TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

Diplomarbeit

The influence of management transactions on stock returns – Evidence for Switzerland

ausgeführt zum Zwecke der Erlangung des akademischen Grades eines

Diplom-Ingenieurs

unter der Leitung von

a.o.Univ.-Prof. Dr. Wolfgang Aussenegg
(E330 Institut für Managementwissenschaften, Bereich: Finanzwirtschaft und Controlling)

eingereicht an der Technischen Universität Wien

Fakultät für Maschinenwesen und Betriebswissenschaften

von

Antoine Graas

0726702
(066 482)

Schäffergasse 20/54
1040 Wien
Österreich

Wien, Mai 2015

____

Antoine Graas

Ich habe zur Kenntnis genommen, dass ich zur Drucklegung meiner Arbeit unter der Bezeichnung

Diplomarbeit

nur mit Bewilligung der Prüfungskommission berechtigt bin.

Ich erkläre weiters Eides statt, dass ich meine Diplomarbeit nach den anerkannten Grundsätzen für wissenschaftliche Abhandlungen selbstständig ausgeführt habe und alle verwendeten Hilfsmittel, insbesondere die zugrunde gelegte Literatur, genannt habe.

Weiters erkläre ich, dass ich dieses Diplomarbeitsthema bisher weder im In- noch Ausland (einer Beurteilerin/einem Beurteiler zur Begutachtung) in irgendeiner Form als Prüfungsarbeit vorgelegt habe und dass diese Arbeit mit der vom Begutachter beurteilten Arbeit übereinstimmt.

Wien, Mai 2015

Antoine Graas

Danksagung

Ich möchte mich bei Prof. Wolfgang Aussenegg bedanken, der mir dank seiner ausführlichen Einführung in die Themenstellung erst die Abfassung dieser interessanten Diplomarbeit ermöglichte. Ausdrücklich will ich mich bei Prof. Aussenegg auch für die äußerst unkomplizierte und anregende Betreuung bedanken. Zusätzlich will ich diese Gelegenheit nutzen, um meinen Eltern für ihre langjährige Unterstützung während meines Studiums zu danken.

Kurzfassung

Die vorliegende Diplomarbeit untersucht den Einfluss von Management-Transaktionen in unternehmenseigenen Aktien auf die Kursentwicklung für den Schweizer Wertpapiermarkt. Börsengeschäfte auf Grundlage privater Informationen sind prinzipiell verboten und auch um die Integrität des Aktienmarktes zu stärken, erfordert die Schweizer Börse eine Deklaration über etwaige Insidergeschäfte. Die aufgestellte Datenbank enthält 1568 Transaktion für den von Mai 2011 bis Juni 2014 umfassenden Zeitraum. Als Untersuchungsmethoden kommen eine Event-Studie und eine multivariate Regressionsanalyse zum Einsatz. Die Resultate zeigen, dass auf Verkaufstransaktionen eine signifikant abnormale negative Preisentwicklung folgt, gleichermaßen führen Erwerbstransaktionen zu signifikanten Preisanstiegen. Dies lässt darauf schließen, dass eine Aktientransaktion des Managements einen vorher unbekannten Informationsgewinn für Investoren darstellt. Außerdem zeigt sich, dass die Unternehmensgröße einen Einfluss auf die Preisentwicklung hat, so rufen Transaktionen kleinerer Firmen größere Reaktionen hervor. Ein wenig unerwartet scheint auch das Kursmomentum im Vorfeld einer Transaktion, einen erheblichen Einfluss auf die nachfolgende Preisentwicklung auszuüben.

Abstract

This thesis examines the influence of management transactions on stock returns in Switzerland. As trading based on private information is forbidden and in a bid to improve stock market integrity, insiders are obligated to disclose their transactions to the Swiss stock exchange. The data sample consists of 1568 transactions from May 2011 to June 2014. An event study and a multivariate regression analysis are applied to measure abnormal returns around transactions. The results show significant negative abnormal performances following sale transactions and significant positive abnormal performances following purchase transactions. This indicates that management transactions reveal previously unknown information to investors. Further observations suggest firm size as an influencing factor with deals in small company stocks triggering greater market reactions. Somewhat unexpectedly, stock price momentum seems to have a considerable impact on long-term price development as well.

Table of contents

1 Introduction

Management transactions are a common phenomenon on stock exchanges around the world. Not least, because remuneration packages for senior employees often include, in some form or another, company securities. Selling or buying those stocks is, therefore, a logical conclusion for higher management and board of directors' members. However, due to comprehensive information about the companies at their disposal, insider deals often draw as a first reaction fears about unfair exploitations of secret knowledge advantages. Stock markets need integrity and fair conditions to attract investors, thus, deals based on inside information are nowadays generally banned as shown by Bhattacharya and Daouk (2002), who look at 107 countries with stock markets and find that in 87 of them insider trading laws exist. They also note that the emergence of insider trading laws is a phenomenon of the 1990s, as prior do these years only 34 out of the 107 countries had introduced such regulations.

Still, most trades of corporate insiders are believed to be based on hidden information and subsequently, one would naturally assume a considerable market reaction to the revelation of a management transaction. The objective of this thesis therefore results in examining if management transactions do indeed trigger abnormal reactions in security prices. And if secondly, the abnormal reactions can also be associated to these management transactions. This examination is based on an event study, a method often used to measure the influence of unexpected events on security prices in academic research. The scope of the study is composed by the Swiss stock market.

