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The effect of Poison Pills on Shareholder Value

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ABSTRACT

This paper examines the effect of the adoption of a poison pill on shareholder value, using a sample of firms from the United States and Canada adopting a poison pill between 2000 and 2017. Two contradicting theories of the incentives of management to adopt a poison pill are identified, the shareholder interest hypothesis and the management entrenchment hypothesis. The first assumes management acts in the interest of shareholders, which should lead to a positive change in stock price, the later the opposite. Evidence on positive abnormal returns of stock prices supporting the shareholder interest hypothesis has been found. The effect of other anti-takeover provisions on the adoption of a poison pill has been evaluated with the governance provision of a classified board. However no significant evidence was found. Furthermore, evidence in line with the insider holding hypothesis, which assumes a firm where management holds a higher number of shares will have more positive abnormal stock returns during a poison pill adoption, has been found.

Keywords:

Poison pill, shareholders, corporate governance, ownership structure, takeovers.

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CHAPTER 1 Introduction

Mergers and acquisitions have been regular occurring phenomena, which are probably linked to the theory of economies of scale. Recently, Akzo Nobel, Unilever, and KPN all had problems with hostile takeovers from competitors or other interested companies. A hostile takeover occurs when an acquirer¹ passes by the target's² management and directly buys shares from shareholders (Berk & DeMarzo, 2011). The management of the target company has the possibility to adopt certain regulations to prevent a hostile takeover or to force the acquirer to negotiate with the target's management and gain a higher bid price. After making several friendly bids to Akzo Nobel's management that were all rejected, PPG threatened to directly buy shares from the shareholders (Proper & Hammond, 2017). When there is a threat of takeover (a certain shareholder holds above a certain number of shares) Akzo Nobel's priority shareholders have the right to make binding nominations for appointments to the 'Board of Management' and the 'Supervisory Board' (Shareholders and the Annual General Meeting, 2016). Thus, even if the acquirer had acquired the majority of shares, it would not be able to discard/ the current management. Possibly because of this regulation, PPG decided not to proceed with its threat in the end. These kind of anti-takeover regulations and restrictions within a company are often called poison pills. They all have in common that the shares of the target are diluted, making it more costly for the acquirer to take over the firm.

A lot of research has been done to find the effect these poison pills have on shareholder value. In general, two contrasting theories can be identified. On the one hand, the management entrenchment hypothesis states that poison pills protect management from takeovers, thereby removing an important check on management's competency. According to this hypothesis, the announcement/presence of poison pill securities is expected to have a negative effect on stock prices. This hypothesis is supported by research of Ryngaert (1988) who found that announcement of the most restrictive forms of poison pills were associated with declines in stock prices. Malatesta and Walking (1988) found that shareholder wealth is on average significantly reduced by adoption of poison pills. On the other hand, the shareholder interest hypothesis predicts a positive effect on stock prices at the announcement of poison pill securities. The hypothesis assumes management to act in the interest of shareholders. The only reason for management to adopt poison pills is to be able to negotiate a higher price (and thus more value) for shareholders. This hypothesis is primarily supported by more recent research. Heron and Lie (2006) observed no harm for shareholders at the announcement of poison pills. Their results even showed an increase in takeover bids for firms with poison pills, without affecting the likelihood of a takeover. Caton and Goh (2008) found significant abnormal positive stock returns for the most democratically governed firms.

To evaluate the validity of these two contrasting hypotheses, this paper will focus on the following question:

“What is the effect of the adoption of poison pill securities on the stock price of North American companies between 2000 and 2017? “

As almost no research has been done on the reactions to adoptions of poison pills in the last 10 years, it is significant that this will be investigated again, while keeping the findings of past years in mind. Possible new findings can be added to the already present knowledge on poison pills to make it more complete and can give information on the current views of the public on poison pills.

To evaluate the effect of an adoption of a poison pill on shareholder value, the following hypothesis is tested.

¹ The firm which is purchasing another firm in an acquisition

² The firm that is threatened by a takeover

Hypothesis 1: *The stock price will increase after the adoption of a poison pill.*

Multiple evaluation periods around the date of adoption are used, a 7-day period (3 days before and after) a 3-day period (1 day before and after) and a 2-day period (the day of adoption and 1 day later).³

An alternative anti-takeover measure to poison pills is a classified board. In a classified board, the terms of board members do not expire at the same time, they are commonly staggered in such a way that only one-third of the members are up for election each year (Berk & DeMarzo, 2011). To test if the presence of another anti-takeover measure leads to a different effect of a poison pill announcement on the stock price, a second hypothesis is evaluated.

Hypothesis 2: *The stock price of companies with a classified board already in place will increase more than the stock price of companies without a classified board.*

Another widespread theory, the ‘Insider Holdings Hypothesis’, evaluates the effect between the amount of shares management holds and poison pill announcements. As the incentives of management are more aligned with shareholders when the management holds a high number of shares of its firm, there should be a positive or less negative effect on the stock price.

Hypothesis 3: *The stock price of companies where management holds a larger number of shares will increase more.*

This paper will proceed as follows: Section 2 will further explain the concept of poison pill securities and its different types. In Section 3 an overview of earlier literature is given. Section 4 will examine the collected data and explain the used methodologies. Section 5 will discuss the found results and an overall conclusion on the research question will be given in Section 6.

³ The choice for these periods will be explained more in detail further on in this paper.

CHAPTER 2 Theoretical Framework

As takeovers and mergers became more common, managers tried more often to find ways to protect their company from hostile threats. Particularly after the U.S. Supreme Court invalidated the basis for anti-takeover laws in most states in 1982⁴ (Garg, sd). Adding the negligent enforcement of anti-takeover laws of the U.S Department of Justice during that time, many firms were induced to devise their own anti-takeover strategies, so called poison pills. The first poison pill was invented in 1982 by Martin Lipton, a corporate lawyer who was advising General American Oil, to deter a hostile takeover threat by making a shareholder rights plan (Corporate Finance Institute, sd). In this plan General American Oil gave out a large amount of stocks, flooding the market, and thereby diluting the value of the stock already purchased by the acquirer. When thereafter, poison pills were legalized by the Delaware Court in 1985⁵ the number of firms adopting poison pills reached a height.

The poison pill, or shareholder rights plan, is a security issued by the board of directors to deter a hostile takeover by dramatically increasing the potential cost of the company's shares, making the shares look unattractive to the acquirer (Ryngaert, 1988). The security or option is triggered, when a firm comes under threat of a hostile takeover. This is per company defined by a certain threshold, for example when one shareholder holds more than 20% of the stock.

