other mechanisms such as the requirements of listings in different levels of corporate governance.

Finally, this paper also contributes to the literature of corporate governance by demonstrating in an exploratory manner possible factors associated with the adoption of poison pills by Brazilian publicly-traded companies. In this sense, it was observed that ownership concentration, board size, firm size, and company performance tend to reduce the propensity of companies to adopt this anti-takeover device, unlike executive compensation which is positively associated with the adoption of poison pills.

In terms of this study's limitations, in addition to the implementation of a single proxy to capture the quality of corporate governance, we stress that the results are limited to the analysis of the association between the adoption of poison pills with differentiated levels of governance, with it not being possible to make any inference in terms of the causality between the two.

In this sense, future studies can employ corporate governance indexes to verify if the results are consistent with those obtained, as well as expanding the analysis to identify the individual aspects of corporate governance which may exacerbate or mitigate the probability of the adoption of poison pills, such as the board independence, the duality of the chief executive officer, board interlocking and the pyramidal structure.

REFERENCES

Almeida, J. C. G., Scalzer, R. S., & Costa, F. M. (2008). Níveis diferenciados de governança corporativa e grau de conservadorismo: Estudo empírico em companhias abertas listadas na Bovespa. *Revista de Contabilidade e Organizações*, 2(2), 118-131. DOI: https://doi.org/10.11606/rco.v2i2.34709

Ambrozini, M. A., Pimenta, T. Jr., & Gaio, L. E. (2015). As pílulas de veneno: cláusulas em estatutos sociais de empresas para dificultar o takeover hostil. *Revista de Administração IMED*, 5(1), 59-69. DOI: https://doi.org/10.18256/2237-7956/raimed.v5n1p59-69

Anjos, L. C. M., Tavares, M. F. N., Monte, P. A., & Lustosa, P. R. B. (2015). Relações entre controle acionário e remuneração de executivos. *Enfoque: Reflexão Contábil*, 34(1), 45-56. DOI: https://doi.org/10.4025/enfoque.v34i1.22493

Arikawa, Y., & Mitsusada, Y. (2011). The adoption on poison pills and managerial entrenchment: Evidence from Japan. *Japan and the World Economy*, 23(1), 63-77. DOI: https://doi.org/10.1016/j.japwor.2010.11.003

Azevedo, Y. G. P., & Nakao, S. H. (2019). The influence of poison pills on executive compensation. *Advances in Scientific and Applied Accounting*, 12(3), 39-61. DOI: https://dx.doi.org/10.14392/ASAA.2019120303

Barbosa, F. H. Filho. (2017). A Crise Econômica de 2014/2017. *Estudos Avançados*, 31(89), 51-89. DOI: https://doi.org/10.1590/s0103-40142017.31890006

Bhojraj, S., Sengupta, P., & Suning, Z. (2017). Takeover defenses: entrenchment and efficiency. *Journal of Accounting and Economics*, 63(1), 142-160. DOI: http://dx.doi.org/10.1016/j.jacceco.2016.12.001

Bortolon, P. M., Sarlo, A. Neto, & Santos, T. B. (2013). Custos de Auditoria e Governança Corporativa. *Revista Contabilidade & Finanças*, 24(61), 27-36. DOI: https://doi.org/10.1590/S1519-70772013000100004

Caixe, D. F., & Krauter, E. (2014). Relação entre governança corporativa e valor de mercado: mitigando problemas de endogeneidade. *Brazilian Business Review*, 11(1), 96-117. DOI: https://doi.org/10.15728/bbr.2014.11.1.5

Carvalho, A. G., & Pennacchi, G. G. (2012). Can a stock exchange improve corporate behavior? Evidence from firms' migration to premium listings in Brazil. *Journal of Corporate Finance,* 18(4), 883-903. DOI: https://doi.org/10.1016/j.jcorpfin.2011.01.003

Claessens, S., & Yurtoglu, B. B. (2013). Corporate governance in emerging markets: A survey. *Emerging Markets Review*, 15, 1-33. DOI: https://doi.org/10.1016/j.ememar.2012.03.002