As corporate insiders with intentions to trade in securities of their company must adhere to specific laws, chapter (2) of this thesis introduces the legal framework for management transactions. Naturally, focusing on the development and peculiarities of Swiss regulations. Under chapter (3), the hypotheses central to the event study are developed on the basis of a literature review. The necessary data analyzed in this thesis is presented in section (4), explaining the sample collection and formation and also illustrating some key characteristics. Before applying the event study, chapter (5) takes a look at the methodology and the underlying theories defining the procedure of such a study. Section (6) presents in detail results of the examination into abnormal returns following public disclosures of management transactions along with possible conclusions. This section also contains more detailed analyses for possible influencing factors like firm size, transaction size, and implementation of revised insider trading regulations. In order to confirm the previous results and to discover additional influencing factors of abnormal returns, a multivariate regression analysis is performed in section (7). The thesis ends with a summary of the drawn conclusions in section (8).

2 Legal Framework

2.1 Insider trading

It is natural and logical for corporate insiders to have access to secret or unreleased information concerning the firms they work for or entertain any other form of professional relation with. Unofficial or inside information is, by definition, unknown to the general public. Creating an information asymmetry which leads to an uneven playing field between different groups of investors. Unsurprisingly, fears arise that insiders use their plus on information to gain an advantage and thereby collecting higher returns on investment choices. This could lead common investors to question the integrity of a market and losing trust. However, contrasting views about banning insider trading or inhibiting it by enacting disclosure laws still exist.

After a review of theoretical and empirical literature on efficient capital market models, Fama (1969) introduces the efficient-market hypothesis which he defines as:

"… assumption that security prices at any time "fully reflect" all available information. A market in which prices always "fully reflect" available information is called "efficient.""[1]

Eugene F. Fama reaches this conclusion and establishes the efficient market hypothesis after considering the adjustment of security prices to three relevant information subsets, describing these different consecutive examinations as weak form tests, semi-strong form tests and strong-form tests[2].

[1] Fama (1969), p. 383
[2] Fama (1969)

Weak form tests examine historical asset prices for any possible dependencies. Trying to find patterns that would maybe allow predictions of future price development. However, Fama (1969) finds that none of the applied tests can proof any dependence in shares returns and consequently cannot refute the efficient market hypothesis. Jensen (1978) points out that scientific research exists showing evidence of predictable trends in returns for certain time periods. Fama (1969) is aware of these findings but insists that these trends can still be explained by a random walk and it is, therefore, impossible to systematically predict future price development by analyzing historical returns.

Semi-strong form tests for the efficient market hypothesis consists of tests examining whether prices efficiently adjust to fundamental performance related company information that is publically available (e.g., earnings announcements, stock splits, etc.)[3]. Fisher et al. (1969) find that prices of split shares fully reflect the information regarding future dividend payments at the time of the split. Ball and Brown (1968) find similar results for earnings announcements, showing that stock prices fully reflect all information when earnings are announced. Fama (1969) sees results like these as confirmation for the semi-strong form of the efficient market hypothesis.

Finally, the strong-form tests examine whether groups with privileged information can have an influence on price formation, i.e., whether security prices contain all private information. Farma (1969) notes that different academic research studies show that certain groups have monopolistic access to information and proceeds to admit that the strong-form efficient market is probably best viewed as an ideal benchmark against which deviations from market efficiency can be judged. Nonetheless, he concludes that for the majority of investors the efficient market hypothesis should be a good preliminary approximation to reality[4].

Under the strong-form efficient market hypothesis any information, even hidden or inside information only accessible to a particular group, is reflected in security prices. Meaning that

---

[3] Fama (1969)

[4] Fama (1969)

in theory no legislation on insider trading should be needed in a fully efficient market. The efficient market hypothesis is for large parts broadly recognized and at the basis of many theories in finance and economics. Some stern supporters of the hypothesis are consequently demanding the legalization of insider trading. Manne (1966) and Carlton and Fischel (1983) claim that insider trading is helpful and can even constitute an advantage to common investors because it reveals relevant information faster and in doing so, also supports pricing efficiency.

A considerable amount of economic research has been conducted in analyzing abnormal returns after management transactions. The majority of these studies confirm indeed significant abnormal performances after public disclosures of insider deals (e.g., Jaffe (1974), Jeng et al. (2003) and Lin and Hows (1990)). These findings consequently reinforce fears about unfair enrichment opportunities for selective groups with access to privileged information at the expense of regular investors. Worries about market integrity, market manipulation and equity between all investors prevailed in most countries, with the U.S. and the U.K. the first to ratify insider trading laws. Nowadays, insider trading regulations are mostly based on a compromise. Thus, lawmakers generally forbid the trading of *"manipulative and deceptive devices, on the basis of material nonpublic information"*[5] in related stock securities. On the other hand, a management transaction is nevertheless recognized as a *"highly valuable source of information to investors"*[6]. For this reason, corporate insiders are not completely excluded from trading in company stocks they are connected to, but are generally subject to public disclosure policies.

