A Work Project, presented as part of the requirements
for the Award of a Master Degree in Finance
from the NOVA – School of Business and Economics

What effect do poison pills have on shareholder value?

An empirical research on the adoption of poison pills

A project carried out on the Master in Finance Program
under the supervision of Professor Duarte Pitta Ferraz, DBA

Simon Hitzelberger
05.01.2017

ABSTRACT

What effect do poison pills have on shareholder value?

An empirical research on the adoption of poison pills

SIMON HITZELBERGER

Poison pills are controversial devices. There is no common conclusion how the market reacts to their adoption. This empirical study finds statistically significant, positive abnormal returns centred on the day of the adoption of the pill. Consequently, this paper argues in favour of the shareholder wealth maximization hypothesis, stating that poison pills protect shareholders by giving the management a superior bargaining position. Further sub-sample analysis shows that poison pill adoption with an unwelcomed takeover threat drive the positive results in the sample. Routine poison pills do not show clear positive abnormal returns at the date of the pill adoption. This conclusion coincides with similar results found by Schepker, Oh and Patel (2016).

Keywords: poison pills, shareholder wealth maximization hypothesis, market reaction

Table of Contents

List of Tables

List of Figures

1. Introduction

Martin Lipton invented the poison pill in 1982 (Sunder, 2014). Poison pills provide special rights to shareholders. These rights, sometimes referred as "shareholder rights plan", make it difficult for other parties to obtain control over the firm. The pill "poisons" any possible acquirer as the takeover gets disproportionally expensive (Anand, 2015). In the United States, poison pills can be implemented by the management without shareholder approval. Therefore a clear understanding of the shareholders' reaction to poison pill adoption is necessary in order to evaluate its impact properly (Johnson & Meade, 2011).

Literature names two opposing hypotheses concerning the market reaction to poison pill adoption. On the one hand, the managerial entrenchment hypothesis states that poison pills isolate the management from the positive forces of the corporate control market. A constant threat of takeover is supposed to be a natural mechanism to reduce agency costs (Kang, 2013). Poison pills protect the management from this external influence and consequently deteriorate the principal agent conflict. The management can act according to personal benefits and interests. As a consequence, they choose inappropriate strategies that do not maximize the wealth of shareholders (Sundaramurthy, Mahoney, & Mahoney, 1997).

On the other hand, the shareholder wealth maximization hypothesis defines antitakeover provisions as rational devices that do protect shareholders. According to the hypothesis, the power of rejecting undesirable raiders is in the long-term interest of shareholders (Yeh, 2014). In general, the long-term perspective of a company should be preferred instead of short-term profits. The shareholder wealth maximization hypothesis is supported by two independent arguments. Firstly, poison pills establish a superior bargaining position. Secondly, these devices enable management to extract the maximum bid premium (Datta & Iskandar-Datta, 1996).

Concerning these hypotheses, the empirical findings show controversial results. Early literature mostly supports the managerial entrenchment hypothesis (Ryngaert, 1988). Recent research tends to argue in favour of the shareholder wealth maximization hypothesis (Schepker et al., 2016). The latter conclusion is in line with the findings of this paper.

The underlying empirical research relies on event study methodology with secondary data of 4,479 poison pill adoption dates between 1997 and 2016. Positive abnormal returns throughout the sample indicate strong evidence in favour of the shareholder wealth maximization hypothesis. These findings are robust for three versions of the market model with diverse benchmarks as well as the Carhart four-factor model. The three index variations used in the market model are the S&P 500, the CRSP database value weighted and the CRSP database with equally weighted returns. A three day event window (-1; 1) centred on the pill adoption date lead to a cumulative abnormal return of 3.97% compared to the S&P 500. All three variations of the market model indicate similar results. The findings for the Carhart four-factor model are slightly lower as the additional factors provide higher explanatory power to determine the origin of the abnormal return (Carhart, 1997).

Sub-sample analysis shows consistency of the findings through various time periods. Further analysis indicates that poison pill adoption with an unwelcomed takeover threat drive the positive results in the sample. As the category “friendly deal” shows extraordinary high abnormal returns, shareholders do not automatically value the isolation of the corporate control market. Instead, shareholders seem to value the protection against hostile offers or unwelcomed bids after a friendly deal was placed. Contrary, routine poison pills do not show clear positive abnormal returns at the date of the pill adoption. These conclusions coincide with similar recent literature (Schepker et al., 2016).

In the next section of the paper, the theoretical context is defined and the two hypotheses are specified. Afterwards, existing literature is reviewed. Subsequently, the data sample, methodology and the resulting empirical outcomes will be presented to end in a conclusion.

2. Theoretical Context

2.1 Anti-takeover Provisions

The market of mergers and acquisitions is constantly growing. In a friendly takeover, the management and the board of directors approve the transaction and its buyout terms. In this scenario, the shareholders usually vote for the acceptance of the takeover offer as well. In contrast, a hostile takeover attempts to address the firm‘s shareholder directly and tries to replace the management. The latter can install legal devices in order to prevent such a hostile takeover attempt. These devices are also known as “anti-takeover provisions” or “takeover defences”. A common risk of anti-takeover provisions is that management entrenches itself instead of acting in the full interest of the shareholders.

Certainly, these definitions describe a vast spectrum of different devices. An important distinction for antitakeover provisions is whether the adoption of the device needs shareholder ratification or not. Poison pills can be implemented without shareholders’ approval in the United States. However, this decision depends on the legalisation of each state individually. Poison pills without shareholder approval are, for instance, legally prohibited in Europe (Johnson & Meade, 2011).

2.2 Poison pills

Poison pills provide special rights to the shareholders. These rights, sometimes referred as shareholder rights plans, make it difficult for other parties to obtain control over the firm and thereby protecting the firm from hostile and unwelcomed bids (Anand, 2015). Consequently, this triggered device “poisons” any possible acquirer as the takeover gets disproportionally

expensive. According to Literature, poison pills are described as the most powerful device in preventing takeovers, some sources go even further and call poison pills the "Holy Grail" of antitakeover defences (Velasco, 2003).

In general, poison pills are adopted as a routine device to prevent future hostile takeovers. Specific purpose pills are implemented as a response to a certain event. In this case, the time period is restricted to the relevance of the event, while traditional pills have a pre-defined, long-term horizon (Schepker et al., 2016). There are five major versions of poison pills: preferred stock plans, flip-over right plans, ownership flip-in plans, back-end plans and voting plans (Dowen, Johnson, & Jensen, 1994). The following chapters will elaborate on these five types in detail.

2.2 Hypotheses

The existing literature concerning antitakeover provision adoption is mainly divided into two opposing hypotheses: the "*shareholder maximization*" hypothesis and the "*managerial entrenchment*" hypothesis, which will now be discussed.

2.3.1 Managerial entrenchment

The managerial entrenchment hypothesis defines poison pills as harmful devices, as they isolate the management from the external forces of the corporate control market (Bebchuk, Cohen, & Ferrell, 2009). Takeovers are seen as a positive governance mechanism which reduces managerial entrenchment and increases the efficiency of the management. A poison pill in place deteriorates the chance of a takeover and consequently declines the probability that a low skilled manager gets replaced or less compensated. Consequently, companies with shareholder right plans are considered as inefficient (Bhojraj, Sengupta, & Zhang, 2014).

Empirical evidence proves that CEOs of companies, which adopt antitakeover defences usually have a higher salary than firms without takeover protection (Schepker & Oh, 2012). and other evidence suggests that managers maintain their position at the cost of shareholder

wealth (Yeh, 2014). Entrenching managers might also alter the firm´s core operating business to their personal abilities and interests, instead of maximizing shareholder wealth. Consequently, the managers get more important and less replaceable to the firm (Burkart & Panunzi, 2006).

The hypothesis points out that poison pills deteriorate the principal agent problem with the management. A hostile takeover attempt from the bidder might be welcomed by the majority of the shareholders. However, due to the antitakeover devices in place, the hostile bidder has minimal chances to win the takeover encounter against the management successfully (Kang, 2013). It is, on these grounds that poison pills create a gap between the bidder and the shareholders as they exclusively put the board in charge of takeover proceedings (Anand, 2015).

Poison pills harm diverse types of shareholders. In general, shareholders suffer as poison pills shrink the chances of a profitable acquisition. Additionally, transaction expenses shrink the liquidation value and small shareholders do not have a significant chance to monitor the board for their entrenchment. Main shareholders like institutional investors that hold a significant amount of ownership, are limited in transactions between each other, as the poison pill gets triggered at a certain threshold (Schepker & Oh, 2012).

Gompers, Ishii and Metrick (2003) define a Governance Index (G-Index) that measures shareholder rights in a specific firm. Based on this methodology, Bebchuk investigates an Entrenchment Index (E-index), which consists of six major antitakeover provisions. Each of the six antitakeover defences in place increase the entrenchment level of the firm by one score. The corresponding empirical outcome states that an enhancement in the index level results in a decline in firm´s value (measured by Tobin´s Q) as well as negative abnormal returns. Poison pills in place are seen as a harmful device for shareholder wealth (Bebchuk et al., 2009).

In conclusion, these studies support the hypothesis that the management acts according to its personal benefits and interests. They choose inappropriate strategies that do not maximize the wealth of the shareholders (Sundaramurthy et al., 1997).

2.3.2 Shareholders wealth maximization

The "shareholder wealth hypothesis", "long-term value creation" or "converge of interest hypothesis" implies that antitakeover provisions are beneficial for shareholders. This hypothesis is divided into two main arguments. The first argument justifies the long-term value creation of poison pills through effective takeover deterrence.

As the board is in control of the firm´s takeover decisions, it has the power to reject undesirable raiders, which displays the long-term interests of the shareholders (Yeh, 2014). Diverse shareholders fear losses in payoffs when rejecting the initial bid of the potential acquirer. Consequently, a hostile bidder might trigger emotional and irrational behaviour, especially when shareholders are unorganised. Therefore, the board can be named as the most skilled party to decide upon a possible takeover (Kang, 2013). Additionally, antitakeover provisions in place do allow that the management can focus on the long-term profit perspective of a company instead of short-term earnings. The present board might have superior information about the current value of the firm, as well as its future developments (Burkart & Panunzi, 2006). It is also vital to state that an adopted poison pill functions as an enhancement in the corporate governance system as it offers the firm flexibility for operating, apart from the raw conditions of the corporate control market (Dowen et al., 1994). The disadvantage of imperfect informed shareholders is that they do not value the stock appropriately and therefore risk the takeover at an unfavourable price (Stein, 1988).

Danielson and Karpoff (2002) support the shareholder wealth maximization hypothesis with evidence that poison pills improve performance and company value. In their data sample of 463 S&P 500 firms, they find that the operating performance is significantly improving

during the following five years after poison pill adoption. Moreover, this enhancement in performance is positively correlated to investor's stock reaction when adopting the pill (Danielson & Karpoff, 2002).

Another paper by Chemmanur, Paeglis and Simonyan (2013) directly analyses the empirical contribution of IPO firms to the managerial entrenchment hypothesis. Firstly, they find that companies with antitakeover provisions in place have higher quality managers. Secondly, the firms with highly skilled management and a larger number of antitakeover devices outperform the remaining firms. Consequently, the evidence rejects the managerial entrenchment hypothesis and argues in favour of long-term value creations thorough the adoption of takeover defences (Gordon & Pound, 1993).