Collares, M. L. (2020). Governança corporativa: Fator preponderante no ativismo de acionistas no Brasil. *Revista de Administração Contemporânea*, 24(5), 414-431. DOI: https://doi.org/10.1590/1982-7849rac2020190388

Comment, R., & Schwert, G. W. (1995). Poison or placebo? Evidence on the deterrence and wealth effects of modern antitakeover measures. *Journal of Financial Economics*, 39(1), 3-43. DOI: https://doi.org/10.1016/0304-405X(94)00823-J

Crisóstomo, V. L., Freire, F. S., & Freitas, M. R. O. (2019). Determinants of corporate sustainability performance – Evidence from Brazilian panel data. *Social Responsibility Journal*, Ahead of Print. DOI: https://doi.org/10.1108/SRJ-04-2018-0102

Dah, B. A., Michael, A., & Dixon, R. (2017). Antitakeover provisions and CEO monetary benefits: Revisiting the E-index. *Research in International Business and Finance*, 42(1), 992-1004. DOI: https://doi.org/10.1016/j.ribaf.2017.07.033

Dalmácio, F. Z., Lopes, A. B., Rezende A. J., & Sarlo, A. Neto. (2013). Uma análise da relação entre governança corporativa e acurácia das previsões dos analistas do mercado brasileiro. *Revista de Administração Mackenzie,* 14(5), 104-139. DOI: https://doi.org/10.1590/S1678-69712013000500005

Darosi, G. C. M. (2014). Governança Corporativa e Desempenho Financeiro nas Sociedades de Energia Elétrica Brasileira. *Caderno Profissional de Administração – UNIMEP*, 4(2), 2014.

Datta, S., & Iskandar-Datta, M. (1996). Takeover defenses and wealth effects on securityholders: The case of poison pill adoptions. *Journal of Banking & Finance*, 20(7), 1231-1250. DOI: https://doi.org/10.1016/0378-4266(95)00051-8

Davis, G. F. (1991). Agents without principles? The spread of the poison pill through the intercorporate network. *Administrative Science Quarterly*, 36(4), 583-613. DOI: http://dx.doi.org/10.2307/2393275

DeAngelo, H., & Rice, E. M. (1983). Antitakeover Charter Amendments and Stockholder Wealth. *Journal of Financial Economics*, 11(1-4), 329-359. DOI: https://doi.org/10.1016/0304-405X(83)90016-8

Diagnósticos da América S. A. (2014). Fato Relevante. Recuperado de https://www.rad.cvm.gov.br/ENET/frmExibirArquivoIPEExterno.aspx?NumeroProtocoloEntrega=406527

Dowen, R. J., Johnson, J. M., & Jensen, G. R. (1994). Poison pills and corporate governance. *Applied Financial Economics*, 4(4), 305-313. DOI: https://doi.org/10.1080/758530897

Eletropaulo Metropolitana Eletricidade de São Paulo S.A. (2018). Fato Relevante. Recuperado de https://www.rad.cvm.gov.br/ENET/frmExibirArquivoIPEExterno.aspx?NumeroProtocoloEntrega=607093

Gine, M., Moussawi, R., & Sedunov, J. (2017). Governance mechanisms and effective activism: Evidence from shareholder proposals on poison pills. *Journal of Empirical Finance*, 43, 185-202. DOI: https://doi.org/10.1016/j.jempfin.2017.07.002

Gompers, P., Ishii, J., & Metrick, A. (2003). Corporate Governance and Equity Prices. *The Quarterly Journal of Economics*, 118(1), 107–156. DOI: https://doi.org/10.1162/00335530360535162

Gorga, E. (2009). Changing the Paradigm of Stock Ownership from Concentrated towards Dispersed Ownership: Evidence from Brazil and Consequences for Emerging Countries. *Northwestern Journal of International Law & Business*, 29, 439–554. DOI: http://dx.doi.org/10.2139/ssrn.1121037

Harris, O., & Madura, J. (2010). Cause and effects of poison pill adoptions by spinoff units. *Journal of Economics and Business*, 62(1), 307-330. DOI: https://doi.org/10.1016/j.jeconbus.2010.01.003