[5] Securities Exchange Act of 1934 of the US, §240.10b5-1

[6] Directive 2003/6/EC of the European Parliament and of the Council of 28 January 2003 on insider dealing and market manipulation (market abuse)

2.2 Evolution of Swiss law

Bhattacharya and Daouk (2002) report that in Switzerland a main stock exchange was established in 1938. Today, the main exchange is the SIX Swiss Exchange founded in May 1995. The first insider trading law was introduced on July 1, 1988. As Krauskopf (1991) notes, the new "Insider Bill" served mainly two purposes. First of all, before the introduction of the new law, only the insider passing on confidential information to a tippee and the tippee who subsequently used the information were covered by the Swiss Penal Code. The insider who used the information himself, was not covered. Secondly, as many insider trading cases in the United States involved Swiss banks forcing the application of Swiss law, the American Government exerted pressure on Switzerland to introduce a new insider legislation which should also facilitate international assistance[7]. The United States were the first to introduce insider trading regulations, a law prohibiting the abuse of inside information which was introduced in 1934[8].

In 2003, the European Parliament and the Council released Directive 2003/6/EC on insider trading and market manipulation, also called the Market Abuse Directive. The directive was intended to further establish a genuine single financial market. For such an integrated market to work efficiently, market integrity and public confidence are of paramount importance. Therefore, the new directive provided a legal framework for all EU Member States to combat both insider dealing and market manipulation.[9]

As a non EU-member Switzerland was not directly implicated by the Market Abuse Directive. Nevertheless, Switzerland decided to overhaul their own insider trading regulations. The directive on the Disclosure of Management Transactions (DMT) came into force on July 1,

[7] Krauskopf (1991)

[8] Securities Exchange Act of 1934 of the US

[9] Directive 2003/6/EC of the European Parliament and of the Council of 28 January 2003 on insider dealing and market manipulation (market abuse)

2005. All issuers whose equity securities are listed on the SIX Swiss Exchange are thereby obligated to report management transactions executed by members of the board of directors or senior management. The purpose of the directive was given as follows:

"The disclosure of management transactions is intended as a means of furthering the supply of information to investors. Such disclosure provides investors with additional qualitative insight with regard to their investment decision."[10]

Since 2005, the DMT has been reviewed and updated several times, specifically in 2008, 2010 and most recently in 2012. These revisions are due to a continuous effort to further strengthen the integrity of the Swiss stock exchange and to prevent, respectively prosecute, market abuse more efficiently. However, the Swiss legislation is still seen lagging behind comparable regulations in the EU or U.S. (cf. Zingg et al. (2007)). For example, the absence of blackout periods prior to corporate announcements is a point often criticized as encouraging insider deals. Or, up until 2011, only transactions exceeding a CHF 100,000 threshold during a given calendar month were subject to disclosure.[11]

The current DMT came into force on 1 April 2013. To find out, if this latest form of the DMT might have an effect on abnormal returns of management transactions, a multivariate regression analysis in section 7 of this thesis takes into account the adaptation of this law.

[10] Directive on the Disclosure of Management Transactions - SWX Swiss Exchange 08/05

[11] Directive on the Disclosure of Management Transactions - SWX Swiss Exchange 3/11

2.3 Reporting requirements for Switzerland

The duty to disclose management transactions applies to all issuers whose equity securities have their primary listing on SIX Swiss Exchange[12]. Reportable transactions are defined in article 4 of the directive on the Disclosure of Management Transactions (DMT) and cover the following securities:

- Equities or similar shares in an issuer.
- Conversion, purchase or sale rights in or from an issuer.
- Financial instruments that provide for or permit a cash settlement.

Any acquisition, disposal or grant of the above mentioned rights is subject to a reporting obligation.

In article 2 the DMT states that members of the board of directors and of the executive committee of an issuer are obliged to report management transactions and issuers are responsible for holding these persons to their disclosure responsibilities. An individual is obliged to report a transaction if the transaction has a direct or indirect effect on his or her assets, clarifies article 3. The liable individual responsible for the transaction has to report it to the issuer in the two following trading days after the transaction’s conclusion. The issuer must then report the transactions within the next three trading days, starting with the date on which the issuer received the relevant information. All notifications are passed on to SIX Exchange Regulation through an electronic reporting platform. The reported information is stored in an internal database for a period of four years. Some of the information is made public on the SIX Swiss Exchange official website and is accessible there for the duration of three years[13].

[12] Directive on the Disclosure of Management Transactions - SWX Swiss Exchange 3/13

[13] Listing Rules – Six Swiss Exchange 02/14, Art. 56

The information on management transactions made public contains[14]:

- Function of the liable individual within the structure of the issuer.
- If the transaction is carried out by a related party, information on whether the transaction was concluded by a natural person or a legal entity
- Type of transactions, namely a sale or purchase.
- Type and total number of equities and reportable securities.
- Price paid or received.
- The International Securities Identification Number (ISIN).
- Execution date of the transaction.

[14] Listing Rules – Six Swiss Exchange 02/14, Art. 56

3 Literature and hypotheses

Academic research around insider trading has a longstanding tradition and as with the early introduction of insider laws, the first event studies analyzing abnormal returns and trading behavior connected to insider transactions, originate from the U.S.. Jaffe (1974), Finnerty (1976) and Seyhun (1986) show early on that insiders outperform markets. These findings do not seem to be a temporary appearance because the results are confirmed by more recent studies (e.g., Aktas et al. (2008) or Ravina and Sapienza (2010)).

Ravina and Sapienza (2010) compare the trading performance of independent directors and other executives, showing that both earn positive substantial abnormal returns and independent directors also earning significantly abnormal returns when they sell company stocks. Lakonishok and Lee (2001) examine insider trading activities in the U.S. during the 1975 to 1995 period and find that insiders are in general contrarian investors and that abnormal returns are more pronounced in small firms. Aktas et al. (2008) report however that even though financial markets do not respond strongly in terms of abnormal returns to insider trading activities, price discovery is hastened on insider trading days. Kolasinski and Li (2010) examine insider trading after earnings announcements and conclude that it seems like insiders exploit market under reaction to earnings news and that price reaction generates abnormal returns.