A firm can have multiple objectives for adopting a poison pill, which all in some way 'deter' a hostile acquirer. Due to the threat of an increase in potential costs by the adoption of a poison pill, the acquirer will be more uncertain about the costs of an acquisition and the chance of success (Bruner, 1991). Especially, because most poison pills are very complex and difficult to understand for outside parties. An acquirer will most likely need some time to assess the future effect of this hindrance and consider if it wants to take the chance. Thereby buying additional time for the board of directors to decide what to do with this takeover threat. This additional time will also give the board a chance to auction the company on their terms. As the acquirer will not like the costs the poison pill will cause, he will be pressured to negotiate with the management and make a deal, so actually try for a non-hostile takeover. Additionally, a very important objective of poison pills is the prevention of coercive bidder tactics such as partial⁶ and front-end loaded tender offers. With the latter, also called a two-tier tender offer, an acquirer uses two steps to takeover a firm. First, it buys a certain number of shares at an agreed upon (often relatively high) price. Then the acquirer uses the power these shares give him to demand a merger at a lower price than paid in the initial step (Ryngaert, 1988).

The exclusion of shareholders in the decision of adopting a poison pill is a common factor of these plans. This decision is solely in the hands of the directors, as they do not need the approval of shareholders. This mostly causes the fear for management entrenchment. Another characteristic all poison pills share is that before circumstances trigger the poison pill, the option or security of poison pills is not detachable from the stock⁷. Otherwise the shareholder trying to acquire the firm could buy these options and impede the entire tactic. When needed, the board of directors can redeem the pill security at a small cost, until shortly after a takeover announcement has been made (Ryngaert, 1988), thereby stopping the costly consequences the pill could have had on the acquirer. This is also a frequently used argument to argue that poison pills do not avoid all takeovers, but just force an acquirer to negotiate with the target's board of directors.

⁴ In the case of *Edgar v. MITE Corp.*

⁵ In the case of *Moran v. Household International, Inc*

⁶ In a partial tender offer the acquirer sets out to buy only a certain amount of the shares (often 51%), later he uses the acquired shares to exploit the other shareholders through for example a minority freeze-out (Bruner, 1991).

⁷ It is not possible to sell or buy the poison pills security separately from the share it belongs to.

There are many different types of poison pills. In general, all constructions with shares of the target firm that have as an objective to hinder a hostile takeover, are considered poison pills. The most common forms will be explained more in-depth.

The original poison plan introduced by Lipton, is a version of the preferred shareholder rights plan. In this plan common shareholders receive convertible preferred shares, whose dividend is slightly higher than the dividend of the common stock that would be received after conversion (Malatesta & Walkling, 1988). This discourages shareholders to convert the preferred stock. When the poison pill is triggered, shareholders other than the acquirer or large block holder can redeem the preferred shares for the highest price the large block holder paid for stock in the past year or a large number of common shares. Both will make a possible merger much more expensive and difficult for an acquirer, either by decreasing the value of the target firm due to a loss of cash or by diluting the value of the shares held by the large block holder, respectively. This is in effect an example of a flip-in provision, as with this provision shareholders are also allowed to buy shares at a discount when the security is triggered, and thus diluting the value of stocks held by the acquirer.

Flip-over provisions, the second type of poison pills, slightly differ from flip-in provisions in the time shareholders have the right to buy the shares at a discount. The flip-over provisions are rights given out to shareholders, that can be used after the merger or acquisition has taken place to get new shares from the surviving company at a substantial discount, most often 50% (Malatesta & Walkling, 1988). Therefore, they cause a merger to be extremely expensive. After the poison pill has been triggered, and thus the stocks can be separately traded, but before the merger has taken place, the acquirer has the chance to obtain most of the rights. This is the only way to decrease the substantial cost created by the flip-over rights.

The third poison pill version is the back-end rights plans. Under this plan shareholders receive a redeemable right (Ryngaert, 1988). When the poison pill is triggered, shareholders, excluding the large block holder, can exchange this right together with the stock it belongs to for more profitable securities or cash equal to the value of the back-end price. The back-end price is higher than the current value of the stock, established by the board to hinder a two-tier acquisition bid. This plan tries to put a limit price on the back-end of a two-tier acquisition, which is where the name is coming from according to Malatesta and Walkling (1988).

The last type of poison pills this paper will discuss is the voting plan, which has the objective to prevent a single party from obtaining voting control of the firm. Under this plan the firm will give out preferred stock to its shareholders. If the pill is triggered, this preferred stock will give the shareholders other than the large block holder, 'supervoting' rights (Malatesta & Walkling, 1988). In this way the large block holder will be prevented from using their voting control and will not be able to influence any control transactions.

As has been mentioned earlier, the adoption of poison pills can have multiple objectives, and therefore also multiple results. This paper will focus on the effects this will have on shareholder value. The adoption of a poison pill will increase the bargaining power of management and can lead to higher premiums for shareholders. However, it can also deter a takeover, leading to a loss of potential premiums for shareholders and safeguard the current management from being fired. The adoption of a poison pill will also signal the potential value of the firm if it would be taken over and at the same time affect the probability that this value will be realized through the higher probability of deterrence (Bruner, 1991). The final or net effect on shareholder wealth, and thus the stock price, will depend on the impact of the different factors, and how they affect each other. The objective of this paper is to find out if adopting a poison pill leads most likely to an increase of shareholder value by increasing bargaining power, or a decrease in shareholder value due to a deterrence effect for a potentially positive takeover.

CHAPTER 3 Literature review

Based on previous literature, the effects of poison pills, insider ownership and governance structures on shareholder value are assessed⁸ The two contrasting hypotheses mentioned in the introduction differ in their expectations of the impact of the different effects the adoption of a poison pill can have. The management entrenchment hypothesis expects the deterrence effect to be stronger than the increase in bargaining power of incumbent management. This would mean that the adoption has a negative effect on shareholders and a decrease in stock prices should be visible. Both Ryngaert (1988) and Malatesta and Walkling (1988) have found evidence in the change of stock prices at announcement of poison pills that support this hypothesis. Ryngaert (1988) also found that for firms with more restrictive poison pills or with a high probability of takeover, the negative change in stock prices is larger. Malatesta and Walkling (1988) support the latter with their finding that firms adopting poison pills are more likely to have been a target. Datta and Iskander-Datta (1996) were not able to find significant evidence of a decrease in stockholder wealth. However, they did find that firms with poison pills perform inferior to industry rivals.

The shareholder interest hypothesis expects the bargaining power effect to be stronger than the deterrence effect. The stock price should then display a positive change, as this will increase shareholder value. Both Comment and Schwert (1995) and Heron and Lie (2006) have found higher takeover premiums for firms that had adopted poison pills. Heron and Lie (2006) even concluded that the presence of poison pills does not reduce the likelihood of a takeover. Even though Comment and Schwert (1995) found significant negative abnormal stock returns for firms adopting poison pills whose takeover rumors were public, they concluded that poison pills do not deter takeovers because of the higher takeover premiums found. Caton and Goh (2008) support the shareholder interest hypothesis for firms without governance protections with their evaluation on the change in stock prices.