Chemmanur and Tian (2013) establish a link between antitakeover defences and corporate innovation, which is a key factor for a long-term competitive advantage. Therefore, the "innovation channel" is an essential determinant of firm value. The findings suggest that firms with antitakeover provisions in place are more innovative and therefore increase firm´s value. These outcomes are interpreted in favour of the long-term value creating hypothesis as antitakeover provisions stimulate innovation. Consequently, antitakeover provisions can be seen as an enhancement of long-term value creation by protecting the management from short-term pressures from the equity market. This reduced level of uncertainty is significantly valued in the innovation channel (Chemmanur & Tian, 2013).

The second argument defines the protection against too low prices in takeovers as value driver for the empirical results. According to this argumentation, the major advantage is not a long-term deterrence effect but the increased bargaining power.

Without the adoption of an antitakeover device, an acquirer would be given the possibility to use the agency problem that occurs between shareholders and the management. As a result the paid price could be less than the true market value of the firm (Anand, 2015). According to

the long-term value creating hypothesis, antitakeover defences increase the quality of work of the management, embolden firm in investing in human capital, give the board a better base for negotiations and raise competition among bidders (Burkart & Panunzi, 2006).

Comment and Schwert (1995) find the cost of deterrence set too high and that the advantages of the bargaining position are underestimated in the literature that supports the managerial entrenchment hypothesis. Poison pills change the bargaining position as they increase the gain to the target firm and raise the costs to the bidder. Consequently, poison pills are related to higher takeover premiums for selling shareholders, in case of a successful takeover as well as the event without transaction (Comment & Schwert, 1995).

Holmén, Nivorozhkin and Rana (2012) use Heckman selection models to account for the likelihood of being a takeover target, the extent of the takeover premium and antitakeover provisions. Ordinary least square regressions show higher takeover premiums for transactions with antitakeover defences is place (Holmén, Nivorozhkin, & Rana, 2012).

3 Review of Empirical Studies on Poison Pill Adoption

3.1 Managerial entrenchment

In line with similar studies from the late 80s, Malesta and Walking (1988) analyse the shareholders´ reaction to poison pill adoption and the industry characteristics of the adopting firm. Their sample of 118 poison pill adoptions indicates a decline in stock price and consequently supports the managerial entrenchment hypothesis. They also find that firms that adopt a poison pill have a higher probability of being taken over than the non-adopting counterparties (Malatesta & Walkling, 1988).

At a similar point of time, Ryngaert (1988) analysed a sample of 380 adoptions between 1982 and 1986. All in all, the market reaction for the full sample is negative with an average

abnormal return of –0.03%. Additionally, he differentiates between the variations of poison pills. Only the most preventive variations do entrench management (Ryngaert, 1988).

Datta and Iskandar-Datta (1996) examine wealth effects of antitakeover provisions on shareholders as well as bondholders. Their results for stock market reaction remain insignificant. However, the outcome of statistically significant bondholder losses is consistent with the managerial entrenchment hypothesis. In the case of a takeover, corporate bondholder are more sensitive to losses than shareholders as they have fewer rights. Firms that adopt poison pills also underperform their industry peers when it comes to key performance figures. The outcomes suggest that the pill adoption is stimulated by poorly skilled managers, trying to isolate themselves from the transaction in the corporate control market (Datta & Iskandar-Datta, 1996).

Sundaramurthy (1997) finds a negative market reaction in his data sample of 486 adoptions between 1984 and 1988. He argues that the extent of the reaction is dependent on the board structure of a firm. The board of a company is responsible for maximizing shareholder´s value, taking important decisions and employ key workers (Sundaramurthy et al., 1997). The separation of the CEO and the chairman position increases transparency and reduces agency costs. Consequently, this segmentation shrinks the negative market reaction as well. However, the negative market reaction increases if the firm´s board has outsider-dominated persons in authority.

Sikes, Tian and Wilson (2014) also find a significant negative market reaction to poison pill adoption, supporting the managerial entrenchment hypothesis. Moreover, this empirical study studies the effect of 62 poison pill announcements due to net operating losses (NOL pills). These pills are adopted to protect tax losses, which would disappear in case of altering ownership. Empirical research finds an increased negative market reaction for NOL pills. The

management‘s purpose does not appear credible to the shareholders and therefore increases the agency costs (Sikes, Tian, & Wilson, 2014).

Yeh (2014) analysed the market reaction of the adoption of anti-takeover defences for 130 Japanese firms between 2005 and 2007. The paper underlines the managerial entrenchment hypothesis by detecting statistically significant negative abnormal returns for various time periods (Yeh, 2014).

3.2 Shareholder wealth maximization

Goh and Caton (2008) evolve the hypothesis that the market reaction of poison pill adoption depends on the governance structure of the firm ex ante. In line with Bebchuk et al (2009), they distinguish between “democratic” firms without antitakeover provisions in place and “autocratically” firms when takeover defences are present. Companies that were classified “democratic” isolate management from efficient market conditions as firms can be significantly undervalued. In this case, the adoption of a pill supports the management and helps to focus on long-term benefits instead of short-term pressure. That reduces the principal agent conflict. As a consequence, the most democratic governed companies show significant positive abnormal returns as well as positive long-term earnings growth forecasts for poison pill adoption (Goh & Caton, 2008).

Most recently, Schepker, Oh and Patel (2016) find poison pills as devices which send “equivocal signals”. They stress that firm and bidder have contrary interests and the interpretation is essential. Therefore, they control for differences of poison pills adopted to protect net operation losses (NOL poison pills) as well as adopted pills if the firm receives an acquisition threat. The empirical results state positive investor reaction when the poison pill is in place to fight a takeover offer. However, NOL poison pills cause a negative market reaction. Because of the fact that poison pills are mostly used for defence purposes, this

evidence is interpreted as support for the shareholder wealth maximization hypothesis (Schepker et al., 2016).

In their series of "Framing controversial actions", Rhee and Fiss (2014) provide an additional event study methodology and content analysis to evaluate market reaction of poison pill adoptions from 1983 to 2008. The authors argue that the market reaction depends on the contextual attributes. On the one hand, poison pill adoptions with an "institutional logic" as a base lead to positive abnormal returns. On the other hand, statements that contain managers with a possible selfish interest show a significant negative market reaction and should not be forgotten. (Rhee & Fiss, 2014).

Heron and Lie (2015) investigate legal validations of poison pills by the Delaware Supreme court. After the *Moran v. Household* decision in 1985, two important validations were adjudicated in the "1995 Delaware rulings". Previous literature describes these rulings as an exogenous shock for managerial entrenchment. This assumption is denied by Heron and Lie in their paper. They do not find evidence that the "1995 Delaware rulings" increased managerial entrenchment. In fact, further analysis implies that poison pills in general do not entrench management. Instead, based on a sample of takeovers from 1985 to 2009, poison pills enhance the takeover premiums for shareholders (Heron & Lie, 2015).

In line with Comment and Schwert (1995), antitakeover provisions enhance the bargaining position of the firm in a possible takeover. As a result, shareholders wealth enhances with better premiums (Bodnaruk, Gao, Östberg, & Yun, 2011).

Heron and Lie (2006) search evidence for the market reaction of poison pills by analysing 526 hostile takeover attempts. They state that poison pills are in the best interest of shareholders. This hypothesis is valid for "routine pills" as well as "morning after pills" that were implemented as a consequence of a takeover attempt. Poison pills increase the bargaining position of a company and therefore enhance the takeover premium. Heron and Lie worry

about the new shareholder activism trend to repeal poison pills. They also criticise academics like Gompers, Ishii and and Metrick (2003) that punish firms for antitakeover provisions in their governance indexes (Heron & Lie, 2006).

Forjan and Ness (2003) also argue in favour of poison pill adoption and the resulting effect of positive abnormal returns as well as increased bargaining power. Furthermore, they find a relation of capital structure and the perceived strength of poison pills. Abnormal returns on the announcement date and the firm-debt asset ratio of a firm are significantly positively correlated. As a result, highly leveraged firms are described to witness more bargaining power in the event of a takeover bid (Forjan & Ness, 2003).

3.3 Contribution to existing literature and business world

It is of great interest to understand the facts which have been mentioned in the previous chapters. Having read so far, it can be claimed that there are no common conclusions to the market reaction and poison pill adoption does not call for a single outcome. Poison pills are indeed one of the most controversial antitakeover provisions discussed in empirical literature (Sunder, 2014). Evidence is also mixed due to the fact that research is generated from four different academic disciplines: economics, finance, management and law (Straska & Waller, 2014). Depending on the purpose and the circumstances, some firms might profit from poison pill adoption while others will not.

Moreover, a large amount of relevant literature was written in the 1980s, especially after the *Moran v. Household* officially validated the use of poison pills in 1985. However, due to on-going legal decisions within the prior decades, research before the 1990s does not seem really useful for the current antitakeover provisions environment (Sokolyk, 2010). Empirical analyses show that the negative market reaction to poison pills during the mergers and acquisition wave in the 1980s vary significantly from other periods in time and therefore should be interpreted with caution (Sundaramurthy et al., 1997).

In addition to that, new trends in the socio-economic environment have to be taken into account and kept in mind when analysing earlier research. In recent years, shareholder activists appeared as an important stakeholder. They influence and speak out to significant decisions as poison pill adoption (Sikes et al., 2014).

The reasons stated above justify the motivation for this empirical research paper. Additional studies that contribute to the controversial topic are still in need, urgently. Furthermore, the sample period used in this study is more extensive comparable to other recent studies, like Rhee and Fiss (2014) or Schepker et al. (2016). Moreover, this paper conducts various sub sample analyses in order to draw more specific conclusions about the origin of the abnormal returns.

4 Data Sample

Poison pill adoption dates were retrieved from the "Corporate Governance Market Overview" in Eikon, the financial software product by Thomson Reuters. In fact, 4,479 poison pill adoption events by American companies are collected. Hence, the study mainly draws on secondary data for the analysis. This study focuses on American firms due to legal constrains. Poison pills are prohibited in the United Kingdom and can only be placed with explicit shareholder approval in the European Union. Conversely, legislation in the United States officially allows the usage of antitakeover takeover protections upon condition that they are used proportionally. In order to fully use the Eventus software for abnormal return calculations, further financial information was added through a Bloomberg Terminal from Bloomberg L.P.

The poison pill adoption dates range from 1st January 1997 to 22th December 2015. Adoption dates prior to 1997 are not used as the data sample of poison pill adoption in the United States has already been conducted in various previous literature. The earliest years in the data

sample (1998, 1999 and 1997) are the years with the highest share while the most recent years (2014, 2015 and 2013) have the least stake. Generally, there seems to be a declining trend of poison pill adoption throughout the period. Interestingly, an exception of this pattern can be seen in the years of 2008 and 2009, when the financial crisis in the U.S. was at its peak. Possibly, uncertainty in the economic environment and the financial instability of the companies lead to an increased demand on antitakeover protection. In order to control more for time-wise differences, this study divides the data sample into sub-periods and presents the results separately as well. As the sub-period of the three latest years of the prior century (1997, 1998 and 1999) with 1,396 adoption dates already takes 31.17% of the sample size, this sub-period is limited to duration of three years. Further sub-samples (from 2000 to 2004 and from 2005 to 2009) range over five years with respective shares of 30.97% and 21.34%. Finally, the most recent sub-sample consists of 740 adoptions from 2010 to 2015.