Following the U.S. lead, event studies on insider trading have also been performed in different stock markets around the world with similar results. Chang (2013) finds that even though regulations in Taiwan specify that insiders give three days prior notice to the competent authority before executing a deal, abnormal returns still exist for purchase and sale deals. Chang (2013) also confirms that abnormal returns show larger magnitudes for transactions in smaller firms. Similarly, Tong et al. (2013) examine insider stock trading activities in days before Chinese listed firms made public announcements to start share-structure reforms and find that over the reform period, the median share value change of event firms is 6% higher than that of control firms. They claim that these results have important implications for enforcement of insider trading regulations in China.

Several studies analyze management transactions in different European markets, too. Aussenegg and Ranzi (2008) examine stock price behavior around the disclosure of corporate insider transactions in seven different countries (Austria, Belgium, France, Germany, Italy, the Netherlands and Switzerland). They find that insiders reveal information to the public and that they show an contrarian investment style. In line with other studies, Aussenegg and Ranzi (2008) also report that firm size significantly influences the price impact of insider trades. Dickgießer (2010) focuses on the stock market in Germany and finds that insiders trade around news announcements to earn abnormal returns. However, he concludes that outside investors cannot easily earn abnormal returns by imitating directors' dealings. These results are confirmed by Del Brio et al. (2002), looking at the Spanish stock market. They find that insiders earn excess profits when investing on corporate nonpublic information, while outsiders mimicking them fail to obtain those excess returns. Degryse et al. (2014) examine short-term stock price behavior around legal insider trades for Dutch listed firms. Their results show that purchases are followed by economically large abnormal returns and that results are strongest for purchases by top executives and for small market capitalization firms. For the UK, Friederich et al. (2002) find that medium-sized trades are in particular more informative for short-run returns than large ones, showing evidence of "stealth trading" whereby informed traders avoid trading in bigger blocks.

Considerably less studies have been conducted in the Swiss market. Fidrmuc et al. (2006), Zingg et al. (2007) and Gebhardt (2013) are among a few studies concentrating, or including, Swiss management transactions. All of them observe significant abnormal reactions after disclosed deals and furthermore, confirm profitable short-term returns to insiders benefit. Without information asymmetry between insiders and general investors, stock prices should show no reaction to disclosures of insider deals.

However, the general assumption about management transactions is the belief that they are based on hidden information not available to common investors. Consequently, the public announcement of an insider deal is often interpreted as a revelation of previously unknown inside information. This sudden release of information supposedly influences stock prices and is responsible for subsequent abnormal returns. This assumption is the main hypothesis in most of the leading event studies into insider deals. Fidrmuc et al. (2006) and Aktas et al. (2008)

confirm a positive effect on security prices after purchase transactions and a negative effect after sale transactions, based on U.S. and U.K. markets. In addition, Lakonishok and Lee (2001) report that insiders are contrarian investors, purchasing declining securities and selling securities showing positive trends.

In accordance with the above mentioned studies, management transactions are generally expected to have an impact on stock returns. Furthermore, the transaction type (purchase or sale) is an indication for future price development. Hence, for the purpose of this thesis, a first hypothesis is formulated:

Hypothesis 1: Insider purchase (sale) transactions have a positive (negative) influence on abnormal returns triggered by the public disclosure of the trades.

Trying to identify supplementary influencing factors in abnormal performances, several studies suggest the size of the companies involved plays a significant role in insider transactions. Both Gregory et al. (1997) and Wong et al. (2000) show that more pronounced abnormal returns are associated with smaller firms, whereas insiders in bigger firms realize less noticeable profits. A logical assumption implies that larger companies are monitored more closely and by a greater number of analysts and investors. Smaller firms may be more successful in keeping relevant information out of the public eye. Thus, a second hypothesis to be tested in this study is formulated:

Hypothesis 2: Insider transactions in larger (smaller) firms have a smaller (bigger) influence on abnormal returns compared to smaller (larger) firms.

Jeng et al. (2003) and Betzer and Theissen (2009) explore in their studies the impact of transaction values on abnormal price reactions. Observing lower abnormal performances following smaller management transactions and higher abnormal performances for bigger ones. Large transaction volumes could imply greater importance and value to the information content revealed by the disclosure of the deal, explaining higher abnormal performances. Therefore, leading to a third hypothesis:

Hypothesis 3: Larger (Smaller) transaction volumes have a bigger (smaller) influence on abnormal returns.

A number of studies have also been conducted with the goal to analyze the effectiveness of insider regulations. Wielhouwer (2013) finds that tightening disclosure rules and thereby reducing the amount of inside information can be effective in countries with ineffective insider trading regulations and low enforcement rates. However, Wielhouwer (2013) reports too that increased disclosure can actually reduce the effectiveness of law enforcement in markets with cost-effective auditing techniques and severe penalties already in place. Degryse et al. (2014) analyze the impact of the implementation of the Market Abuse Directive[15] (see section 2.2) in the Netherlands, finding that the new insider trading regulation reduced the information content of sales by top executives. In a similar way, Anderson et al. (2013) examined the impact of stricter insider trading rules by the Securities and Exchange Commission (SEC) in October 2000 on the U.S. options market. They find that the amount of firms showing symptoms of insider trading halved after the implementation of stricter rules.