A relationship has been found between insider ownership, which is defined as percentage of stocks held by management, and the adoption of poison pills. Both Mallette and Fowler⁹ (1992) and Heron and Lie (2006) have discovered that the probability of a firm adopting a poison pill decreases as the stocks held by management increase. An almost similar finding by Malatesta and Walkling (1988) shows that managers of firms that adopt poison pills have a lower percentage of insider ownership. These results combined with the theory that the incentives of management should be more aligned with shareholders when they hold a larger number of shares in its firm, suggest that adopting a poison plan is not in the interest of shareholders. This phenomenon, mentioned as the 'Insider ownership hypothesis' in the introduction, suggests that if a firm adopts a poison pill, the effect on the stock price will be less negative or even positive, if management holds a higher percentage of its firms shares. This has been evaluated by Ryngaert (1988), who however wasn't able to find a significant difference. McWilliams evaluated this effect for anti-takeover amendments instead of poison pills and found a negative relation between insider holdings and the change in stock price for all type of amendments, except for fair price amendments. In conclusion, no direct evidence of the 'Insider ownership hypothesis' has been found.

Many research has been done on the effects of anti-takeover amendments that are already in place on the change of stock price when a poison pill is announced. Many hypothesize that these amendments combined with a poison pill adoption will lead to a larger decline in stock prices. Ryngaert (1988) found no significant evidence for staggered boards, but if there was no takeover speculation present, fair-price and supermajority amendments did increase the decline in stock price. Comment and Schwert (1995) did not find a significant difference in stock prices between situations where anti-takeover laws were in place or where these were not in place. Caton and Goh (2008) found data to

⁸ In table 11 at the end of this paper an overview of the literature is given.

⁹ Only for inside directors, not for independent directors

support this theory in reverse, only for firms without any governance protections will the change in stock price be less negative or even positive, when a poison pill is adopted. Brickley, Coles and Terry (1994) evaluated the effect the fraction of outside directors¹⁰ has on the change in stock price due to announcement of a poison pill and found a significant positive relation. Next to this, Mallette and Fowler (1992) have evaluated the effect of an increase in the fraction of independent directors on the probability of a poison pill adoption, but they weren't able to find a significant relation.

¹⁰ An outside (or independent) director is a member of a board of directors who has no ties to the company, he or she is neither employed by the firm or a stakeholder.

CHAPTER 4 Data and Methodology

The data evaluated in this paper consists of 207 observations of companies from the United States or Canada, adopting a poison pill in the period 2000-2017. These companies, and the date of adoption of the poison pill were identified using CapitalIQ¹¹. Data on classified boards and the percentage of shares held by insiders¹² (% insider owned) are also collected from CapitalIQ. Observations for which no data on these variables was available were excluded, leaving 396 observations. The stock price data was gathered from Datastream. Again, observations for which this data was not available were excluded, resulting in the 207 observations that could be used for the tests. Finally, the descriptive statistics such as industry code and indicators of company size were found on CapitalIQ.

Table 1: Number of poison pill adoptions in the sample per year

Year	Frequency	Year	Frequency
2000	1	2009	14
2001	3	2010	18
2002	2	2011	21
2003	0	2012	20
2004	1	2013	22
2005	2	2014	13
2006	5	2015	26
2007	3	2016	23
2008	13	2017	20

In table 1 a distribution summary over time is displayed, showing that the sample mostly consists of poison pills adopted after 2007. More than 90% of the poison pills were adopted between 2008 and 2017.

Tables 2, 3 and 4 provide characteristics of our sample firms. Only 13% of the firms in this sample have a classified board in place, as can be seen in table 2. This may indicate that few firms have an anti-takeover provision in place before they adopt a poison pill. The average % insider owned is approximately 11% and the 3rd quartile is at 15%. This seems to indicate that for firms adopting poison pills insiders hold only a small number of shares, which is in line with the theory that poison pills are adopted to entrench management. Since through the adoption of a poison plan management has more control, which it misses on basis of the low number of shares held.

Table 2: Independent Variables

Variable	Mean	Standard deviation	1 st quartile	Median	3 rd quartile
Classified board ^a	0.12	0.33	0	1	1
% insider owned ^b	10.69	13.34	1.81	5.67	14.51

a. *Classified = 1 if firm has a classified board of directors, 0 otherwise.*

b. *% insider owned = percentage of firm's shares that are held by insiders of the firm (insiders are here defined as officers of management or directors of the board)*

Table 3: Industry statistics

¹¹ In the initial plan announcement dates would be used to measure stock price effects. Because this information could not be found with the available resources, the adoption date will be used instead of the announcement date. The consequences of using the adoption date are further discussed in the conclusion.

¹² Percentage of shares held by insiders serves as a proxy for management holdings. It includes the percentage of shares held by management officers and board directors of the firm.

Industry^a	Frequency	%
Agriculture, Forestry and Fishing	2	1.0%
Mining	82	39.8%
Construction	1	0.5%
Manufacturing	51	24.8%
Transportation, Communications, Electric, Gas and Sanitary service	10	4.9%
Wholesale trade	5	2.4%
Retail Trade	3	1.5%
Finance, Insurance and Real Estate	26	12.6%
Services	27	13.1%
Public Administration	0	0.0%

a. Industry is based on the 2-digit SIC code

In table 3 an overview of the different industries the firms in this sample operate in, based on their SIC code, is displayed. There is significant industry clustering visible, as almost 65% of the sample consists of Mining or Manufacturing firms. Additionally, almost no firms operating in the Agriculture, Forestry and Fishing, Construction or Public Administration industries are included in the sample. A reason for this clustering could be a higher presence of (hostile) takeovers in the Mining and Manufacturing industries, and therefore more firms adopting poison pills.

Table 4: Descriptive company statistics

Variables^a	Mean	Median	Standard deviation
Market capitalization	\$ 1,057.21	\$ 63.90	\$ 4,281.17
Total assets	\$ 3,559.24	\$ 68.93	\$ 34,18.,25
Debt/assets Leverage ratio	0.61	0.08	1.48
Capital expenditures	\$ 61.47	\$ 2.27	\$ 263.85
Capex/asset ratio	0.08	0.03	0.15
Winsorized Leverage ratio	0.21	0.08	0.26

a. All variables (except for the ratio's) are in million US dollars, measured at fiscal year-end.

On average, the firms in the sample are considered large sized companies (Companies Act, 2014), both in terms of market capitalization and total assets. The leverage ratio, debt over assets, is quite high with 61%, as then more than half of the assets would be financed by debt. However, the median is much lower at 7.5%. It appears that the high mean value of 61% is caused by a few high outliers. This is confirmed when winsorizing the data at 5%, which results in a mean of 21%. Capital expenditures average at 62 million US dollars and 7.7% over total assets, which seems to be in the normal range.

The empirical tests, that are described below, involve abnormal stock returns of firms adopting a poison pill. To get rid of the market movements or normal changes in the stock price, which are not caused by the adoption of the poison pill, an abnormal return is calculated using a market adjusted mean technique. By deducting the expected change in stock price from the actual change, it can be checked if the change in stock price is significantly different from what it would be if the poison pill had not been adopted.