Hermalin, B. E., & Weisbach, M. S. (2003). Boards of directors as an endogenously determined institution: A survey of the economic literature. *Economic Policy Review*, 9(1), 7-26. DOI: https://doi.org/10.3386/w8161

Heron, R. A., & Lie, E. (2006). On the use of poison pills and defensive payouts by takeover targets. *Journal of Business*, 79(4), 1783-1807. DOI: https://doi.org/10.1086/503648

Heron, R. A., & Lie, E. (2015). The effect of poison pill adoptions and court rulings on firm entrenchment. *Journal of Corporate Finance*, 35, 286-296. DOI: https://doi.org/10.1016/j.jcorpfin.2015.09.008

International Meal Company S.A. (2018). Fato Relevante. Recuperado de https://www.rad.cvm.gov.br/ENET/frmExibirArquivoIPEExterno.aspx?NumeroProtocoloEntrega=596635

Jensen, M. C., & Ruback, R. S. (1983). The market for corporate control: The scientific evidence. *Journal of Financial Economics*, 11(1-4), 5-50. DOI: https://doi.org/10.1016/0304-405X(83)90004-1

Jiraporn, P. (2005). An empirical analysis of corporate takeover defenses and earnings management: evidence from the US. *Applied Financial Economics*, 15(5), 293-303. DOI: DOI: https://doi.org/10.2139/ssrn.1483787

Klapper, L. F., & Love, I. (2004). Corporate governance, investor protection, and performance in emerging markets. *Journal of Corporate Finance*, 10(5), 703-728. DOI: https://doi.org/10.1016/S0929-1199(03)00046-4

Knoeber, C. R. (1986). Golden Parachutes, Shark Repellents, and Hostile Tender Offers. *The American Economic Review*, 76(1), 155-167.

La Porta, R., Lopez-de-Silanez, F., Shleifer, A., & Vishny, R. W. (2002). Investor Protection and Corporate Valuation. *The Journal of Finance*, 57(3), 1147-1170. DOI: https://doi.org/10.1111/1540-6261.00457

Leal, R. P. C., Carvalhal, A. L., & Iervolino, A. P. (2015). One Decade of Evolution of Corporate Governance Practices in Brazil. *Revista Brasileira de Finanças*, 13(1), 131-161. DOI: http://dx.doi.org/10.12660/rbfin.v13n1.2015.50904

Loh, C. (1994). The influence of outside directors on the adoption of poison pills. *Quarterly Journal of Business and Economics*, 33(1), 3-11.

Machado, J. H., & Famá, R. (2011). Ativos intangíveis e governança corporativa no mercado de capitais brasileiro. *Revista Contemporânea de Contabilidade*, 8(16), 89-109. DOI: https://doi.org/10.5007/2175-8069.2011v8n16p89

Maestri, H. C. (2011). Estudo Comparado sobre a Aplicabilidade das Poison Pills no Direito Brasileiro e Norte-Americano. *Revista Direito em (Dis)Curso*, 4(1), 64-73.

Malatesta, P. H., & Walking, R. A. (1988). Poison pill securities: stockholder wealth, profitability, and ownership structure. *Journal of Financial Economics*, 20, 347-376. DOI: https://doi.org/10.1016/0304-405X(88)90050-5

Mallette, P., & Fowler, K. L. (1992). Effects of board composition and stock ownership on the adoption of "poison pills". *The Academy of Management Journal*, 35(5), 1010-1035. DOI: https://doi.org/10.5465/256538

Martes, C. R. (2014). *Sobre o controle minoritário nas companhias listadas no novo mercado*. (Dissertação de mestrado). Faculdade de Direito da Universidade Federal de São Paulo, São Paulo, SP, Brasil. DOI: https://doi.org/10.11606/D.2.2014.tde-08122014-155609

Manoel, A. A. S., Moraes, M. B. C., Nagano, M. S., & Sobreiro, V. A. (2018). Cash holdings and corporate governance: The effects of premium listing in Brazil. *Review of Development Finance*, 8(2), 106-115. DOI: https://doi.org/10.1016/j.rdf.2018.11.002

Markle, K. S., Mills, L. F., & Williams, B. (in press). Implicit Corporate Taxes and Income Shifting. *The Accounting Review*, 2019. DOI: https://doi.org/10.2308/accr-52526

Nardi, P. C. C., & Nakao, S. H. (2008). Impacto da entrada nos níveis diferenciados de governança corporativa sobre a imagem institucional das empresas. *Contabilidade Vista & Revista*, 19(2), 85-111.