In line with the afore mentioned studies and the fact that the Swiss regulation on insider trading was updated in April 2013, a fourth hypothesis is formulated. For management transactions executed after this date, generally reduced abnormal performances are expected as the implementation of new regulations is predicted to diminish the amount of inside information and thereby reduce the information asymmetry.

Hypothesis 4: After the implementation of updated insider trading regulations, purchase (sale) transactions show less positive (negative) abnormal returns following the disclosure of a management transaction compared to before the implementation.

[15] Directive 2003/6/EC of the European Parliament and of the Council of 28 January 2003 on insider dealing and market manipulation (market abuse)

4 Data

4.1 Management transactions

The management transaction data is based on published notifications from the official SIX Swiss Exchange website. The records can be found by navigating to the “News” section, continuing with “Published Notifications” and finally “Management Transactions”.[16] The data has been hand-collected for the period starting 16 May 2011 and ending 21 July 2014. A more extended time period for examination purposes would have been desirable however, the sample had to be limited due to the fact that management transactions data is only publically available for a duration of exactly three years. A published notification on a management transaction contains the following different fields of information: issuer, ISIN, transaction date, liable person’s position within the company, type of transaction (purchase or sale), type of rights (registered or bearer shares), total amount of rights, transaction value and optional further transaction details. After copying all available data into Microsoft Excel, a database is created.

In order to receive a usable and meaningful sample, the data needs to be checked for obvious errors and has to comply with certain criteria. Errors, among others, include different empty information fields in published notifications or execution dates not coinciding with trading days, making the specific transaction dataset unusable.

The first group of criteria is chosen to improve the meaningfulness of the sample. Thus, only transactions involving purchases or sales of shares are considered. All other financial instruments like derivatives, for example, are left out too. Also excluding deals that were not based on an investment choice but on personnel remuneration plans, vesting, donations or other

[16] http://www.six-swiss-exchange.com/news/notifications/management_transactions_en.html

grant forms. Furthermore, deals including shares trading in a currency different to CHF have been eliminated.

The second group of criteria is due to research design choices. Deals in identical securities executed on the same day and with identical information on the liable person’s position are totaled. Assuming that these transactions are the result of partial executions of orders and should, therefore, be considered as a single transaction for the purpose of this study. In a further attempt to improve the information content of calculated abnormal returns, insider deals of the same company within a 20-day trading window have been discarded. This step is chosen to prevent different management transactions having a confounding effect on the study result. A measure, similarly applied in comparable event studies (e.g., Aussenegg and Ranzi (2008)). Finally, transactions relating to companies where no historical stock prices are available for the estimation period (e.g., delisting) are also excluded. Table 1 presents a summary of the cleaning process.

Table 1: Collected management transactions data sample cleaning process.

	Type of transaction			
	Purchase	***Sale***	***All***	***Eliminated***
Starting data sample	5005	3888	8909	
After excluding obvious errors and other irregularities	4207	3518	7741	-1168
After excluding non-shares transactions and transactions not based on an investment choice (e.g., donations and personnel remuneration plans)	3203	2828	6031	-1710
After excluding same company transactions within a 20-day period	847	822	1669	-4362
Final sample after excluding transactions with no appropriate historical stock data	792	776	1568	-101

4.2 Stock quotes and company information

Historical stock prices and other necessary company key figures were obtained from Google Finance.[17] The stock data was downloaded with the help of an open source MATLAB script

[17] http://www.google.com/finance

package.[18] The data was also adjusted for possible dividends as the standard historical stock quotes from Google Finance do not consider them. By default, they are only adjusted for splits and other common capital market measures. Other key figures used in this study, such as market capitalization, were downloaded from Google Finance with a self-written MATLAB HTML parsing script. Table 2 gives an overview over the 202 companies present in the data sample along with key statistical properties of their daily returns. Daily returns are generally collected from 1 July 2010 to 19 September 2014, except for a few firms which were not listed for the complete duration of this period (e.g., delisting) and which are marked with an *.

Table 2: Statistical properties for 202 companies in data sample (1 July 2010 - 19 September 2014)