The overall trend in the market is measured using the Standard & Poor's 500 (S&P 500). This is an American stock market index based on the stock prices of 500 large companies that have stock listed

on the NYSE or NASDAQ (Bloomberg, sd). This index was chosen because all the firms in the sample are located in the US and Canada, and, as can be seen from the descriptive statistics in table 4, are on average quite large.

To generate a forecasting model for the firm's stock return under normal circumstances, an ordinary least squares regression is used to estimate the parameters α and β (see formula a). To make sure the poison pill adoption, or rumors of a possible adoption have no effect on this estimated α and β , the regression is done in a period long before the poison pill is adopted. For this sample the period chosen is [-345, -40], with 0 as the day of adoption.

Formula a
$$R_{jt} = \alpha_j + \beta_j \times R_{m,t} + \varepsilon_{jt}$$

With R_{jt} as the stock return of firm j on day t, during the estimation period of [-345, -40], α_j and β_j the estimated α and β for firm j, $R_{m,t}$ the return of the S&P 500 on day t, and ε_{jt} the error term of firm j on day t.

For this regression, the assumptions are made that the stock returns are normally distributed with market index return and there is a linear relationship. The expected error (ε_{jt}) is assumed to be equal to zero and homoscedastic. Additionally, error terms of different observations should not be correlated with each other.

With these estimated parameters α and β , and the proxy used for market movements, the forecasting model can be used to estimate the stock price in the period around the adoption of the poison pill. This estimated return will then be deducted from the actual return of stock (see formula b).

Formula b
$$AR_{jt} = R_{jt} - (\alpha_j + \beta_j \times R_{mt})$$

Where AR_{jt} denotes the abnormal return for firm j at day t, R_{jt} the actual return in the evaluation period of firm j at day t, R_{mt} the return on the S&P500 on day t, and α_j and β_j the estimated α and β for firm j.

For the choice of the period that the stock price should be evaluated, several considerations were made:

- To make sure confounding effects, such as announcement of takeover bids, other defensive tactics, earnings reports or dividend changes do not affect the stock price that will be evaluated, the evaluation period should be close around the adoption date and not too long. This is also confirmed by Ryngaert (1988) as he states that stock returns are often impure measures of a pill's defense impact. This is due to many other events happening around the adoption of a poison pill, which also affect the stock return of the firm. Keeping the evaluation period short around the announcement date is one of the measures he offers to control for these confounding effects.
- As there could already be rumors, or an announcement the day before, it could be better to start the evaluation period one (or more) day(s) before the adoption date.

Additionally, to get an idea of the movements in return, the average AR's (abnormal returns per day) were plotted from day -10 to +10 (see figure 1). The high spike on day 1 most probably indicates that the largest effect of stock prices on the adoption of a poison pill takes place on the day after adoption. There are also some spikes visible further away from the adoption day (day 0). However, these are

smaller than the one on day 1 and might have been caused by other events during that period. These are therefore deemed as less significant.

It was decided for this study to compare multiple periods, and, additionally, to see what the difference is between these periods. A 7-day period of 3 days before and 3 days after adoption [-3,3] is chosen, as this period is often used in earlier literature. This period can then be taken as basis to compare the other two periods to. A 2-day period of the adoption day and the day after adoption [0,1] is chosen because of the spike in figure 1. From the consideration mentioned above, it may be deduced that some of the effects of the adoption should be seen before the adoption date. Therefore, an additional 3-day period of 1 day before and 1 day after adoption [-1,1] is chosen.

First abnormal returns (AR) were calculated per day per firm. Then, these abnormal returns were aggregated to get the total return for a specific period.¹³

Finally, the statistical significance of the abnormal return, per period, is evaluated with a one-sample t-test, using the t-statistic described in formula c. Histograms of the returns of all three periods show a normal distribution (see figure 2) thereby confirming the normality assumption of the one-sample t-test.

Formula c

$$T = \frac{\frac{\sum AR_k}{n}}{\sqrt{\frac{\sum (AR_{jk} - AAR_k)^2}{n-1}}} \times \sqrt{n}$$

Where AR_{jk} denotes the abnormal return for firm j in period k, $\sum AR_k$ denotes the sum of the abnormal return of all firms in period k, n the number of firms, and AAR_k the average of the abnormal return of all firms in period k.

The additional variable classified board is added as a dummy variable, with 1 representing a firm with a classified board and 0 otherwise. The second hypothesis, which hypothesizes that the change in stock price will be more positive for the group with a classified board, is evaluated using an independent-sample t-test. An important assumption for this test is equal variances for both groups. This can be tested using an F-test for equal variances or a Levene's test. The choice of this test depends on the normality of the sample, as the Levene's test is more robust and can also give results with good statistical power if the sample is not normally distributed. Because for both groups the distribution is normal (see figure 3), the F-test for equal variances will be used here. If variances are not equal a non-parametric test, like Welch's independent sample t-test should be used.

The third hypothesis uses another variable, % insider owned, which is a continuous variable that ranges from 0.02 to 90.88%. This hypothesis expects that there is a negative relationship between % insider owned and stock price return. Using an ordinary least squares regression, this relationship is tested, under the assumptions that there is a linear relationship, normal distribution and the errors are homoscedastic. However, when looking at the histogram of % insider owned, the distribution is skewed to the right. And when examining the scatterplots of all three periods on % insider owned, heteroscedasticity of the errors is visible. To solve for the non-normality, a new variable is created which takes the log of % insider owned. As can be seen from figure 4, the distribution becomes less skewed due to the variable transformation. Additionally, when comparing the graphs in figure 5 the errors look more homoscedastic. Therefore, this new variable will be used for this empirical test.

Next to the ordinary least squared regression, a one-way ANOVA is run to evaluate if there are significant differences in stock return between different levels of % insider owned. To run this test, the variable % insider owned is changed in a categorical variable with 4 groups. As most of the

¹³ With the calculation of the abnormal return of a specific period, the average of the multiple days is used.

observations are below 20%, a division per 25% (ranging from 0%-25%, 25%-50%, 50%-75% and 75%-100%.) makes any evaluation insignificant. Therefore, the groups are divided by the number of observations, meaning the first group consists of the lowest 25% of observations, etc. The groups therefore will range from 0%-1.81%, 1.81%-5.67%, 5.67%-14.51% and 14.51%-90.88% shares held by insiders. An assumption of the one-way ANOVA test is to have equal variances between the groups. This is tested using a Levene's test of equal variances. If the null hypothesis of the Levene's test can be rejected and the variances between the groups are significantly different, a nonparametric test will need to be used instead of the one-way ANOVA.