Pelucio-Grecco, M. C., Geron, C. M. S., & Grecco, G. B. (2014). The effect of IFRS on earnings management in Brazilian non-financial public companies. *Emerging Markets Review*, 21, 42-66. DOI: https://doi.org/10.1016/j.ememar.2014.07.001

Portulhak, H., Theiss, V., Kühl, M. R., & Colauto, R. D. (2017). Poison pills e gerenciamento de resultados: Estudo em companhias do novo mercado da BM&FBovespa. *Revista Universo Contábil*, 13(2), 25-42. DOI: https://doi.org/10.4270/ruc.2017207

Rhee, E. Y., & Fiss, P. C. (2014). Framing controversial actions: Regulatory focus, source credibility, and stock market reaction to poison pill adoption. *Academy of Management Journal*, 57(6), 1734-1758. DOI: https://doi.org/10.5465/amj.2012.0686

Ryngaert, M. (1988). The effect of poison pill securities on shareholder wealth. *Journal of Financial Economics,* 20, 377-417. DOI: https://doi.org/10.1016/0304-405X(88)90051-7

Saona, P., & Muro, L. (2018). Firm and country level attributes as determinants of earnings management: an analysis for Latin American firms. *Emerging Markets Finance and Trade*, 54(12), 2736-2764. DOI: https://doi.org/10.1080/1540496X.2017.1410127

Schepker, D. J., & Oh, W. (2013). Complementary or Substitutive Effects? Corporate Governance Mechanisms and Poison Pill Repeal. *Journal of Management*, 39(7), 1729-1759. DOI: https://doi.org/10.1177/0149206312441209

Sikes, S. A., Wilson, R. J., & Tian, X S. (2014). Investors' reaction to the use of poison pills as a tax loss preservation tool. *Journal of Accounting and Economics*, 57(2-3), 132-148. DOI: https://doi.org/10.1016/j.jacceco.2014.02.002

Silva, A. L. P., Lana, J., & Marcon, R. (2018). Pactuando e Impactando: O Efeito dos Acordos de Acionistas no Valor de Mercado da Firma. *Brazilian Business Review*, 15(1), 88-104. DOI: http://dx.doi.org/10.15728/bbr.2018.15.1.6

Silva, C. C. D. S., & Martins, O. S. (2018). Reflexo da qualidade de governança corporativa no processo de avaliação de empresas. *Gestão & Regionalidade*, 34(102), 75-93. DOI: http://dx.doi.org/10.13037/gr.vol34n102.4224

Soares, A. M., Peters, M. R. S., & Ciasca, D. N. (2017). Evidenciação: índice de conformidade e evidenciação do relatório de administração das empresas de energia elétrica listadas no nível 1 e 2 de governança da BM&FBovespa em 2016 em relação ao parecer de orientação 15/87 da CVM. *Revista Metropolitana de Governança Corporativa*, 2(2), 3-18.

Spence, M. (1973). Job market signaling. *The Quarterly Journal of Economics*, 87(3), 355-374. DOI: https://doi.org/10.2307/1882010

Sternberg, L., Leal, R. P. C., & Bortolon, P. M. (2011). Affinities and agreements among major Brazilian shareholders. *Journal of Disclosure and Governance*, 8(3), 213-228. DOI: https://doi.org/10.1057/jdg.2011.6

Straska, M., & Waller, G. (2014). Antitakeover provisions and shareholder wealth: A survey of the literature. *Journal of Financial and Quantitative Analysis*, 49(4), 933-956. DOI: https://doi.org/10.1017/S0022109014000532