Most of the data retrieved (98.75%), states a triggering reason why the poison pill is adopted. However, the majority of events (68.41%) are to refresh the routine measure that the firm stays protected. A smaller share (18.04%) is adopted due to friendly deals. In this scenario, the intention is to protect the agreement from spontaneous hostile takeover attempts.

4,479 adoption dates are used during the analysis. A sample of 232 events is excluded due to the insecurity of reliable CUSIP identification. The 8-digit CUSIP code is used to uniquely identify any issuer of shares in the United States. In 598 cases the financial data for the event period needed could not be found. As the reliability of the calculations depends on financial data, companies operated with, should be covered in the *Center of Research in Security Prices* (CRSP) database. Additionally, events with too few estimation or event period days are not taken into account. This occurs in 17 and 7 cases respectively. Summing up, it can be said that 854 security events are dropped in total. Consequently, 3,625 adoption dates are available to be used reliably.

5 Methodology

From the data sample collected a new empirical study is conducted to enrich to the controversial evidence about managerial entrenchment or the shareholder wealth maximization hypothesis. Before presenting the empirical results of the study, the methodology will be outlined.

5.1 Event study methodology

In order to identify common market reactions to poison pill adoption, this empirical research relies on event study methodology. As stock market data is publicly available for everyone and online accessible within seconds, market efficiency is assumed. Therefore, the information of the adoption of the poison pill is incorporated by the shareholders in a short while (Agrawal & Kamakura, 1995).

Event study methodology is widely used in empirical antitakeover literature. Most of the research presented in the literature review follows the approach in similar variations (Sundaramurthy et al., 1997) (Rhee & Fiss, 2014) (Schepker et al., 2016). This study adapts the methodology in order to make the current and more extensive data set comparable to prior research. In order to present the most accurate results, this empirical research bases on a daily event study, using daily return stock data.

A common trend of stock market decline after the adopting event will be interpreted in favour of the managerial entrenchment hypothesis. In this case, shareholders seem to react negatively on the use of antitakeover protection. They seem to be in favour of ownership changes that might be value creating. Inversely, a common trend of significant positive abnormal returns indicates evidence for the shareholder maximization hypothesis. In this matter, shareholders either value the long-term view, the additional bargaining power for the management or a combination of both factors.

The study draws on the Eventus Software 9.0 for event studies and financial research, provided by Wharton Research Data Services of the Wharton School (University of Pennsylvania). Eventus is based on SAS algorithms. A significant advantage of Eventus is the connection to the *Center of Research in Securities Prices* (CRSP) database that allows direct stock prices data retrieval.

5.1.1 Event window

Day zero ("0") is defined as the day of the event, which corresponds in this study to the day of the poison pill adoption. Days prior to the event are negative. For example, day "-5" is considered as five days before the adoption of the poison pill. Conversely, the terminology "+5" describes the date five days after the event.

In fact, it is necessary to determine an event window. The event window is the period of time (measured in days) in which the abnormal returns concerning the pre-defined event are quantified. This study includes (several) days before and after the event date. The inclusion of days before the event is justified by the fact that information about the adoption event is often announced earlier by the media. Obviously, this effect should be included for a complete analysis. Additionally, the time window should also include (some) days after the event as it might take some time to incorporate the reaction of the market to its full extend. For instance, the event could occur after the market closes. Therefore, shareholders' reaction is expressed in the stock prices of the following day. However, it is also important not to set the event window too wide as the abnormal returns get diluted and therefore the effect might not be highlighted adequately. In order to have control over this risk, this study elaborates various event windows and its results. First of all, a sudden impact of the event is measured by only including the event itself and the following day (0;+1). In addition, this study also controls for longer and shorter event windows, each centred on the event date. In detail, periods of three (-1; +1), five (-2; +2) and seven (-3; +3) days are examined. Longer periods of pre-adoption (-

15; -4) and post-adoption (+4; +15) represent "neutral" times without the impact of the specific event (Brown & Warner, 1985).

The estimation period starts 255 active trading days prior to the event and ends 46 days before the event takes place. In essence, the estimation period should be a regular timeframe that calculates the sensitivity of a firm´s beta for example. Hence, the period should be isolated with any influence from the event itself.

5.1.2 Abnormal return calculations

The help of the event study methodology makes it possible that this empirical research examines the resulting market reactions to the adoption of poison pills. Obviously, the events take place at different dates so t=0 represents the day of the realisation. In order to build a robust empirical model, this study follows the structural advices in "*The Event Study Methodology since 1969*" (Binder, 1998), "*Event Studies in Economics and Finance*" (MacKinley, 1997) as well as "*Econometrics for Event Studies*" (Kothari & Warner, 2007).

R_{it} is the return of a firm´s security i during the period t relative to the event:

$$R_{it} = K_{it} + e_{it}$$

Therefore, the return can be seen as a composition of the expected return K_{it} (for example predicted by a model) and $e_{it,,}$ which is the uncertain part that is referred as "abnormal return" (Brown & Warner, 1985). Consequently, the abnormal return is defined as the difference between the observed and the predicted return:

$$e_{it} = R_{it} - K_{it}$$

Alternatively, the abnormal return can be described as the difference between the return conditional of the event, subtracting the expected return without the event in place, thus unconditional of the event. This methodology enables to measure the direct impact of the event on stockholders´ wealth (Kothari & Warner, 2007).

In order to draw general conclusions about the impact of an event, the abnormal returns have to be aggregated. Using the cumulative abnormal return (CAR) method, this paper quantifies the performance of the event window due to the adoption of a poison pill. The CAR starting at time t_1 and ending at t_2 is defined as the sum of the abnormal returns included (MacKinley, 1997):

$$CAR_i(t_1; t_2) = AR_{i;t_1} + \cdots + AR_{i;t_2} = \sum_{t=t_1}^{t_2} AR_{it}$$

Adding the abnormal returns together and relating them to the event period leads to cumulative average abnormal return:

$$CAAR_i = \frac{1}{N} \sum_{i=1}^{N} CAR_i$$

In order to calculate the abnormal returns, a model that computes "normal" returns (unconditional to the event) is needed. Brown and Warner describe three variations suitable for excess return calculations: Mean adjusted returns, market adjusted returns and the OLS market model (Brown & Warner, 1985).

5.1.2.1 Market model

In practice, the market model is the most common model acquired for normal return calculations. The OLS market model is a statistical model that relates the reaction of shareholders to the sensitivity of a market portfolio (MacKinley, 1997). The market model is a one factor model facing the idiosyncratic market risk. The parameter beta ("β") indicates if the stock is more or less volatile compared to the market. Beta is necessary to compute as it indicates the risk that cannot be minimized through diversification. Risk exposure above the market risk should result in more volatile stock movements. This needs to be compensated with a risk premium above the market return. The beta β_i is computed by dividing the

covariance of the normal return R_{it} and the market return R_{mt} by the variance of the market return:

$$\beta_i = \frac{COV\ (R_{it,}R_{mt})}{Var\ (R_{mt})}$$

Incorporating the risk measure beta in our model results to the following equation:

$$R_{it} = \alpha_i + \beta_i R_{mt} + e_{it}$$

Solving for the examined abnormal return, the equation can be restructured into (Higgins & Nelling, 2002):

$$e_{it} = (R_{it} - \alpha_i) - \beta_i R_{mt}$$

$$with \quad E(e_{it}) = 0 \qquad\qquad var(e_{it}) = \sigma_e^2$$

where α_i, β_i and σ_e^2 are defined as OLS parameters respectively.

In order to present robust results, this study uses three different stock indexes as market portfolio. On the one hand, the dataset of the *Center of Research in Security Prices* (CRSP) is used as a "Equal Weighted Index" as well as a "Value Weighted Index" (MacKinley, 1997). The CRSP database is one of the most numerous and complete one for historical stock market information of the United States. It contains data across various industries and size classes. Therefore, the CRSP database is chosen as a suitable benchmark as most of the adopting firms are smaller ones with the need of protection and as a consequence not suitable comparable to market indexes containing only major corporations. On the other hand, this empirical study also uses the S&P 500 Index as market portfolio. The S&P 500 is chosen as an appropriate benchmark as it represents the leading firms in the United States that cover together 75 percentage of the entire American equity market capitalization.

The the abnormal return (AR) can be easily quantified as the difference between the normal return R_{it} and the market return R_{mt} (Kothari & Warner, 2007):

$$AR_{it} = R_{it} - R_{mt}$$

The market model explains variations of return due to market changes. Consequently, the market model offers an increased certainty for detecting event effects.

5.1.2.2 Fama-French factor model

The market model is a one factor model focusing entirely on the market risk. In order to deliver robust results, this study also tests the outcomes of calculating the normal returns via using the model of Fama and French. They use a three factor model including company size, book-to-market ratio and market risk. In their point of view, small caps and shares with a lower price-to-book ratio outperform the market. Hence, three variables explain stock anomalies more detailed and consequently detect event effects more precisely. The following equation leads to returns using the Fama and French methodology (Fama & French, 1993):

$$R_{it} = R_f + \alpha_i + b_i\left(R_{mt} - R_f\right) + s_i * SMB + h_i * HML + e_{it}$$

The excess return relative to the market portfolio can be obtained by subtracting the risk-free returns R_f from the market returns R_{mt}. SMB represents the company size via measuring market capitalization ("Small minus Big"). According to Fama and French, small companies tend to outperform large firms. HML stands for the difference of companies with high book to market ratio and firms with a low ratio. Fama and French state that value stocks outperform growth stocks. The factors SMB and HML are costless available on the webpage of Kenneth French. The corresponding coefficients b_i, s_i and h_i are sensitivities (betas) determined by linear regression (Fama & French, 1996) (Fama & French, 2014).

Fama and French include additional factors in their model that offer higher explanatory power. This study extends the three factor model by adding an additional factor "momentum". Momentum (MOM) in the context of shares describes the tendency to continue increasing after a period of rise and the tendency of declining after an earlier decrease. Carhart (1997) found this factor in his research. In essence, the existence of momentum is a market anomaly

that financial literature struggles to explain. However, the inclusion of the momentum factor helps in this empirical study to explain stock price movements more accurately. According to Carhart´s definition, a share has a momentum factor if the previous 12 months average of returns is positive (Carhart, 1997).

5.1.2.3 Statistical significance

This empirical study also tests for the significance of the abnormal returns. Generally, there are two different groups of significance tests: parametric and nonparametric tests. On the one hand, parametric tests assume normal distribution of the companies returns. On the other hand, nonparametric tests do not rely on probability distribution assumptions. In order to ensure robust results, this study uses parametric as well as nonparametric test to deter statistical significance. The Patell Z-test is one of the most common used parametric tests (Forjan & Ness, 2003):

$$Z_t = \sum SCAR_i/\sqrt{J} \quad \sim N(0,1)$$

In this formula, $SCAR_i$ is defined as standardized cumulative abnormal return and J the total amount of companies.

6 Empirical results

This section elaborates the empirical outcome of the event study. First of all, the full data sample is analysed.

6.1 Full data sample analysis

6.1.1 Market model

The full sample contains 4,479 adoption events from 1st January 1997 to 1st January 2016. 854 events have been dropped as the dataset does not provide all the required financial information for the analysis. This leads to a total of 3,625 events usable. An OLS market model is used to test the hypothesis, in which three market indexes are used for robustness:

CRSP Value Weighted, CRSP Equally weighted as well as the S&P 500. In all variations, dividends are excluded.