CHAPTER 5 Results

In this section the results of the tests that are described above will be discussed. All tests are done for all the three periods, [-3,3], [-1,-1] and [0,1], with 0 representing the adoption day. The significance level and threshold p-value will be 0.05 for all empirical tests.

Table 5: One-sample t-test of the effect of a poison pill adoption on stock price

Period	Mean	Standard Deviation	t-statistic	p-value ^a
[-3,3]	-0.0005%	0.0213%	-0.3550	0.6385
[-1,1]	0.0050 %	0.0367%	1.9491	0.0263
[0,1]	0.0090%	0.0034%	2.6488	0.0044

- a. As the hypothesis assumes a positive return, only the one-sided p-value with the mean larger than zero is evaluated.

To evaluate the first hypothesis, which expects the return on stock price in the evaluation period around the adoption date to be positive, a one-sided t-test is carried out for the three different evaluation periods. For period [-1,1] and [0,1] a significant positive mean return of 0.005% and 0.009% is found, with a p-value of 0.026 and 0.004, respectively. From this we may conclude that the adoption of a poison pill has a significant positive effect on the stock price, confirming hypothesis 1. However, as the mean return is negative for the period [-3,3], although not statistically significant, this cannot be concluded for certain. The difference between these results, possibly could have been caused by the difference in length of the estimation periods. Because period [-3,3] measures for a longer period, the average effect could be smaller or the period could be affected by other events not included in the two smaller periods.

Table 6: Independent sample t-test of the poison pill effect on stock price for firms with and without a classified board

Period		# of observations	Mean	Standard Deviation	t-statistic	p-value ^a
[-3,3]	Classified ^b	26	-0.0038%	0.0152%	0.8373	0.7983
	Normal ^c	181	-0.0001%	0.0220%		
[-1,1]	Classified	26	0.0067%	0.0301%	-0.2549	0.3995
	Normal	181	0.0047%	0.0376%		
[0,1]	Classified	26	0.0068%	0.0455%	0.2442	0.5963
	Normal	181	0.0093%	0.0491%		

- a. Only the one-sided p-value with the alternative hypothesis that the group of firms with a classified board in place has a higher mean than the group without is evaluated here, as this the hypothesis we would like to test.
- b. Group Classified consists of firms with a classified board.
- c. Group Normal consists of firms that don't have a classified board.

The second hypothesis is based on the theory that if a company already has an anti-takeover provision in place, the effect of the poison pill adoption on the stock price will be different. The provision that is evaluated in this hypothesis is the classified board. When a firm has a classified board, the members of the board are not all replaced at the same time, but in fractions (often one-third). This is an often-used anti-takeover defense, because it will be more difficult for a hostile acquirer to impose a takeover by

replacing all or a majority of the board members at the same time. The hypothesis tested here presumes that the presence of a classified board will lead to a higher abnormal return on stock price.

Only for period [-1,1] does the group with a classified board have a higher mean than the firms without, but for none of the periods a significant difference is found. The independent t-test, that is used here, assumes equal variances of the two groups. To test this assumption the F-test for equal variances, with the null hypothesis that the ratio of the variance of group 1 over the variance of group 2 is equal to 1, is used. Table 7 gives the results of this test, where only for period [-3,3] the null hypothesis could be rejected, meaning that variances for both groups in period [-3,3] are different.

Table 7: F-test for equal variances and Welch's independent sample t-test

	<i>F-test</i>	<i>Welch's independent sample t-test</i>	
Period	p-value	t-statistic	p-value^a
[-3,3]	0.0307	1.1013	0.8616
[-1,1]	0.1878	-0.3011	0.3825
[0,1]	0.6775	0.2585	0.6012

- a. Only the one-sided p-value with the alternative hypothesis that the group of firms with a classified board in place has a higher mean than the group without is evaluated here, as this the hypothesis we would like to test.

Consequently, a non-parametric version of the independent t-test, which does not assume equal variances, has to be performed. In table 7 the results of Welch's independent sample t-test are shown. As only for period [-3,3] the null hypothesis of the F-test can be rejected, only the p-value of Welch's test for this period is of relevance. However, also for this test the null hypothesis cannot be rejected.

Therefore, none of the periods has a significant difference in return between the two groups. This means that having a classified board doesn't seem to affect the impact of a poison pill adoption. The second hypothesis can therefore not be accepted.

Table 8: Regressions of abnormal stock return and the log variable % insider owned

Period	coefficient	t-statistic	p-value
[-3,3]	-0.0002	-0.26	0.796
[-1,1]	0.0003	0.22	0.829
[0,1]	-0.0012	-0.73	0.465

With the third hypothesis we test the insider holdings theory. This theory assumes that the change in return on stock price due to a poison pill adoption will increase more (or decrease less) when the number of shares held by management are higher. The effect of the continuous variable % insider owned is first evaluated using an ordinary least squares regression. To satisfy the assumptions of the regression, the log of the variable % insider owned is used.

For neither of the periods a significant relationship between the independent variable % insider owned, expressed as a continuous variable, and stock price is found, as can be seen in table 8.

Table 9: One-way ANOVA and Levene's test of equal variances for the categorical variable % insider owned

Period	F-statistic	p-value	Levene's test
[-3,3]	0.50	0.6841	0.467
[-1,1]	3.01	0.0312	0.094
[0,1]	2.12	0.0990	0.013

For the second test of this hypothesis, the independent variable % insider owned is changed in a categorical variable of four groups, based on quartile cutoffs of the sample. A one-way ANOVA test is used to find out if the means of the 4 groups are significantly different. Only for period [-1,1] the differences are found to be statistically significant. Because the one-way ANOVA test also assumes equal variances between the 4 groups, a Levene's test is performed to evaluate if this assumption is correct. The null hypothesis of equal variances can be rejected for period [0,1], indicating that the one-way ANOVA test might not be the right test to use for this period. Either a non-parametric version of the one-way ANOVA can now be used, such as the Kruskal-Wallis test. The p-value in table 10 of the Kruskal-Wallis test indicates that this test also does not have a significant result for period [0,1]. However, the Kruskal-Wallis test is identified by many as quite insensitive and often doesn't find any significant results. Another option is transforming the variable to achieve equal variances.

Table 10: Additional tests for period [0,1] with categorical variable % insider owned: non-parametric Kruskal-Wallis test and one-way ANOVA and Levene's test for the reciprocal % insider owned

Period	Kruskal-Wallis		1/ % insider owned		
	Chi-squared statistics	p-value	F-statistic	p-value	Levene's test
[0,1]	6.263	0.0995	0.97	0.4096	0.164

Using the $1/x$ reciprocal transformation of the categorical variable % insider owned¹⁴, both the Levene's test and one-way ANOVA are performed again for R01, see table 10. The p-value of Levene's test shows that the transformation did achieve approximate equal variances, as the null hypothesis cannot be rejected. However, the one-way ANOVA again cannot be rejected.

In conclusion, the third hypothesis is only supported by the results of the one-way ANOVA test for period [-1,1]. Therefore, the data collected in this study and the analysis done, give an indication, but do not confirm the insider holdings hypothesis.