Symbol	Issuer	Mean	Median	StandardDeviation	Kurtosis	Skeweness	Max	Min
VTX:ABBN	ABB Ltd	0.02%	0.05%	1.50%	5.88	-0.20	6.64%	-7.21%
SWX:ACUN	Accu Holding AG	0.03%	0.00%	3.74%	8.65	0.27	18.72%	-18.72%
SWX:ACIN	Acino Holding AG	0.01%	0.00%	1.95%	53.30	2.56	27.43%	-17.50%
VTX:ATLN	Actelion Ltd.	0.10%	0.05%	1.84%	11.45	0.56	13.89%	-10.20%
SWX:ADXN	Addex Therapeutics Ltd	-0.10%	-0.12%	4.63%	49.07	2.95	62.81%	-35.69%
VTX:ADEN	Adecco SA	0.03%	0.07%	1.92%	5.49	-0.31	8.14%	-11.42%
SWX:ADBN	Advanced Digital Broadcast Holdings SA	-0.09%	0.00%	3.06%	7.15	-0.18	17.34%	-16.99%
SWX:AEVS	AEVIS Holding SA	0.06%	0.00%	2.72%	11.34	0.37	19.80%	-13.71%
SWX:AFGN	AFG Arbonia-Forster-Holding AG	0.01%	0.00%	2.32%	6.19	-0.05	12.76%	-11.92%
SWX:AIRE	Airesis SA	0.00%	0.00%	1.69%	5.32	0.48	8.94%	-6.80%
SWX:ALLN	Allreal Holding AG	0.01%	0.00%	0.70%	6.83	-0.19	3.47%	-3.67%
SWX:APHN	Alpha PetroVision Holding AG	-0.19%	0.00%	6.56%	13.73	1.23	52.61%	-29.73%
SWX:ALPN	Alpine Select AG	0.03%	0.00%	0.68%	87.10	-5.85	2.61%	-11.12%
SWX:ALPH	Alpiq Holding AG	-0.12%	0.00%	1.39%	10.38	-0.01	9.37%	-7.15%
SWX:ALSN	ALSO Holding AG	0.02%	0.00%	2.20%	13.33	0.89	15.46%	-12.02%
SWX:APEN	APEN AG	0.04%	0.00%	2.27%	9.64	-0.15	12.76%	-18.23%
SWX:APGN	APG SGA SA	0.09%	0.00%	1.77%	7.05	0.33	11.62%	-7.33%
SWX:ARYN	ARYZTA AG	0.07%	0.09%	1.30%	5.63	-0.10	5.91%	-6.99%
SWX:ASCN	Ascom Holding AG	0.04%	0.00%	2.02%	5.76	-0.22	8.49%	-10.65%
SWX:AUTN	Autoneum Holding AG*	0.03%	0.00%	2.28%	4.24	-0.01	8.73%	-9.50%
SWX:BANB	Bachem Holding AG	-0.02%	0.00%	1.98%	9.35	-0.24	11.26%	-14.76%

[18] "Download Daily Data from Google and Yahoo! Finance" by Michael Weidman - http://www.mathworks.com/matlabcentral/fileexchange/43627-download-daily-data-from-google-and-yahoo--finance