Table 1 presents the results of the full sample compared to the S&P 500. It shows a detailed view of the event window 15 days before the event until 15 days after the event. The section of the table below also accumulates the abnormal returns of the different event windows together. The average cumulative abnormal return for a three-day event window centred on the adoption date (-1; 1) is 3.97% with high significance in all statistical tests. A major amount of 2,052 events are detected as positive abnormal returns, while only 1,571 occurrences are negative abnormal returns respectively. Increasing the event window to five days (-2; 2) leads to a rise in the abnormal return to 4.54%, also significant on the 0.001 level. During this event window, the ratio of positive abnormal returns to negative abnormal returns even advances to 2,107 versus 1,516. This tendency continues for a longer period of seven days (-3; 3), leading to a cumulative abnormal return of 4.91%. The ratio between positive and negative abnormal returns is with 2,104 versus 1,520 again clearly dominated by positive occurrences. Moreover, we control for neutral periods where no effect should be seen. Therefore, a twelve days period before (-15; -4) and after (+4; +15) the event is taken into account. Both show a positive cumulative abnormal return of 1.16% and 1.15% respectively. However, a small abnormal return over a twelve days horizon should not be interpreted as event specific. Hence, this outcome shows that time periods significantly before and after follow a “normal” path while days around the event are confronted with an exogenous shock. To elaborate on this conclusion, one needs to focus on the detailed view. In this point of view, the abnormal returns and its significance are listed on a daily basis. The highest significance can be found at the day of the adoption of the pill (Patell Z of 24.543) and the day after the event (Patell Z of 39.168). Obviously, the market reaction should be the most at these days as shareholders adapt their portfolio to their opinion of the event. The high effect on the following days indicates that information is not incorporated immediately by the stockholders.

Additionally, the results show significant abnormal returns on a 0.001 level for the period three days before the event. However, this outcome does not surprise as this study investigates the market reaction to poison pill adoption. Early significance is comprehensible as the announcement of the use of the poison pill is communicated earlier through media. A proof it is still the event which is definitely causing the positive effect can be seen in the mean cumulative abnormal returns per day. The day of the adoption reveals a positive abnormal return of 1.33% and the day afterwards 2.26% respectively. Other days in the entire event period (-15; 15) are mostly small and positive, but also insignificant.

Figure 1 illustrates the empirical results visualized. The chart shows the mean cumulative abnormal returns on the day relative to the event (-15; +15). Additionally, the 95% confidence limits (from mean -1.96 standard error to mean +1.96 standard error) are denoted in the dotted lines as orientation. Basically, the graph shows how the abnormal returns accumulating during the event window. In the pre-event period, there are no strong abnormal returns recognizable. However, a tendency for a slightly positive market reaction can already be seen. The time centred on the event date then shows strong abnormal returns, indicating a highly significant positive market reaction due to the event. In the post-event period, significant abnormal returns disappear again. Again, a positive tendency is overall visible. Shareholders seem to value the protection of the poison pill sustainably.

Figure 2 compares the outcomes of different abnormal return calculations. The purple line equals the methodology for cumulative abnormal returns (CAR), elaborated more detailed in graph 1. In addition, figure 2 also shows the cumulative total return (CRET) as the green line as well as Buy-Hold abnormal return (BHAR), which represents the blue plot in the chart. As expected, all three abnormal return calculation methods show similar results. This offers evidence for the robustness of the calculations. The outcome also positions the CAR between the more extreme results of the CRET and BHAR calculations. As a consequence, this study

focuses mainly on outcomes of the CAR calculation methodology as it offers more standardized and less extreme values. Generally, the CAR methodology is the one most widely used in academic literature and the business world.

In order to present robust outcomes, this study conducts the analysis for the same sample with the CRSP Equally Weighted Index as benchmark as well. The results are presented in table 2. As expected, the outcome is very similar to the prior ones. Abnormal returns are now 1.35% for the event date and 2.25% for the day afterwards. The neutral time periods of twelve days before and after the event show the biggest difference. The pre-adoption period (-4; -15) has a cumulative abnormal return of 1.05%. Similarly, the post-adoption period (+4; 15) displays a positive abnormal return of 0.96%. Therefore, the equally weighted market model indicates more accurately the neutrality controlled for the period before and after the event.

Finally, the CRSP Value Weighted Index is used as the last variation of the market model. Table 3 elaborates the results with the value weighted benchmark option. Again, the outcome is similar to the previous two variations of the market model. In this version, the abnormal return at the event date is 1.33% and 2.25% for the following date respectively.

Summing up, all three variations of the market model lead to relatively similar results. Consequently, the results can be interpreted as robust. All three models indicate positive abnormal returns, especially centred on the adoption date of the poison pill. Taking all outcomes into consideration, the evidence of the market model clearly argues in favour of the wealth maximization hypothesis as the abnormal returns are thorough positive and statistically significant.

6.1.2 Fama-French model

Fama and French include additional factors in their model. This study also incorporates the analysis of the momentum factor in line with Carhart (1997). These factor models are supposed to have a higher explanatory power.

Table 4 shows the results of the factor model. The comparison to the market model is drawn with the Value Weighted Index as benchmark. This version reflects reality more reasonable as bigger firms also have more impact in economic life than small ones. First of all, the day of the event ("0") has a highly significant, positive abnormal return of 1.29%. Adding the 2.21% abnormal return of the following day, leads to a cumulative abnormal return of 3.50%, centred on the event date (0; 1). A longer event window of three days (-1; +1) reveals a cumulative abnormal return of 3.86%. The market model indicates a relatively higher abnormal return of 3.97% for the same period. This tendency can also be steadily recognized in longer event windows of five (-2; +2) and seven days (-3; +3). The longest event window (-3; +3) states a CAR of 4.66%. In this scenario, the market model expresses a 5.2% higher value compared to the factor model.

In order to present robust results, the same analysis is also conducted for the Equally Weighted Index. In essence, the outcome provides similar results to the prior analysis. The main period centred on the adoption date states a cumulative abnormal return of 3.52% for the Fama-French version versus 3.59% for the market model respectively. The similar result for different models provides evidence in favour of the robustness of the calculations.

Summing up, the market model shows higher, positive abnormal returns than the factor model. This is in line with previous expectations as factor models have additional explanatory power. Hence, the factor model can identify certain empirical proven market anomalies while the market model recognizes them as additional abnormal returns.

6.2 Further analysis

In general, this empirical research finds highly significant positive abnormal returns for various event windows. Thus, the full sample analysis clearly argues in favour of the shareholders wealth maximization hypothesis. In order to provide further specific statements, the paper also controls for various sub-samples.

6.2.1 Sub-period analysis

In order to elaborate differences concerning time periods, the sample is divided in smaller time periods. 710 poison pill adoptions affect the time between 2010 and 2015. In order to guarantee reliable results, an amount of 170 events are dropped.

In essence, the results of the latest sub period are even more clear and straightforward than the full sample analysis. The day of the event shows a highly significant (Patell Z of 13.940) positive abnormal return of 1.57%. The abnormal return of the following day amounts 2.03%. (Patell Z of 15.982). Interestingly, the second day after the event (+1) does already indicate insignificant outcomes. In addition, the day before the event (-1) shows a significant abnormal return on the 0.1 level. Hence, there is a clear positive market reaction to poison pill adoption. The information seems to be incorporated quicker into the share price compared to the full sample. An explanation could be the technological advantage of the recent period. Additionally, the legal clarification process and acceptance of poison pill usage continues to rise during the years.

955 poison pill adoptions match the time from 2005 to 2009. In this period, the abnormal return of the event date is only 0.36%. Generally, the cumulative abnormal returns of different event windows are lower compared to the full sample results. A logic explanation for this outcome is the fact that the sample size contains the years of the financial crisis between 2007 and 2009. Many economists see this period as the worst financial breakdown since the Great Depression in the 1930s.

The abnormal returns of the period from 2000 to 2004 are 1.88% on the day of adoption and 2.58% the following day and therefore significantly higher compared to the previous period. Again, the tendency for less significance around the centred event than in the entire sample stays accurate.

Finally, a sub-period of a prior decade is tested. In essence, the abnormal results are significantly lower than previous sub-periods that do not have a financial crisis in place. While the *Moran v. Household* ruling of the Delaware Supreme Court already validated the usage of poison pills in 1985, most of the legal rulings took place during the 90s. The *1995 Delaware rulings* are often referred as an essential decision in poison pill clarification. Generally, the 90s still seem to be a developing time frame for poison pill usage (Heron & Lie, 2015). Thus, the additional uncertainty relative to later sub periods might be an explanation for the lower abnormal returns.

Summing up, all the sub periods controlled for show highly significant abnormal returns centred on the date of the adoption. Consequently, this empirical research strongly argues in favour of the shareholders´ wealth maximization hypothesis.

6.2.2 Takeover activity

This sub sample analysis focuses on a following takeover after the adoption is in place. On the one hand, this section controls for the difference of routine adoptions and events caused by takeover interests. The majority of the events (68.41%) are routine measures. Hence, the results of the routine measures are compared to the other events (31.59%). On the other hand, this study controls for differences of companies that adopted pills and have been merged or acquired and companies that still exist independently. In this manner, the results indicate whether shareholders value a direct takeover threat differently.

First of all, table 5 shows the results for a sample solely existing of routine measure adoptions. An amount of 2,555 events is reliably usable for this purpose. Surprisingly, the outcome differs significantly from the prior results so far. The day of the event (“0”) shows a small, positive abnormal return of 0.12%, but only significant on the 0.1 level. In a more specific view, a share of 1.359 adoption dates show negative abnormal returns, while only 1,195 events display positive abnormal returns. The following day of the event (“+1”) shows

a highly significant (Patell Z of 7.968) abnormal return of 0.59%. However, the detailed illustration balances within positive and negative returns really similar with 1,289 to 1,265 events. Summing up, the findings of the routine measure sample are not as clear and highly significant. In order to clarify the drivers of the entire, more significant sample, table 6 shows the results of non-routine measure adoption cases. The 56 events that have no reason of adoption stated are dropped in order to guarantee robust results. In essence, the non-routine measure sample consists of 20 categories that are mostly varieties of takeover threats. The results of the non-routine measure sample indicate strong und highly significant abnormal returns in case of a foreseeable takeover threat. The event date shows a highly significant (Patell Z of 43.223) abnormal return of 4.36% with a ratio of 613 positive abnormal returns to 407 negative ones. The abnormal return on the following day is even bigger (6.48%) and more significant (Patell Z of 60.962). Again, the results also show a first reaction of 1.24% on the day before. This can be explained by the fact that the event might have been announced earlier in the media and therefore shareholders already expect the decision.

As the non-routine measure sample consists of 20 categories of takeover activity, it is of great interest to understand the drivers of this sample. Therefore, this study controls for the specific classes of poison pill usage. Surprisingly, the highest incidents occur for pill adoptions that were placed as a response to a "friendly deal". These events show extraordinary abnormal returns at the day of the event (6.45%) and the following day (10.26%). "Hostile offers" reveal abnormal returns of 4.97% and 0.41% respectively. Next in line are "unsolicited bids" with 3.82% and 2.12%. This outcome leads to the important insight that shareholder do not automatically favour the isolation of the corporate control market through the usage of poison pills. They seem to highly appreciate friendly transactions and therefore value the protection of the friendly deal against potential hostile takeover attempts. In general, shareholders do welcome poison pill adoption as a response to an unwelcome offer. Contrary, categories as "sudden stake accumulation", "shareholder proposal" or "friendly stakeholder" do not show a

common market reaction. Abnormal returns are either positive or negative but remain statistically insignificant.