¹⁴ First, the reciprocal of the continuous variable is taken. Then, then this variable is divided into a categorical variable, again based on quartile cutoffs of the sample.

CHAPTER 6 Conclusion

With a sample of 207 firms adopting poison pills between 2000 and 2017 in the United States and Canada, this study describes the effect of the adoption of a poison pill on the share price of the firm's stock. The study provides evidence that is consistent with the shareholder interest hypothesis, which states that poison pills are adopted in the interest of increasing shareholders value. The motive of management is assumed to be to get a higher takeover premium and not to deter a takeover. If this assumption holds, this positive effect should be visible in the stock price of the firm, showing a positive abnormal return.

A significant positive abnormal return on stock prices has been found in this study, for 2 of the 3 time periods studied, supporting the shareholder interest hypothesis. These findings are in line with results of Caton and Goh (2008), who found positive stock returns and positive changes in earnings forecasts for firms without governance protections. Heron & Lie (2006) also found results which support the shareholder interest hypothesis. They concluded that for firms adopting a poison pill the likelihood of a takeover does not decrease and that these firms have higher takeover premiums.

In the tests carried out in this paper, the adoption date of poison pills is used. However, the effect of the adoption would be better measured around the announcement date. This is the first day it is officially known the firm will adopt a poison pill and the public can immediately react to this news. Due to limitations in data availability, this was not possible for this paper, but would be useful to test in further research. The announcement date has also been used by, amongst others, Malatesta and Walking (1988) and Comment and Schwert (1995). Additionally, due to the fact that rumors on the adoption of a poison pill before the announcement date never can be excluded, it is probably even better to use time periods around these specific dates than the specific day of announcement.

Furthermore, other events could be taking place during the period of the adoption that could influence the results. In further research it would definitely be useful evaluate these effects. For example, by making a distinction between the firms with confounding effects and the ones without, as has been done by Ryngaert (1988).

The effects of other governance structures or anti-takeover provisions on a poison pill, have been often discussed. Ryngaert (1988) has found a larger decline in stock price for firms with fair-price or supermajority amendments. Additionally, Caton and Goh (2008) found positive stock returns for firms without governance provisions and Sunder (2014) concluded that a staggered board combined with a poison pill increase deterrence. On the contrary, Brickley, Coles and Terry (1994) found a higher positive return for firms with a higher fraction of outside directors.

This paper has also attempted to investigate this, by using a classified board as an example. As not all the members of the board change at the same time (1/3rd per time on average), a hostile acquirer is not able to install a majority in the board and thereby enforce a takeover. This paper postulated the hypothesis that if a classified board is in place, the return in share price will be either less negative or more positive when a poison pill is adopted. This is based on the theory that the classified board has a positive effect. However, the results of this study do not support this.

For this specific test the two groups might have been too small and not comparable enough in size. Additionally, to be able to draw a conclusion on the effect of anti-takeover provisions or governance structures, multiple provisions or structures should be evaluated. Which is something that could be tested in further research.

Another hypothesis which is often mentioned in combination with poison pills, and is also tested in this paper, is the insider ownership hypothesis. According to this hypothesis, the number of shares held by insiders of the firm has a positive effect on the change in stock price due to the adoption of a poison pill. There should be a more positive or less negative abnormal return on stock prices when the

amount of insider ownership increases, because the motivation of management will be more in line with those of shareholders.

With the tests performed in this paper, some evidence is found that supports the insider holding hypothesis, however as the data are not consistent in this respect, this is not enough to accept this hypothesis or confirm the theory.

In previous literature, the hypothesis is interpreted in a different way. Malette and Fowler (1992) and Heron and Lie (2006) evaluated the effect of insider ownership on the probability of adopting a poison pill. This is something that also could be tested in further research, when firms without poison pills would be included in the sample. If a new random sample of firms would be used, including both firms with and firms without a poison pill, the differences between these firms could be tested and the possibility of a firm adopting a poison pill could be evaluated.

When looking at earlier literature, an interesting development over time can be seen. In earlier years most papers supported the management entrenchment hypothesis, stating that the adoption of poison pills results in decreasing stock returns (for example Ryngaert (1988) and Malatesta and Wakling (1988)). In later years, more evidence in line with the shareholder interest hypothesis has been found. It seems like the public opinion on poison pills or the way the public reacts to a poison pill adoption has changed, leading to increased returns on stock. The question arises what changed this public view. It might be that the more favorable literature on poison pills changed the public's opinion. However, it could also be that other factors than the literature on poison pills caused this. The literature used in this study does not give evidence for the one or the other theory, but this could be tested by looking at more literature.

Other possible interesting research could be done through evaluating the stock price effect of poison pills in Europe. As there is a large support in continental Europe for the stakeholder theory, there may be different results found for changes in stock prices.

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Tables and Figures

Table 11: Literature overview

Author(s) and date	Sample and methods	Hypotheses	Results
Malatesta & Walkling, 1988	118 firms, announcement between 1982 and 1986, from CCA. They used a market model technique (form of CAPM) to estimate abnormal returns. These firms are also compared to other, comparable firms that didn't adopt poison pills.	<ol style="list-style-type: none"> 1. The stock price effect of poison pills is negative. 2. Firms that adopt poison pills are more likely to have been a target of a takeover 3. Managers of firms that adopt poison pills are expected to hold a relative small amount of the firm's stock 4. Firms that adopt poison pills (and thus are takeover targets) are less profitable. 	<ol style="list-style-type: none"> 1. A statistically significant decrease in stock prices is found. Stockholder interest hypothesis is rejected. 2. The data supports this. 3. Compared to managers from firms not adopting poison pills (from the same industry), managers that adopt poison pill hold a significantly smaller amount of its firm's stock. 4. Firms adopting poison pills are found to be significantly less profitable than other firms over the year prior to the adoption. <p>Conclusion: Managerial interest hypothesis</p>
Ryngaert, 1988	380 firms from SEC and CCA (Corporate Control Alert); distinction made between firms with and without confounding events.	<ol style="list-style-type: none"> 1. Management entrenchment hypothesis. 2. A high probability of takeover increases the decline in stock price. 3. More restrictive pills will have a larger stock price decline. 4. Firms with already adopted features that make the poison pills plans more restrictive, will have larger stock price declines. 5. Insiders holding hypothesis 	<ol style="list-style-type: none"> 1. Only a marginally significant decline in stock prices found. 2. Accepted, a significant higher decline found. 3. Accepted, even when takeover speculation is not present they still have a larger price decline. 4. For staggered boards, no significant evidence was found. For firms with fair-price/supermajority amendments, the decline in stock price is only larger when there is no takeover speculation. 5. No significant differences found between groups of different percentages of management holdings
McWilliams, 1990	325 firms that proposed anti-takeover amendments between 1980 and 1984 are used for the evaluation of the stock price effects.	<ol style="list-style-type: none"> 1. The stock price reaction wealth effect of the amendments depends on managerial share ownership and the type of amendment proposed. 	<ol style="list-style-type: none"> 1. A negative relation is found between managerial share ownership (insider holdings) and the change in stock price for all type of amendments, except for fair price amendments.
Bruner, 1991	Instead of a regression analysis, as used in most other literature, Bruner simulates the effect of a poison pill in a hypothetical situation.	<ol style="list-style-type: none"> 1. The bidder pays the costs for the poison pill. 2. The poison pill is an effective deterrent of hostile takeovers. 3. The strength of the pill to harm an acquirer depends mostly on purchase value and trigger percentage. 	<ol style="list-style-type: none"> 1. Evidence shows the opposite, share prices of the target decrease, there is no significant difference between premiums of firms with and without poison pills. 2. The pill has never been activated deliberately, thus it deters hostile takeover, however after bargaining with management, a friendly takeover can happen often. 3. Contrary to beliefs of legal and financial advisors, the exercise price