Symbol	Issuer	Mean	Median	StandardDeviation	Kurtosis	Skeweness	Max	Min
VTX:BALN	Bâloise Holding AG	0.06%	0.06%	1.34%	5.39	-0.03	7.17%	-6.79%
SWX:BC	Bank Coop AG	-0.03%	0.00%	1.13%	21.30	1.69	12.32%	-5.19%
SWX:LINN	Bank Linth LLB AG	0.00%	0.00%	0.42%	6.78	-0.47	1.93%	-2.15%
SWX:BCGE	Banque Cantonale de Genève	0.00%	0.00%	0.90%	6.55	-0.19	4.76%	-4.76%
SWX:BCJ	Banque Cantonale du Jura SA	0.01%	0.00%	2.48%	5.83	0.04	13.77%	-10.53%
SWX:BCVN	Banque Cantonale Vaudoise	0.02%	0.00%	1.21%	9.10	0.03	7.14%	-7.58%
SWX:BARN	Barry Callebaut AG	0.05%	0.00%	1.18%	5.06	0.08	5.87%	-4.87%
SWX:BLKB	Basellandschaftliche Kantonalbank	-0.02%	0.00%	0.85%	6.21	-0.28	4.48%	-5.91%
SWX:BSLN	Basilea Pharmaceutica AG	0.05%	0.00%	2.51%	8.01	0.22	16.89%	-13.01%
SWX:BION	BB Biotech AG	0.12%	0.20%	1.52%	5.73	-0.33	7.13%	-6.39%
SWX:BEAN	BELIMO Holding AG	0.07%	0.00%	1.54%	8.71	0.11	9.75%	-10.85%
SWX:BELL	Bell AG	0.04%	0.00%	1.42%	8.59	0.65	10.39%	-6.66%
SWX:BBN	Bellevue Group AG	-0.08%	0.00%	2.41%	12.10	0.39	17.54%	-14.49%
SWX:TIBN	Bergbahnen Engelberg-Trübsee-Titlis AG	0.11%	0.00%	2.09%	6.62	0.18	13.59%	-9.25%
SWX:BEKN	Berner Kantonalbank AG	-0.02%	0.00%	0.60%	8.67	0.02	3.61%	-3.42%
SWX:BLIN	BFW Liegenschaften AG	0.04%	0.00%	1.58%	6.01	0.09	7.41%	-8.01%
SWX:BKW	BKW AG*	0.02%	0.00%	1.77%	7.49	0.57	11.13%	-7.42%
SWX:BOBNN	Bobst Group SA	0.02%	0.00%	2.17%	4.87	0.17	10.39%	-11.10%
SWX:BON	Bondpartners SA	-0.02%	0.00%	1.42%	13.31	0.78	10.44%	-7.23%
SWX:BOSN	Bossard Holding AG	0.10%	0.00%	2.12%	5.38	0.10	11.51%	-8.17%
SWX:BUCN	Bucher Industries AG	0.08%	0.00%	1.75%	6.43	-0.47	7.45%	-10.64%
SWX:BCHN	Burckhardt Compression Holding AG	0.09%	0.00%	1.86%	9.12	-0.37	8.41%	-15.14%
SWX:BRKN	Burkhalter Holding AG	0.10%	0.00%	1.57%	9.17	0.25	10.75%	-8.56%
SWX:BVZN	BVZ Holding AG	-0.03%	0.00%	1.96%	9.16	0.36	11.07%	-9.56%
SWX:CALN	Calida Holding AG	0.03%	0.00%	1.92%	5.85	0.61	9.40%	-7.10%
SWX:CASN	Castle Alternative Invest AG	0.00%	0.00%	1.19%	11.55	0.23	10.00%	-8.33%
SWX:CPEN	Castle Private Equity AG	0.10%	0.00%	1.18%	17.66	-0.10	11.35%	-8.69%
SWX:CMBN	Cembra Money Bank AG*	-0.01%	0.00%	1.16%	5.72	-0.24	3.95%	-5.11%
SWX:CPGN	Cham Paper Group Holding AG	0.02%	0.00%	1.71%	6.01	0.34	9.98%	-7.18%
SWX:VCH	Charles Vögele Holding AG	-0.10%	-0.11%	2.63%	9.38	0.00	14.92%	-17.30%
SWX:LISP	Chocoladefabriken Lindt & Sprüngli AG	0.07%	0.05%	1.20%	6.42	0.26	7.90%	-6.01%
SWX:CICN	Cicor Technologies Ltd.	0.02%	0.00%	1.88%	6.88	0.26	12.93%	-8.97%
VTX:CLN	Clariant AG	0.02%	0.11%	2.23%	12.21	-1.14	9.25%	-17.83%
SWX:CLTN	COLTENE Holding AG	0.01%	0.00%	1.97%	8.28	0.35	12.02%	-10.53%
SWX:COTN	Comet Holding AG	0.15%	0.00%	1.74%	7.21	0.62	10.10%	-6.99%
VTX:CFR	Compagnie Financière Richemont SA	0.08%	0.10%	1.89%	5.60	-0.12	7.97%	-9.24%
SWX:CFT	Compagnie financière Tradition S.A.	-0.08%	0.00%	1.75%	8.50	0.47	11.07%	-8.74%
SWX:CON	Conzzeta AG	0.07%	0.00%	1.78%	28.64	2.11	22.19%	-10.75%
SWX:CPHN	CPH Chemie + Papier Holding AG	-0.01%	0.00%	1.53%	10.88	0.13	9.14%	-12.16%
SWX:CLXN	Crealogix Holding AG	0.05%	0.00%	1.68%	12.93	0.53	13.09%	-9.70%
VTX:CSGN	Credit Suisse Group AG	-0.04%	-0.03%	2.02%	6.24	-0.17	10.78%	-11.07%
SWX:CYTN	Cytos Biotechnology AG	-0.16%	-0.29%	6.41%	31.52	-0.18	52.61%	-67.32%
SWX:DCN	Datacolor AG	0.07%	0.00%	2.31%	8.54	0.24	11.78%	-12.43%
SWX:DAE	Dätwyler Holding AG	0.07%	0.07%	1.88%	9.01	0.31	14.74%	-9.11%
SWX:DKSH	DKSH Holding AG*	0.05%	0.00%	1.42%	6.00	0.52	7.99%	-5.74%
SWX:DESN	Dottikon ES Holding AG	0.00%	0.00%	1.74%	9.77	0.76	11.51%	-8.84%
VTX:DUFN	Dufry AG*	0.07%	0.00%	2.06%	5.22	-0.18	7.56%	-8.58%
SWX:ESUN	Edisun Power Europe AG	-0.07%	0.00%	4.82%	13.76	1.09	45.74%	-23.99%
SWX:RLD	Edmond de Rothschild (Suisse) S.A.	-0.03%	0.00%	1.55%	5.08	-0.02	7.90%	-6.25%
SWX:EFGN	EFG International AG	-0.02%	0.00%	2.57%	15.74	0.13	23.03%	-22.77%
SWX:ELMN	Elma Electronic AG	-0.01%	0.00%	1.12%	13.09	0.34	8.33%	-7.12%
SWX:EMMN	Emmi AG	0.07%	0.00%	1.44%	6.50	0.00	8.17%	-8.12%