Summing up, most of the positive abnormal returns of the full sample result from non-routine measure adoptions. Without doubt, these routine adoptions are most likely expected and it is for these grounds that shareholders do not suddenly adapt the stock price expectation. The effect might be small, but still significant and positive. However, the results show that shareholder react very positively to antitakeover devices in case of an unwelcomed takeover threat. Consequently, the distinction of poison pills with different adoption purposes is urgently necessary to justify the market reaction. Early literature as Ryngaert (1988) or Malesta and Walkling (1988) do not incorporate that analysis.

In order to present robust results, this empirical research also conducts a similar analysis. During the data collection via Bloomberg, the information if the company still exists as it has been when adopting the pill was retrieved. In case of an acquisition, this information was noted. This sample is supposed to have a takeover threat before the takeover occurs. Firms that have been "delisted" or are defined as "unlisted" are excluded from the sample.

In essence, the findings of this robustness test are in line with the previous results. The results outperform the full sample in every event window that has been controlled for. The event period centred on the event date (0; +1) shows significance on the 0.01 level and a cumulative abnormal return of 5.98%. Again, the outcome differs significantly for the firms that have not been taken over and consequently are not interpreted of having a feasible takeover threat. This conclusion is in line with Schepker et al. (2016) who has come to similar results. The day of the event has a positive abnormal return of 0.35%. However, only 776 events are defined positive, while 857 are negative. Hence, firms that have not been acquired after adopting the poison pill do not give strong evidence for the shareholder maximization hypothesis. Nevertheless, they still give a tendency for being positive.

All in all, both empirical analyses show the importance of dividing poison pill adoptions by its usage. In the case of an unwelcomed takeover threat, shareholders appreciate the adoption of the pill significantly. Routine measures do not motivate shareholders for a sudden stock price adaption.

6.2.3 Industry analysis

In order to ascertain a deeper analysis of the positive abnormal returns, this study also controls for industry characteristics. Therefore the sample of 4,479 adoption dates is divided into the corresponding industries that the firms are mainly operating in. Expectably, the results vary across industries. For banks, a majority of 44 adoptions are negative at the day of the event while only 28 occurrences show positive results. However, the results remain insignificant. Contrary to this example, the result for the "software" industry shows highly significant abnormal returns on the day of the event (2.73%) and the following day (4.13%). A similar strong reaction is detected for the pharmaceutical industry with 1.68% and 5.59% respectively.

A possible explanation could be the distinction between industries with high and low takeover activity. The software and the pharmaceutical industry are known to be takeover intense. Their success relies on the successful implementation of certain products as drugs or programs. Merger and acquisitions are relatively rare in the banking sector. However, this argumentation should be interpreted with caution as the industry samples differ in their usage of poison pills. Interestingly, the banking sample has a remarkably high share of routine adoptions (84.88%), while the industries of software (56.94%) and pharmaceuticals (68.99%) have significantly lower stakes. This finding supports the earlier insight that the reason of poison pill adoption needs to be incorporated when measuring the market reaction.

6.2.4 Termination of poison pills

As a further analysis, it is also interesting to control for a market reaction to the termination of the antitakeover device. As the full data sample uses recent adoption dates and since a lot of events have not reached the termination date yet, only a limited amount of 1,336 poison pill expiration dates can be reliably used. Table 7 displays the results of the empirical analysis. Most of the event windows that have been controlled for do not show statistical significant abnormal returns. The event window centred on the expiration date (0; +1) displays a small abnormal return of 0.41%. However, the level of significance (0.05) is relatively low in relation to previous results. As a result, there is no real evidence supporting a market reaction at the expiration date of the pill. A possible explanation is that the date of the termination is declared in advance so shareholders do not need to adjust their stock price expectation suddenly. Additionally, at the date of the expiration there might already be a new adoption in place or in the process of planning. This is especially the case for routine measure adoptions.

7 Interpretation of results

Poison pills are controversial devices. However, this empirical research clearly offers evidence in favour of the shareholders wealth maximization hypothesis. Shareholder right plans have a positive impact on shareholders´ value as the market model shows strong abnormal returns. This finding is robust for the *S&P 500*, the *CRSP Weighted Index* as well as the *CRSP Equally Weighted Index* as market benchmark options. In addition, the Fama-French-momentum factor model shows that the results are robust and not model biased. Controlling for various sub-periods leads to the insight that economic conditions do influence stock price reaction. However, the positive market reaction to poison pill adoptions stays robust for every time frame. Further analysis indicates a weak market reaction to the routine measure adoption cases while an unwelcomed takeover threat leads to enormously significant abnormal returns. Remarkably, this is also the case if the company just completed a friendly

deal. Shareholders do not value the isolation from the external forces of the corporate control market but seem to oppose hostile takeover attempts. This result is in line with another current paper of Schepker et al. (2016). In this scenario, shareholders seem to value the protection trough this antitakeover device positively. The positive outcome of poison pill adoption coincides with prior findings of Comment and Schwert (1995), Fuchs (2001) and Hannes (2002) who find protected companies with an increase bargaining position and higher takeover premiums in case of an takeover. In addition to that, Danielson and Karpoff (2002) state a rise in performance for firms with a shareholder rights plan in place. Moreover, there is no strong positive market reaction to poison pill termination.

All in all, early literature like Ryngaert (1988) or Malesta and Walkling (1988) find negative market reactions to poison pill adoption. In addition to this empirical study, more current papers show a tendency for a positive market reaction as Lipton (2015) or Heron and Lie (2015) for instance. Taking all evidence together, this paper finds positive abnormal market returns for poison pill adoption and therefore clearly argues in favour of the shareholder maximization hypothesis. Poison pills have a positive effect on shareholder value.

8 Limitations and future research directions

Besides, it is necessary to keep the limitations of this study in mind. First of all, this study focuses on poison pill adoption dates. In essence, there might be already an earlier effect due to the media announcement in advance is possible. In this case, the entire effect could not be seen solely at the date of the adoption. In order to minimize this effect, this study controls for a variety of event windows. Furthermore, similar studies that have been published in prestigious journals as the *Journal of Financial and Quantitative Analysis* for instance also do use adoption dates for the corresponding analysis (Goh & Caton, 2008). As already

mentioned, the market reaction to poison pill expiration might be blurred through renewed routine measures.

Generally, this empirical study could be the base of further research. After the invention of the poison pill by Martin Lipton in 1982, a vast amount of poison pill research was published in the 80s and 90s. Most of the analysis at that period were more basic and support the managerial entrenchment hypothesis. In the current century, the research conducted in this area declined. Although the research to poison pills remains controversial, there seems to be a tendency now in favour of the shareholder wealth maximisation hypothesis. Further research on the base of this study might finally clarify how shareholders value poison pills.

9 Conclusion

When Martin Lipton invented the poison pill in 1982 and since then, they have been viewed as controversial devices (Sunder, 2014). Poison pill intervene in an ordinary corporate control market and can be implemented without shareholder approval in the United States (Johnson & Meade, 2011). Early literature as Malatesta and Walkling (1988) or Ryngaert (1988) mostly define shareholder right plans as management entrenching provisions. Recent research as Schepker et al. (2016) or Heron and Lie (2015) tend to find a positive market reaction to poison pill adoption. This conclusion is in line with the empirical findings of this paper. The analysis shows highly significant abnormal returns centred on the date of the pill adoption. Diverse model variations confirm the robustness of this outcome. Further sub-sample analysis indicates that poison pill adoption with an unwelcomed takeover threat drive the positive results in the sample. This does not mean that shareholders value the isolation of the firm in the market of corporate control automatically. In fact, the protection of “friendly deals” is appreciated the most. Contrary, routine poison pills do not show clear positive abnormal returns at the date of the pill adoption. Summing up, shareholders react positively to poison

pill adoption, especially if they expect a hostile takeover attempt. Shareholders seem to value the protecting effect that provides management a superior bargaining position. This position allows management to negotiate to the maximal possible bid premium (Datta & Iskandar-Datta, 1996).

10 References

Agrawal, J., & Kamakura, W. (1995). The Economic Worth of Celebrity Endorsers: An Event Study Analysis. *Journal of Marketing*.

Anand, A. (2015). The future of Poison Pills in Canada: Are takeover bid reforms needed?, (February 2001), 8–19.

Bebchuk, L., Cohen, A., & Ferrell, A. (2009). What Matters in Corporate Governance? Retrieved from http://www.law.harvard.edu/programs/olin_center/\nhttp://papers.ssrn.com/abstract_id=593423\nhttp://www.law.harvard.edu/faculty/bebchuk/data.shtml.\nhttp://www.law.harvard.edu/faculty/bebchuk/studies.shtml.

Bhojraj, S., Sengupta, P., & Zhang, S. (2014). Takeover Defenses : Promoting Entrenchment and Efficiency. *Draft*, 1–31.

Binder, J. J. (1998). The Event Study Methodology Since 1969. *Review of Quantitative Finance and Accounting*, *11*(2), 111–137. http://doi.org/10.1023/A:1008295500105

Bodnaruk, A., Gao, P., Östberg, P., & Yun, H. (2011). Passive Shareholders as a Takeover Defense. Retrieved from file://localhost/Users/christian/Documents/Papers/Unknown/Unknown/BodnarukPassive Shareholders as a Takeover__.pdf

Brown, S. J., & Warner, J. B. (1985). Using Daily Stock Returns - The Case of Event Studies. *Journal of Financial Economics*, *14*(1), 3–31. http://doi.org/10.1016/0304-405X(85)90042-X

Burkart, M., & Panunzi, F. (2006). Takeovers. *Finance Working Paper*, *63*(1), 91–93.

Carhart, M. (1997). On Persistence in Mutual Fund Performance. *Journal of Finance*, *52*(1), 57–82.

Chemmanur, T., & Tian, X. (2013). Do Anti-Takeover Provisions Spur Corporate Innovation? *Working Paper*, (February). http://doi.org/10.2139/ssrn.1572219

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. http://doi.org/10.1016/0304-405X(94)00823-J

Danielson, M., & Karpoff, J. (2002). Do Pills Poison Operating Performance?, (May 7,2002), 1–22.

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

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

Fama, & French. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, *33*(1), 3–56. http://doi.org/10.1016/0304-405X(93)90023-5

Fama, & French. (1996). Multifactor Explanations of Asset Pricing Anomalies. *Journal of Finance*, *51*(1), 55–84.

Fama, & French. (2014). A five-factor asset pricing model. *Fama-Miller Working Paper, University of …*, (March 2014). Retrieved from http://www8.gsb.columbia.edu/programs-admissions/sites/programs-admissions/files/finance/Finance Seminar/spring 2014/ken french.pdf

Forjan, J., & Ness, B. Van. (2003). An Investigation of Poison Pill Securities, Long-Term Debt, and the Wealth of Shareholders. *American Journal of Business*, *18*(2), 17–22. http://doi.org/10.1108/19355181200300008

Goh, J., & Caton, G. (2008). Corporate Governance, Shareholder Rights, and Shareholder Rights Plans: Poison, Placebo, or Prescription? *Journal of Financial and Quantitative Analysis*, *2*, 381–400. http://doi.org/10.1017/S0022109000003562

Gordon, L. a, & Pound, J. (1993). Information, Ownership Structure, and Shareholder Voting: Evidence from Shareholder-Sponsored Corporate Governance Proposals. *Journal of Finance*, *48*(2), 697–718.