Vieira, J., Martins, E., & Fávero, L. P. L. (2009). Poison pills no Brasil: um estudo exploratório. *Revista Contabilidade & Finanças*, 20(50), 6-24. DOI: https://doi.org/10.1590/S1519-70772009000200002

How to cite this paper

Azevedo, Y. G. P.; Gomes, H. B.; & Nakao, S. H. (2021). Poison pills and corporate governance: a study in the Brazilian stock market. *Revista de Contabilidade e Organizações*, 15:e169831. DOI: http://dx.doi.org/10.11606/issn.1982-6486.rco.2021.169831

Appendix A – Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Poison pill	1										
(2) New Market	**0.501**	1									
(3) Level 2	**-0.095**	**-0.230**	1								
(4) Level 1	**-0.188**	**-0.346**	**-0.087**	1							
(5) Ownership concentration	**-0.364**	**-0.436**	**0.129**	**0.165**	1						
(6) Board size	-0.036	**0.091**	**0.177**	**0.183**	-0.034	1					
(7) Firm size	**-0.087**	**0.082**	**0.132**	**0.232**	0.015	**0.512**	1				
(8) Performance	-0.035	**0.079**	-0.036	**-0.067**	**-0.054**	**0.083**	**0.053**	1			
(9) Compensation	**0.284**	**0.321**	0.049	0.042	**-0.263**	**0.398**	**0.419**	**0.184**	1		
(10) Leverage	0.001	**-0.063**	**0.087**	**-0.058**	**0.087**	-0.028	**0.079**	**-0.376**	-0.051	1	
(11) Growth opportunities	**0.105**	**0.212**	0.024	-0.050	**-0.142**	**0.209**	**0.197**	**0.214**	**0.293**	**0.246**	1

Source: research data.
Note:Coefficients in bold are statistically significant at a 5% level.

Appendix B – Sensitivity analysis

Dependent variable: Poison pill	Model 2		Model 3	
	Logit	Probit	Logit	Probit
New Market	14.813***	1.488***	13.659***	1.424***
	(4.112)	(0.141)	(3.723)	(0.137)
Level 2	3.593**	0.656**	5.277***	0.885***
	(1.967)	(0.292)	(2.853)	(0.281)
Level 1	-17.133	-0.062	-2.416	-0.016
	(0.498)	(0.285)	(0.578)	(0.283)
Ownership concentration	-1.974***	-0.011***	-3.201***	-0.018***
	(0.004)	(0.002)	(0.005)	(0.003)
Board size	-16.228***	-0.096***	-20.495***	0.003***
	(0.035)	(0.023)	(0.039)	(0.027)
Firm size	-13.322	-0.078	1.167*	0.094**
	(0.121)	(0.079)	(0.096)	(0.047)
Performance	-1.350***	-10.173***	-32.275	-0.193
	(0.001)	(2.162)	(0.259)	(0.219)
Compensation	1.199***	0.105***	1.046***	0.026***
	(0.029)	(0.013)	(0.014)	(0.007)
Leverage	3.611	0.806	1.105	0.049
	(3.293)	(0.523)	(0.071)	(0.037)
Growth opportunities	-99.540	-4.301	1.046	0.016
	(0.041)	(5.221)	(0.150)	(0.084)
Constant	-91.677	-1.524	0.045***	-1.787***
	(0.167)	(1.126)	(0.038)	(0.470)
Year	Included	Included	Included	Included
Sector	Included	Included	Included	Included
AIC	948.012	945.984	978.8645	978.7718
LR chi2	578.81***	580.84***	547.96***	548.05***
Goodness-of-fit	1143.45	1154.00	1173.90	1150.40
Count R^2	0.836	0.831	0.839	0.838
McFadden's Adjusted R^2	0.354	0.355	0.333	0.333

Source: research data.

Note: Model 2 presents an estimate of the model presented in Equation 1 with winsorized variables at a level of 3%. Model 3 presents an estimate of the robustness test, as demonstrated in Section 4.3. Logit link coefficients are presented as an odds ratio. Standard errors reported between parentheses. ***, **, * indicate significance at a level of 1%, 5% and 10%, respectively.