			multiple, the ratio of the exercise price to the current stock price, is the characteristic to look at.
Malette & Fowler, 1992	All US industrial manufacturing firms on COMPUSTAT 1988 with a SIC between 2000-3999 (excluding some firms due to missing data).	<ol style="list-style-type: none"> 1. When there is a higher proportion of independent directors on a board, the probability of a poison pill adoption is lower. 2. A firm where the CEO and the chair of the board are not the same person is less likely to adopt a poison pill. 3. The longer the tenure of an (independent) board member, the less likely the firm will adopt a poison pill. 4. Vice versa for the CEO. 5. Insider holdings hypothesis. 6. A firm with higher levels of institutional ownership, has a larger probability of adopting a poison pill. 	<ol style="list-style-type: none"> 1. No significant relation found between independence of directors and likelihood of poison pill adoption. 2. The results support this hypothesis. Additionally, a significant interaction effect is found between leadership structure and independence of directors. 3. No correlation between tenure of board and adoption of poison pills is found. 4. No significant effect of CEO tenure on poison pills adoption. But there is a significant interaction between board and CEO tenure found. 5. A significant negative effect on the probability of adoption of poison pills is only found for stock ownership by insider directors, not by independent directors. 6. Hypothesis is strongly supported.
Brickley, Coles & Terry, 1994	A sample of 247 firms that adopted poison pills in the period 1984-1986 was used. Event study of 2-day period (day before and day of the announcement)	<ol style="list-style-type: none"> 1. Based on the assumption that outside directors represent shareholder interest, the stock price effect of the announcement of a poison pill becomes more positive as the fraction of outside directors increases. 2. Outside directors represent shareholders' interests, and are therefore more likely to push for an auction. 	<ol style="list-style-type: none"> 1. A positive, significant relation was found for stock price reaction and the fraction of outside directors. This supports the stockholder-interest hypothesis. 2. The fraction of outside directors is positively correlated to the probability that a firm will encourage an auction.
Comment & Schwert, 1995	Update on earlier event studies using poison pills adopted in December 1991. Announcement date from DJNR, CCA or Wall Street Journal Index. Abnormal return measured using a 3-day period (1 day before and after announcement)	<ol style="list-style-type: none"> 1. Management entrenchment hypothesis: the stock price effect of poison pills is negative. 2. A firm already covered by an anti-takeover law has a less negative effect on the stock price at announcement of pill adoption. 3. The presence of antitakeover measures leads to higher takeover premiums. 4. Main hypothesis: Poison pills deter takeovers. 	<ol style="list-style-type: none"> 1. Significant negative abnormal returns found for the control premium group (pill adoptions after takeover rumors are public), implying deterrence. However, for the whole sample no significant negative abnormal returns are found. 2. No significant difference found between firms covered by an anti-takeover law or not. 3. Firms protected by state laws or poison pills earn a higher premium on their shares. 4. Conclusion: The result of 3 are deemed to overthrow the slight evidence of deterrence of 1. Thus the hypothesis cannot be accepted.

Datta & Iskander-Datta 1995	A sample of 91 poison pills adopted between 1985-1989 from IRRC's Corporate Takeover Defenses. To estimate bond excess returns, the mean adjusted returns methodology adapted for bond is used. (19-day interval)	<ol style="list-style-type: none"> 1. Securityholder-interest hypothesis 2. Negative signal hypothesis (opposite to 1): bondholders anticipate the increase in leverage that will be caused by a takeover. 3. Management entrenchment hypothesis 4. A higher proportion of insider ownership has a negative effect on bondholders' wealth. 	<ol style="list-style-type: none"> 1. The evidence rejects this hypothesis in favor of hypothesis 2. 2. A significant wealth loss for bondholders was found, whereas stockholders were unaffected. And the leverage of the firms rose significantly after pill adoption. This is consistent with the hypothesis 3. No significant decrease in stockholder wealth found. However, firms that adopted a poison pill perform significantly inferior to their industry rivals. 4. Results support this hypothesis, and thus the idea that higher insider ownership leads to a lower alignment of stockholder-bondholder interests.
Forjan & Van Ness, 2003	A sample of 411 flip-in poison pill plans, from Corporate Control Alert, was used in a regression event study.	<ol style="list-style-type: none"> 1. Capital markets react to an announcement of a poison pill. 2. If the leverage ratio of a firm is high, the abnormal returns of shares of that firm will be greater. 	<ol style="list-style-type: none"> 1. There is a positive market reaction found before announcement, but during announcement the reaction is insignificant. 2. Abnormal returns of shares during announcement period are positively related to the firm's debt-asset ratio <p>Conclusion: the capital structure of a firm plays an important role in the perceived strength of poison pills</p>
Heron & Lie, 2006	526 unsolicited takeover attempts announced between 1985-1998 from SDC.	<ol style="list-style-type: none"> 1. Insiders holding hypothesis 2. Poison pills deter takeovers. 	<ol style="list-style-type: none"> 1. The probability of the adoption of poison pills decreases as the insider ownership increases. 2. The presence of a poison pill does not reduce the likelihood of a takeover. Higher takeover premiums are found for firms that adopted poison pills either before or after unsolicited takeover attempt. <p>= > support the shareholder interest hypothesis</p>
Caton & Goh, 2008	A sample of 449 pill adoptions from 1990-2004 found through SDC (Securities Data Corporation)	<ol style="list-style-type: none"> 1. The shareholder value of firms without governance protections will increase when a poison pill is adopted. 	<ol style="list-style-type: none"> 1. Positive stock returns and positive changes in earnings forecasts are only found for firms without governance protections. No significant relations with stock returns were found for board composition or merger activity subsequent to pill adoption.
Ryngaert & Scholten, 2010	269 defeated takeover bids, before and after the Time-Warner decisions of 1989 (1980-2000).	<ol style="list-style-type: none"> 1. Management entrenchment hypothesis: due to the more stricter post Time-Warner legal defenses, share price revaluations are less positive after 1989. 2. After 1989 the management turnover is lower than before 1989 due to entrenchment. 	<ol style="list-style-type: none"> 1. No significant differences were found between stock price returns before and after 1989. 2. Contrary to the management entrenchment hypothesis, management turnover was found to be higher after 1989.
Sunder, 2014	Multiple arguments	<ol style="list-style-type: none"> 1. The bargaining power 	<ol style="list-style-type: none"> 1. The increased bargaining power