Heron, R. A., & Lie, E. (2006). On the Use of Poison Pills and Defensive Payouts by Takeover Targets On the Use of Poison Pills and Defensive Payouts by Takeover Targets*. *Source: The Journal of BusinessJournal of Business*, *79*(4), 1783–1807. http://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. http://doi.org/10.1016/j.jcorpfin.2015.09.008

Higgins, E., & Nelling, E. (2002). The Effect of Poison Pill Securities on Shareholder Wealth in Real Estate Trusts.

Holmén, M., Nivorozhkin, E., & Rana, R. (2012). Do anti-takeover devices affect the takeover likelihood or the takeover premium? *The European Journal of Finance*, *20*(4), 319–340. http://doi.org/10.1080/1351847X.2012.703141

Johnson, D. J., & Meade, N. L. (2011). Shareholder Wealth Effects of Poison Pills in the Prescence of Anti-Takeover Amendments. *Journal of Applied Business Research*.

Kang, S. Y. (2013). Transplanting a Poison Pill to Controlling Shareholder Regimes — Why It Is So Difficult Transplanting a Poison Pill to Controlling Shareholder Regimes —, *33*(3), 619–676.

Kothari, S. P., & Warner, J. B. (2007). Econometrics of Event Studies. *Handbook of Empirical Corporate Finance SET*, *2*, 3–36. http://doi.org/10.1016/B978-0-444-53265-7.50015-9

MacKinley, C. (1997). Event studies in economics and finance. *Journal of Economic Literature*, *XXXV*, 13–39. http://doi.org/10.2307/2729691

Malatesta, P. H., & Walkling, R. A. (1988). Poison pill securities. *Journal of Financial Economics*, *20*, 347–376. http://doi.org/10.1016/0304-405X(88)90050-5

Rhee, E. Y., & Fiss, P. C. (2014). Framing Controversial Actions : Regulatory Focus , Source Credibility , and Stock Market Reaction To Poison Pill Adoption, *57*(6), 1734–1758.

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

Schepker, D. J., & Oh, W.-Y. (2012). Complementary or Substitutive Effects? Corporate Governance Mechanisms and Poison Pill Repeal. *Journal of Management*, *39*(7), 1729–1759. http://doi.org/10.1177/0149206312441209

Schepker, D. J., Oh, W.-Y., & Patel, P. C. (2016). Interpreting Equivocal Signals: Market Reaction to Specific-Purpose Poison Pill Adoption. *Journal of Management*, (July). http://doi.org/10.1177/0149206316635250

Sikes, S. A., Tian, X., & Wilson, R. (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. http://doi.org/10.1016/j.jacceco.2014.02.002

Sokolyk, T. (2010). The Effects of Anti-takeover Provisions on Acquisition Targets, *1*(July 2010). http://doi.org/10.1017/CBO9781107415324.004

Stein, J. C. (1988). Takeover Threats and Managerial Myopia. *Journal of Political Economy*, *96*(1), 61–80.

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

Sundaramurthy, C., Mahoney, J. M., & Mahoney, J. T. (1997). Board structure, antitakeove provisions, and stockholder wealth. *Strategic Management Journal*, *18*(3), 231–245. http://doi.org/10.1002/(SICI)1097-0266(199703)18

Sunder, D. L. (2014). The Controversial "Poison Pill" Takeover Defense: How valid are the Arguments in Support of it? Introduction, *XXIII*(November 2013), 47–66.

Velasco, J. (2003). Just do it: an antidote to the poison pill, *849*.

Yeh, T. ming. (2014). The effects of anti-takeover measures on Japanese corporations. *Review of Quantitative Finance and Accounting*, *42*(4), 757–780. http://doi.org/10.1007/s11156-013-0361-0

11 Appendix

Table 1: Market Model Abnormal Returns, S&P 500

Market Model Abnormal Returns, Standard & Poor's 500 Composite Index

Day	N	Mean Abnormal Return	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
-15	3622	-0.03%	1743:1879	-0.373	-0.502	0.385
-14	3623	0.07%	1743:1880	0.464	1.090	0.469
-13	3623	0.06%	1731:1892	1.429$	0.906	0.833
-12	3623	0.07%	1779:1844>	1.645*	0.974	0.796
-11	3623	0.15%	1743:1880	2.227*	2.176*	0.466
-10	3623	0.24%	1783:1840>	3.817***	3.614***	1.735*
-9	3623	0.18%	1779:1844>	2.544**	2.626**	1.717*
-8	3623	0.00%	1689:1934	0.139	0.010	-0.880
-7	3623	0.14%	1795:1828>>	0.086	2.051*	1.452$
-6	3623	0.10%	1708:1915	1.361$	1.485$	-0.238
-5	3623	0.12%	1714:1909	0.693	1.736*	0.089
-4	3623	0.07%	1787:1836>	2.053*	1.004	0.766
-3	3623	0.26%	1799:1824>>	4.287***	3.859***	1.609$
-2	3623	0.37%	1829:1794>>>	7.003***	5.482***	3.113**
-1	3623	0.39%	1802:1821>>	7.519***	5.698***	2.418**
0	3623	1.33%	1834:1789>>>	24.543***	19.721***	4.587***
+1	3620	2.26%	1913:1707>>>	39.168***	33.356***	7.630***
+2	3619	0.19%	1743:1876	2.447**	2.840**	1.366$
+3	3617	0.11%	1732:1885	1.120	1.627$	0.099
+4	3615	0.11%	1723:1892	0.736	1.600$	-0.241
+5	3615	0.06%	1719:1896	1.579$	0.850	-0.089
+6	3613	0.09%	1765:1848)	0.585	1.401$	0.783
+7	3610	0.10%	1708:1902	1.143	1.524$	0.177
+8	3609	0.15%	1786:1823>>	1.685*	2.157*	1.217
+9	3609	0.05%	1667:1942(	0.664	0.756	-0.412
+10	3609	0.01%	1745:1864	-0.365	0.173	0.620
+11	3608	0.30%	1800:1808>>	4.148***	4.390***	2.262*
+12	3606	0.07%	1717:1889	-0.487	1.039	0.461
+13	3606	0.05%	1694:1912	0.490	0.670	-0.451
+14	3606	0.11%	1777:1829>	0.830	1.626$	1.333$
+15	3605	0.06%	1760:1845)	1.257	0.842	0.748

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

to $,* and show the direction and significance of a generic one-tail generalized sign test.

Eventus (R) Software from Cowan Research, L.C.

Market Model Abnormal Returns, Standard & Poor's 500 Composite Index

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
(-15,-4)	3623	1.16%	0.74%	1877:1746>>>	4.639***	4.956***	2.191*
(-3,+3)	3624	4.91%	3.95%	2104:1520>>>	32.549***	27.413***	7.870***
(-2,+2)	3623	4.54%	3.70%	2107:1516>>>	36.078***	29.993***	8.548***
(-1,+1)	3623	3.97%	3.27%	2052:1571>>>	41.121***	33.918***	8.450***
(0,+1)	3623	3.59%	2.93%	2064:1559>>>	45.016***	37.511***	8.638***
(+4,+15)	3615	1.15%	0.56%	1851:1764>>>	3.551***	4.908***	1.850*

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Figure 1: Cumulative Abnormal Return: Mean & 95% Confidence Limits

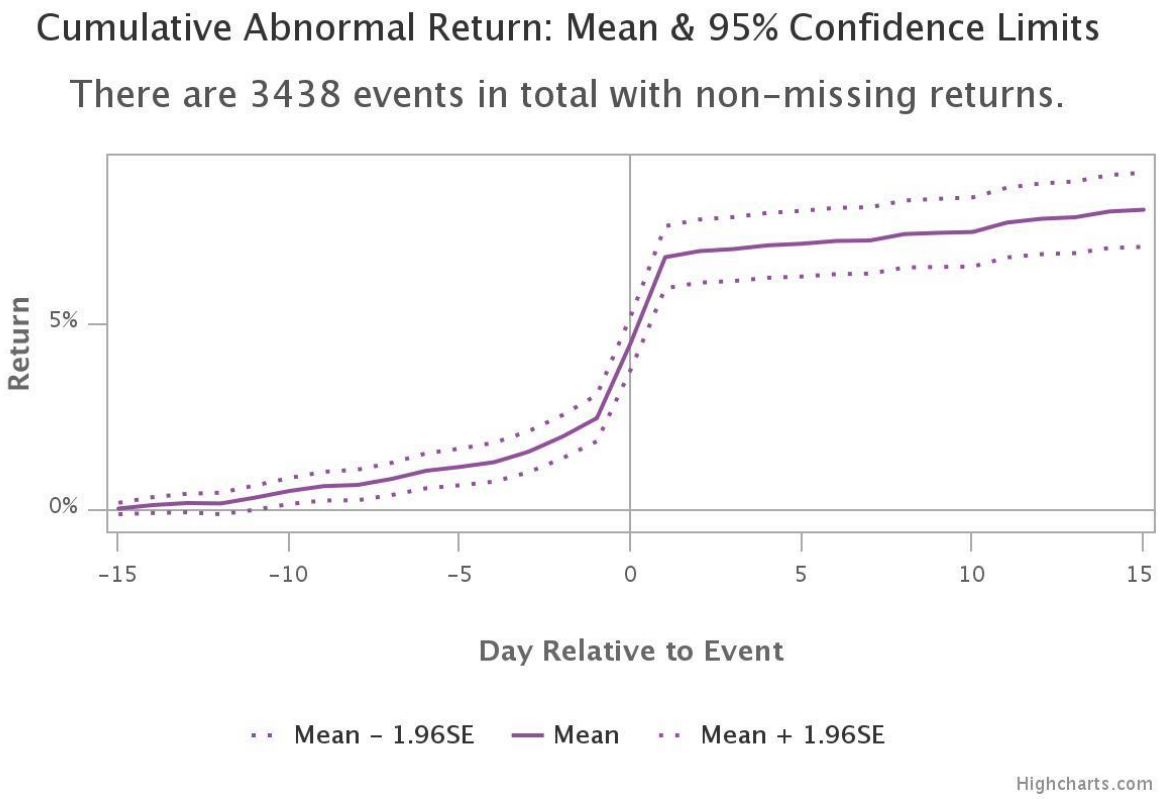

Figure 2: Mean Cumulative Return by Day Relative to Event

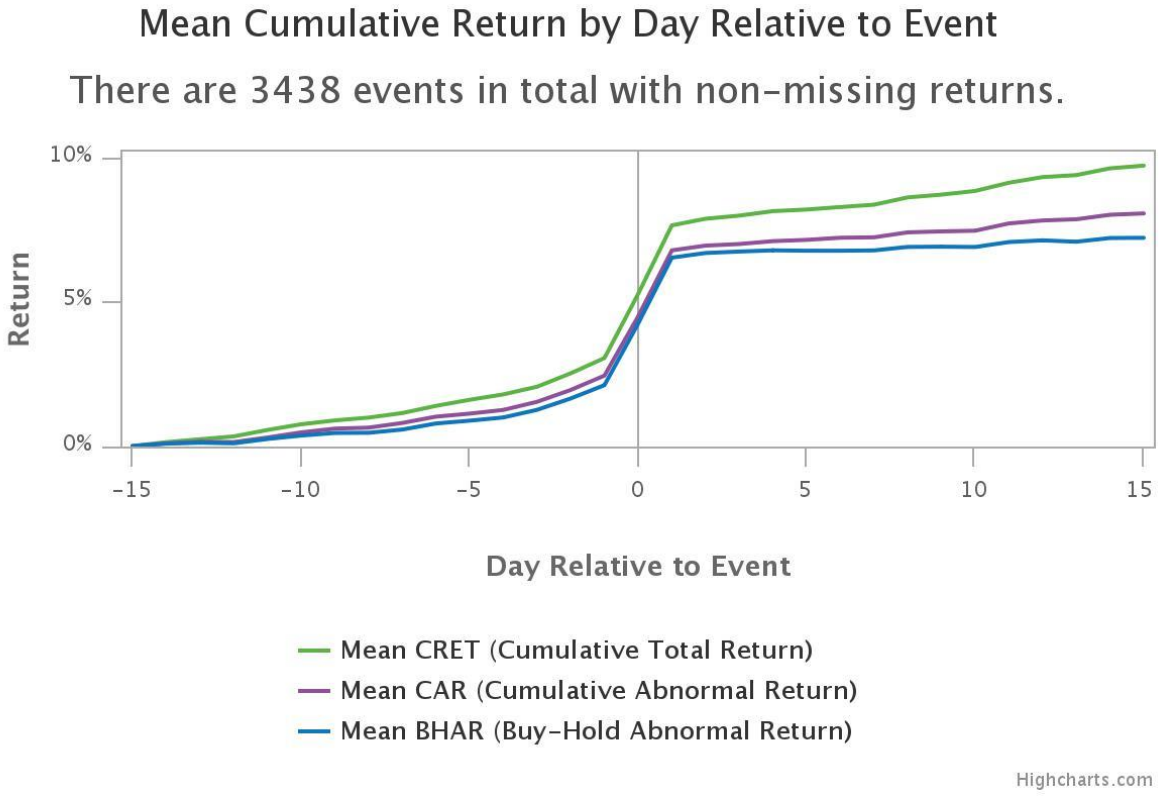

Table 2: Market Model Abnormal Returns, Equally Weighted Index

Market Model Abnormal Returns, Equally Weighted Index

Day	N	Mean Abnormal Return	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
-15	3622	-0.04%	1756:1866)	-0.241	-0.665	0.445
-14	3623	0.09%	1746:1877	0.873	1.340$	0.600
-13	3623	0.05%	1753:1870	1.393$	0.821	0.844
-12	3623	0.06%	1758:1865)	1.414$	0.870	0.654
-11	3623	0.11%	1740:1883	1.754*	1.678*	0.249
-10	3623	0.23%	1776:1847>	3.667***	3.409***	1.639$
-9	3623	0.16%	1790:1833>>	2.297*	2.412**	1.576$
-8	3623	0.00%	1653:1970<	0.144	-0.017	-1.097
-7	3623	0.12%	1761:1862)	-0.095	1.877*	1.269
-6	3623	0.10%	1731:1892	1.775*	1.531$	0.202
-5	3623	0.11%	1745:1878	0.922	1.675*	0.330
-4	3623	0.06%	1743:1880	2.100*	0.869	0.657
-3	3623	0.26%	1807:1816>>	4.483***	3.980***	1.884*
-2	3623	0.38%	1849:1774>>>	7.349***	5.749***	3.462***
-1	3623	0.40%	1829:1794>>>	7.933***	5.963***	2.810**
0	3623	1.35%	1857:1766>>>	25.058***	20.307***	5.042***
+1	3620	2.25%	1923:1697>>>	39.409***	33.864***	7.704***
+2	3619	0.19%	1779:1840>	2.603**	2.938**	1.496$
+3	3617	0.09%	1709:1908	0.877	1.401$	-0.203
+4	3615	0.11%	1719:1896	0.886	1.723*	0.059
+5	3615	0.03%	1677:1938	1.138	0.412	-0.676
+6	3613	0.07%	1748:1865	0.257	1.016	0.394
+7	3610	0.10%	1707:1903	0.990	1.534$	0.191
+8	3609	0.14%	1771:1838>	1.619$	2.076*	1.164
+9	3609	0.03%	1665:1944(	0.444	0.514	-0.569
+10	3609	0.00%	1712:1897	-0.658	-0.019	0.143
+11	3608	0.28%	1800:1808>>	3.929***	4.205***	2.357**
+12	3606	0.05%	1716:1890	-0.653	0.728	0.132
+13	3606	0.04%	1688:1918	0.484	0.614	-0.417
+14	3606	0.08%	1759:1847>	0.585	1.213	1.006
+15	3605	0.04%	1758:1847>	1.068	0.551	0.835

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Eventus (R) Software from Cowan Research, L.C.

Market Model Abnormal Returns, Equally Weighted Index

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
(-15,-4)	3623	1.05%	0.74%	1880:1743>>>	4.615***	4.561***	2.127*
(-3,+3)	3624	4.92%	4.02%	2109:1515>>>	33.163***	28.025***	8.389***
(-2,+2)	3623	4.56%	3.77%	2129:1494>>>	36.825***	30.764***	9.174***
(-1,+1)	3623	3.99%	3.32%	2057:1566>>>	41.795***	34.702***	8.982***
(0,+1)	3623	3.59%	2.95%	2052:1571>>>	45.545***	38.285***	9.013***
(+4,+15)	3615	0.96%	0.47%	1796:1819>>	2.920**	4.199***	1.333$

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

-

Table 3: Market Model Abnormal Returns, Value Weighted Index

Market Model Abnormal Returns, Value Weighted Index

Day	N	Mean Abnormal Return	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
-15	3622	-0.03%	1747:1875	-0.276	-0.430	0.500
-14	3623	0.07%	1736:1887	0.490	1.110	0.451
-13	3623	0.06%	1733:1890	1.343$	0.870	0.790
-12	3623	0.06%	1764:1859)	1.504$	0.880	0.638
-11	3623	0.14%	1745:1878	2.089*	2.056*	0.324
-10	3623	0.23%	1781:1842>	3.742***	3.494***	1.661*
-9	3623	0.18%	1796:1827>>	2.597**	2.641**	1.737*
-8	3623	0.00%	1683:1940	0.160	0.008	-0.898
-7	3623	0.14%	1790:1833>	0.059	2.017*	1.395$
-6	3623	0.10%	1713:1910	1.507$	1.540$	-0.102
-5	3623	0.12%	1717:1906	0.724	1.719*	0.118
-4	3623	0.07%	1769:1854)	2.055*	0.984	0.759
-3	3623	0.26%	1803:1820>>	4.371***	3.912***	1.716*
-2	3623	0.37%	1828:1795>>>	7.074***	5.561***	3.227***
-1	3623	0.39%	1812:1811>>	7.598***	5.734***	2.427**
0	3623	1.33%	1845:1778>>>	24.625***	19.805***	4.606***
+1	3620	2.25%	1912:1708>>>	39.270***	33.483***	7.657***
+2	3619	0.19%	1743:1876	2.494**	2.854**	1.407$
+3	3617	0.10%	1725:1892	1.009	1.550$	0.007
+4	3615	0.11%	1720:1895	0.738	1.617$	-0.221
+5	3615	0.05%	1714:1901	1.493$	0.781	-0.178
+6	3613	0.09%	1769:1844>	0.520	1.324$	0.736
+7	3610	0.11%	1713:1897	1.186	1.566$	0.193
+8	3609	0.14%	1774:1835>	1.563$	2.059*	1.092
+9	3609	0.04%	1670:1939(	0.618	0.656	-0.466
+10	3609	0.01%	1745:1864	-0.472	0.108	0.512
+11	3608	0.29%	1789:1819>>	4.110***	4.382***	2.284*
+12	3606	0.06%	1705:1901	-0.622	0.919	0.358
+13	3606	0.05%	1681:1925	0.521	0.686	-0.472
+14	3606	0.10%	1777:1829>	0.785	1.558$	1.264
+15	3605	0.06%	1764:1841>	1.300$	0.867	0.856

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Eventus (R) Software from Cowan Research, L.C.

Market Model Abnormal Returns, Value Weighted Index

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
(-15,-4)	3623	1.14%	0.73%	1878:1745>>>	4.613***	4.875***	2.129*
(-3,+3)	3624	4.90%	3.95%	2103:1521>>>	32.682***	27.533***	7.955***
(-2,+2)	3623	4.53%	3.70%	2111:1512>>>	36.247***	30.145***	8.642***
(-1,+1)	3623	3.97%	3.26%	2048:1575>>>	41.271***	34.060***	8.481***
(0,+1)	3623	3.58%	2.92%	2057:1566>>>	45.144***	37.661***	8.671***
(+4,+15)	3615	1.11%	0.54%	1835:1780>>>	3.398***	4.763***	1.720*

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Table 4: Fama-French-Momentum Model Abnormal Returns, Value Weighted Index

Eventus (R) Software from Cowan Research, L.C.

Fama-French-Momentum Model Abnormal Returns, Value Weighted Index

Day	N	Mean Abnormal Return	Positive: Negative	Portfolio Time-Series (CDA) t	Rank Test Z
-15	3622	-0.08%	1728:1894	-1.203	-0.094
-14	3623	0.07%	1775:1848)	1.140	0.599
-13	3623	0.03%	1728:1895	0.432	0.487
-12	3623	0.04%	1764:1859	0.602	0.575
-11	3623	0.12%	1714:1909	1.833*	-0.163
-10	3623	0.23%	1781:1842>	3.518***	1.624$
-9	3623	0.18%	1798:1825>>	2.777**	1.783*
-8	3623	-0.02%	1681:1942(	-0.310	-0.963
-7	3623	0.15%	1792:1831>	2.331**	1.615$
-6	3623	0.10%	1730:1893	1.548$	0.118
-5	3623	0.10%	1731:1892	1.483$	0.093
-4	3623	0.08%	1744:1879	1.175	0.907
-3	3623	0.27%	1794:1829>	4.152***	1.901*
-2	3623	0.34%	1844:1779>>>	5.204***	2.825**
-1	3623	0.36%	1823:1800>>>	5.504***	2.525**
0	3623	1.29%	1834:1789>>>	19.883***	4.645***
+1	3620	2.21%	1908:1712>>>	34.183***	7.653***
+2	3619	0.16%	1762:1857	2.425**	0.897
+3	3617	0.04%	1675:1942<	0.551	-0.873
+4	3615	0.11%	1710:1905	1.769*	-0.083
+5	3615	0.01%	1671:1944<	0.227	-0.961
+6	3613	0.09%	1750:1863	1.414$	0.575
+7	3610	0.09%	1710:1900	1.434$	-0.108
+8	3609	0.12%	1752:1857	1.908*	0.684
+9	3609	0.03%	1664:1945<	0.413	-0.760
+10	3609	-0.01%	1740:1869	-0.160	0.195
+11	3608	0.31%	1817:1791>>>	4.773***	2.666**
+12	3606	0.06%	1717:1889	0.960	0.124
+13	3606	0.04%	1696:1910	0.632	-0.517
+14	3606	0.07%	1755:1851	1.142	1.215
+15	3605	0.04%	1764:1841)	0.642	0.640

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Eventus (R) Software from Cowan Research, L.C.