	<p>supporting poison pills are examined for their validity. For 1. a simple decision tree analysis (with probabilities and average payoffs) is used with data from past research.</p>	<p>argument: the gains from higher premiums offset the loss of premium when a takeover fails</p> <ol style="list-style-type: none"> Information asymmetries and expertise of the board, make shareholders unfit to make decisions about takeover. Deterrence of hostile takeover using a poison pill is higher when combined with a staggered board 	<p>does not create a higher premium for shareholders on average, findings are robust.</p> <ol style="list-style-type: none"> Argument appears reasonable, however in the paper the belief stays that this should not mean shareholders should not be involved in the decision. Adopting a poison pill, without a provision for shareholder review, combined with an effective, staggered board strongly suggests management entrenchment, according to Sunder.
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Figure 1: Average Abnormal return (AR) per day for time period [-10,10]

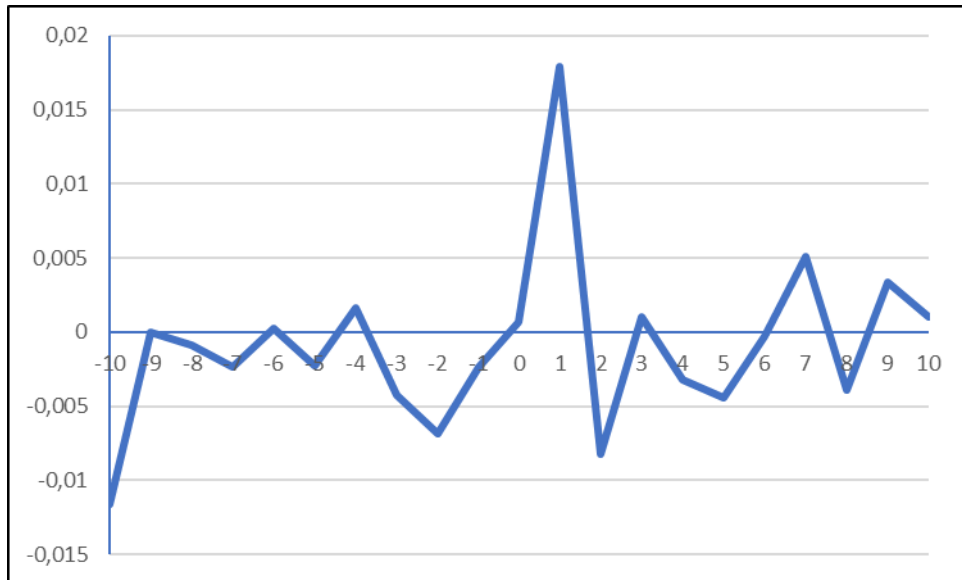


Figure 2: Histograms for periods [-3,3], [-1,1] and [0,1], respectively

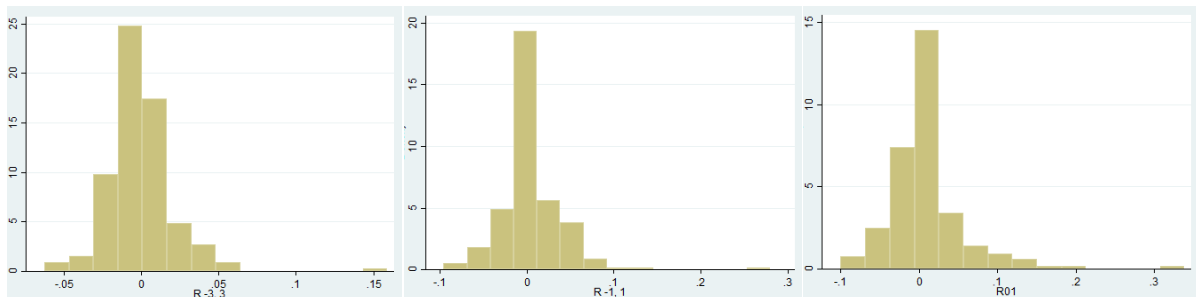


Figure 3: Histograms for firms with a classified board and firms without, for period $[-3,3]$, $[-1,1]$ and $[0,1]$, respectively

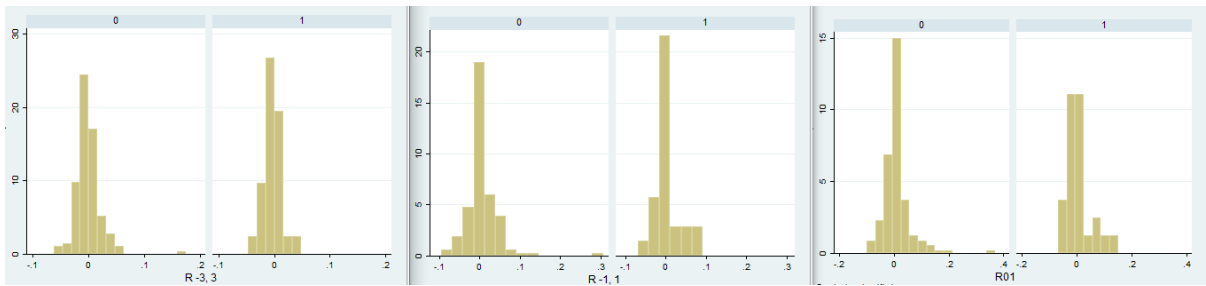


Figure 4: Histograms of % insider owned before and after log transformation

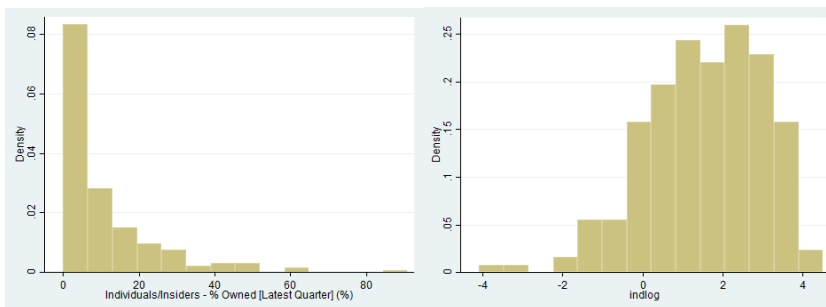


Figure 5: Scatterplots of % insider owned before and after log transformation for periods $[-3,3]$, $[-1,1]$ and $[0,1]$, respectively.