Fama-French-Momentum Model Abnormal Returns, Value Weighted Index

Days	N	Mean Cumulative Abnormal Return	Positive: Negative	Portfolio Time-Series (CDA) t	Rank Test Z
(-15,-4)	3623	0.99%	1889:1734>>>	4.424***	1.899*
(-3,+3)	3624	4.66%	2083:1541>>>	27.157***	7.398***
(-2,+2)	3623	4.35%	2102:1521>>>	30.039***	8.294***
(-1,+1)	3623	3.86%	2053:1570>>>	34.377***	8.558***
(0,+1)	3623	3.50%	2035:1588>>>	38.211***	8.696***
(+4,+15)	3615	0.98%	1788:1827>	4.368***	1.060

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Table 5: Routine measure Market Model Abnormal Returns, S&P 500

Market Model Abnormal Returns, Standard & Poor's 500 Composite Index

Day	N	Mean Abnormal Return	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
-15	2554	-0.09%	1218:1336	-1.054	-1.069	-0.540
-14	2554	0.08%	1250:1304)	0.337	0.922	1.273
-13	2554	0.02%	1191:1363	0.983	0.299	0.169
-12	2554	0.05%	1259:1295>	0.680	0.619	0.602
-11	2554	0.10%	1226:1328	1.144	1.185	0.019
-10	2554	0.15%	1242:1312	1.758*	1.865*	1.048
-9	2554	0.20%	1261:1293>	2.068*	2.461**	2.285*
-8	2554	-0.03%	1169:1385<	-0.962	-0.318	-1.953*
-7	2554	0.07%	1260:1294>	-1.519$	0.861	1.159
-6	2554	-0.03%	1187:1367	-0.119	-0.340	-1.139
-5	2554	0.04%	1202:1352	-0.539	0.533	-0.052
-4	2554	-0.05%	1246:1308	0.353	-0.622	0.242
-3	2554	0.10%	1257:1297>	0.982	1.177	0.780
-2	2554	0.18%	1254:1300)	3.523***	2.198*	1.824*
-1	2554	0.05%	1233:1321	1.184	0.591	0.372
0	2554	0.12%	1195:1359	1.545$	1.501$	-0.055
+1	2554	0.59%	1289:1265>>	7.968***	7.267***	4.375***
+2	2553	0.13%	1224:1329	1.363$	1.624$	1.013
+3	2553	0.14%	1244:1309	1.423$	1.672*	0.739
+4	2552	0.08%	1196:1356	0.574	0.982	-0.867
+5	2552	0.09%	1224:1328	2.100*	1.073	0.091
+6	2552	0.10%	1244:1308	0.397	1.213	0.552
+7	2551	0.08%	1199:1352	0.678	1.035	-0.375
+8	2550	0.16%	1249:1301)	1.507$	1.987*	0.679
+9	2550	0.06%	1189:1361	0.801	0.683	-0.450
+10	2550	0.07%	1229:1321	0.271	0.824	0.717
+11	2550	0.34%	1271:1279>	4.384***	4.144***	2.396**
+12	2550	-0.02%	1201:1349	-1.621$	-0.212	-0.489
+13	2550	0.12%	1201:1349	1.300$	1.514$	-0.423
+14	2550	0.07%	1243:1307	-0.028	0.816	0.765
+15	2550	0.12%	1233:1317	1.857*	1.460$	0.540

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Eventus (R) Software from Cowan Research, L.C.

Market Model Abnormal Returns, Standard & Poor's 500 Composite Index

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
(-15,-4)	2554	0.52%	0.17%	1276:1278>>	0.899	1.846*	0.899
(-3,+3)	2555	1.31%	0.96%	1341:1214>>>	6.804***	6.056***	3.419***
(-2,+2)	2554	1.08%	0.83%	1335:1219>>>	6.951***	5.894***	3.367***
(-1,+1)	2554	0.76%	0.57%	1309:1245>>>	6.157***	5.403***	2.709**
(0,+1)	2554	0.72%	0.51%	1326:1228>>>	6.700***	6.200***	3.054**
(+4,+15)	2552	1.27%	0.66%	1313:1239>>>	3.515***	4.478***	0.905

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Table 6: Non-routine measure Market Model Abnormal Returns, S&P 500

Market Model Abnormal Returns, Standard & Poor's 500 Composite Index

Day	N	Mean Abnormal Return	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
-15	1019	0.14%	504:515)	1.394$	1.095	1.296$
-14	1020	0.08%	469:551	0.393	0.615	-0.617
-13	1020	0.16%	520:500>	1.224	1.241	1.292$
-12	1020	0.13%	501:519	2.171*	0.982	0.788
-11	1020	0.30%	494:526	2.595**	2.301*	0.889
-10	1020	0.49%	518:502>	4.409***	3.728***	1.719*
-9	1020	0.13%	495:525	1.535$	0.989	0.341
-8	1020	0.06%	501:519	1.834*	0.455	0.861
-7	1020	0.33%	513:507>	2.725**	2.465**	1.080
-6	1020	0.46%	503:517	2.955**	3.499***	1.022
-5	1020	0.27%	487:533	1.910*	2.070*	0.156
-4	1020	0.39%	521:499>>	3.525***	2.972**	1.164
-3	1020	0.69%	522:498>>	6.634***	5.191***	1.932*
-2	1020	0.89%	553:467>>>	7.639***	6.689***	3.191***
-1	1020	1.24%	545:475>>>	12.089***	9.353***	3.544***
0	1020	4.36%	613:407>>>	43.223***	32.896***	7.712***
+1	1017	6.48%	603:414>>>	60.962***	48.957***	7.896***
+2	1017	0.35%	496:521	2.480**	2.672**	1.148
+3	1015	0.06%	467:548	0.035	0.439	-0.591
+4	1014	0.20%	502:512)	0.534	1.489$	0.501
+5	1014	-0.02%	476:538	-0.316	-0.155	-0.174
+6	1012	0.07%	493:519	0.239	0.529	0.427
+7	1010	0.17%	487:523	1.241	1.304$	0.799
+8	1010	0.08%	510:500>	0.552	0.621	1.093
+9	1010	0.06%	462:548	0.106	0.461	-0.051
+10	1010	-0.09%	495:515	-0.882	-0.648	0.390
+11	1009	0.23%	507:502>	1.197	1.774*	1.186
+12	1007	0.26%	489:518	1.422$	1.981*	1.098
+13	1007	-0.14%	473:534	-1.032	-1.033	-0.173
+14	1007	0.22%	510:497>	1.708*	1.675*	1.392$
+15	1006	-0.09%	502:504)	-0.646	-0.709	0.616

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Eventus (R) Software from Cowan Research, L.C.

Market Model Abnormal Returns, Standard & Poor's 500 Composite Index

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
(-15,-4)	2554	0.52%	0.17%	1276:1278>>	0.899	1.846*	0.899
(-3,+3)	2555	1.31%	0.96%	1341:1214>>>	6.804***	6.056***	3.419***
(-2,+2)	2554	1.08%	0.83%	1335:1219>>>	6.951***	5.894***	3.367***
(-1,+1)	2554	0.76%	0.57%	1309:1245>>>	6.157***	5.403***	2.709**
(0,+1)	2554	0.72%	0.51%	1326:1228>>>	6.700***	6.200***	3.054**
(+4,+15)	2552	1.27%	0.66%	1313:1239>>>	3.515***	4.478***	0.905

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Table 7: Termination Dates Market Model Abnormal Returns, S&P 500

Market Model Abnormal Returns, Standard & Poor's 500 Composite Index

Day	N	Mean Abnormal Return	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
-15	1335	0.03%	602:733<	-0.125	0.274	-0.598
-14	1335	0.09%	665:670	1.307$	0.751	1.621$
-13	1335	-0.09%	594:741<<	-1.703*	-0.799	-1.390$
-12	1334	0.08%	649:685	1.306$	0.666	0.787
-11	1335	0.09%	632:703	-0.296	0.786	0.096
-10	1335	-0.21%	612:723<	-2.703**	-1.780*	-2.077*
-9	1335	-0.07%	645:690	-0.087	-0.557	0.301
-8	1335	0.16%	646:689	1.588$	1.336$	1.680*
-7	1335	0.01%	628:707	0.152	0.097	-0.225
-6	1335	-0.15%	648:687	-0.405	-1.290$	0.133
-5	1335	0.11%	618:717(	0.414	0.898	0.168
-4	1335	-0.05%	658:677	-1.038	-0.407	-0.144
-3	1335	-0.03%	632:703	-0.844	-0.282	-0.429
-2	1335	-0.17%	605:730<	-1.761*	-1.433$	-1.805*
-1	1335	0.00%	629:706	0.837	-0.034	-0.454
0	1335	0.27%	679:656>	2.533**	2.294*	1.967*
+1	1310	0.14%	626:684	0.368	1.181	-0.080
+2	1296	-0.14%	629:667	-0.215	-1.175	0.152
+3	1296	-0.07%	612:684	-1.284$	-0.548	-1.041
+4	1294	0.09%	596:698(	-0.018	0.776	-0.720
+5	1294	0.16%	655:639>	2.168*	1.333$	2.182*
+6	1294	-0.25%	624:670	-2.558**	-2.128*	-0.727
+7	1292	0.02%	652:640>	1.633$	0.177	0.729
+8	1288	-0.04%	625:663	-0.454	-0.337	-0.156
+9	1288	-0.09%	610:678	-0.619	-0.718	-0.584
+10	1288	0.14%	614:674	0.875	1.202	-0.055
+11	1288	-0.02%	616:672	0.839	-0.191	-0.038
+12	1287	-0.17%	581:706<	-1.433$	-1.460$	-1.218
+13	1287	0.10%	604:683	0.017	0.812	0.389
+14	1287	0.34%	630:657	2.299*	2.871**	1.013
+15	1284	0.21%	625:659	1.300$	1.780*	0.822

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.

Eventus (R) Software from Cowan Research, L.C.

Market Model Abnormal Returns, Standard & Poor's 500 Composite Index

Days	N	Mean Cumulative Abnormal Return	Precision Weighted CAAR	Positive: Negative	Patell Z	Portfolio Time-Series (CDA) t	Rank Test Z
(-15,-4)	1335	0.00%	-0.09%	628:707	-0.458	-0.007	0.102
(-3,+3)	1336	0.00%	-0.02%	638:698	-0.114	0.012	-0.639
(-2,+2)	1335	0.10%	0.10%	648:687	0.791	0.378	-0.098
(-1,+1)	1335	0.41%	0.22%	678:657>	2.164*	1.974*	0.827
(0,+1)	1335	0.41%	0.17%	695:640>>	2.059*	2.442**	1.334$
(+4,+15)	1294	0.49%	0.24%	651:643)	1.131	1.181	0.473

The symbols $,*,**, and *** denote statistical significance at the 0.10, 0.05, 0.01 and 0.001 levels, respectively, using a generic one-tail test. The symbols (,< or),> etc. correspond to $,* and show the direction and significance of a generic one-tail generalized sign test.