Symbol	Issuer	Mean	Median	StandardDeviation	Kurtosis	Skeweness	Max	Min
SWX:EMSN	Ems-Chemie Holding AG	0.11%	0.09%	1.29%	5.11	-0.11	7.02%	-5.55%
SWX:EDHN	Energiedienst Holding AG	-0.05%	0.00%	1.53%	5.15	0.10	6.69%	-7.99%
SWX:RUS	ENR Russia Invest SA	0.01%	0.00%	3.66%	78.94	-0.08	43.33%	-42.85%
SWX:EVE	Evolva Holding SA	-0.03%	0.00%	3.42%	14.43	1.54	30.75%	-15.91%
SWX:FTON	Feintool International Holding AG	0.03%	0.00%	1.75%	37.37	2.09	20.10%	-16.99%
SWX:FORN	Forbo Holding AG	0.08%	0.08%	1.70%	12.33	0.39	13.32%	-9.67%
SWX:GALN	Galenica AG	0.07%	0.09%	1.36%	8.43	0.25	7.85%	-7.24%
SWX:GAM	GAM Holding AG	0.04%	0.00%	2.04%	4.88	-0.14	9.30%	-9.87%
SWX:GATE	gategroup Holding AG	-0.04%	0.00%	2.20%	10.98	-0.74	9.95%	-19.84%
VTX:GEBN	Geberit AG	0.06%	0.06%	1.34%	7.34	-0.30	7.10%	-7.58%
SWX:FI-N	Georg Fischer AG	0.05%	0.06%	2.00%	6.27	-0.31	9.26%	-12.31%
VTX:GIVN	Givaudan SA	0.05%	0.08%	1.20%	7.55	0.02	6.84%	-7.96%
SWX:GBMN	Goldbach Group AG	-0.05%	0.00%	2.00%	7.78	1.11	12.35%	-6.93%
SWX:GRKP	Graubündner Kantonalbank	0.01%	0.00%	0.49%	4.09	-0.14	1.73%	-2.42%
SWX:GMI	Groupe Minoteries SA	0.01%	0.00%	3.34%	8.53	0.28	21.41%	-16.17%
SWX:GUR	Gurit Holding AG	-0.02%	0.00%	2.11%	4.74	0.09	9.62%	-8.77%
SWX:HBMN	HBM Healthcare Investments AG	0.07%	0.00%	1.21%	6.30	0.26	6.80%	-5.99%
SWX:HELN	Helvetia Holding AG	0.06%	0.06%	1.43%	5.82	0.07	6.88%	-6.98%
SWX:HLEE	Highlight Event and Entertainment AG	-0.04%	0.00%	3.95%	36.16	1.23	47.54%	-36.29%
SWX:HOCN	HOCHDORF Holding AG*	0.02%	0.00%	1.22%	6.51	0.07	6.02%	-6.27%
VTX:HOLN	Holcim Ltd	0.00%	0.00%	1.63%	5.39	-0.14	6.64%	-8.39%
SWX:HUBN	Huber+Suhner AG	0.01%	0.00%	1.81%	7.62	0.14	13.23%	-9.91%
SWX:HUE	Hügli Holding AG	0.02%	0.00%	1.55%	7.56	0.15	9.38%	-8.51%
SWX:HBLN	Hypothekarbank Lenzburg AG	0.00%	0.00%	0.95%	9.05	0.21	6.97%	-5.69%
SWX:IPS	I.P.S. Innovative Packaging Solutions AG	0.00%	0.00%	3.02%	6.11	0.09	13.41%	-13.06%
SWX:IMPN	Implenia AG	0.06%	0.00%	1.69%	5.51	0.44	7.58%	-6.23%
SWX:IFCN	INFICON Holding AG	0.08%	0.00%	1.79%	7.00	-0.03	8.61%	-10.55%
SWX:INI	Infranor Inter AG	0.01%	0.00%	6.06%	12.64	0.50	50.92%	-37.15%
SWX:INRN	Interroll Holding AG	0.06%	0.00%	1.75%	5.49	-0.24	9.09%	-8.63%
SWX:IS	Intershop Holding AG	0.04%	0.00%	0.54%	21.13	-1.02	3.08%	-6.02%
SWX:VBSN	IVF HARTMANN Holding AG	0.05%	0.00%	1.50%	5.66	0.37	7.33%	-5.63%
VTX:BAER	Julius Bär Gruppe AG	0.03%	0.04%	1.72%	5.28	-0.11	8.01%	-7.71%
SWX:JFN	Jungfraubahn Holding AG	0.05%	0.00%	1.39%	8.90	0.74	11.10%	-5.15%
SWX:KABN	Kaba Holding AG	0.04%	0.00%	1.25%	16.56	-0.91	5.49%	-13.30%
SWX:KARN	Kardex AG	0.03%	0.00%	2.05%	10.10	-0.37	12.67%	-12.64%
SWX:KOMN	Komax Holding AG	0.05%	0.00%	2.04%	7.87	-0.16	10.66%	-13.85%
SWX:KUD	Kudelski S.A.	-0.07%	0.00%	2.46%	5.59	-0.07	12.07%	-11.96%
VTX:KNIN	Kühne + Nagel International AG	0.02%	0.00%	1.47%	6.72	-0.25	6.46%	-9.97%
SWX:KUNN	Kuoni Reisen Holding AG	-0.01%	0.00%	1.87%	8.64	-0.55	7.88%	-14.49%
SWX:LECN	Leclanché S.A.	-0.16%	0.00%	4.79%	50.82	-2.33	36.18%	-65.17%
SWX:LEHN	LEM Holding SA	0.09%	0.00%	1.68%	9.98	0.43	12.68%	-8.80%
SWX:LEON	Leonteq AG*	0.32%	0.08%	2.24%	8.89	-0.40	9.40%	-15.42%
SWX:LIFE	LifeWatch AG	-0.04%	0.00%	3.18%	14.30	-0.16	20.04%	-28.30%
SWX:LOEP	Loeb Holding AG	-0.01%	0.00%	1.56%	9.60	0.17	10.53%	-8.56%
SWX:LOGN	Logitech International S.A.	-0.01%	0.00%	2.59%	12.24	0.05	16.58%	-17.39%
VTX:LONN	Lonza Group AG	0.05%	0.06%	1.84%	8.11	-0.60	7.13%	-14.11%
SWX:LOHN	Looser Holding AG	0.02%	0.00%	1.46%	5.79	0.07	6.64%	-7.68%
SWX:LUKN	Luzerner Kantonalbank AG	0.02%	0.00%	0.70%	5.46	0.12	4.09%	-3.20%
SWX:MCHN	MCH Group AG	0.05%	0.00%	1.43%	8.46	0.34	9.42%	-9.05%
SWX:METN	METALL ZUG AG	0.00%	0.00%	2.01%	246.14	-10.80	7.57%	-45.36%
SWX:MBTN	Meyer Burger Technology AG	-0.10%	-0.18%	3.21%	7.21	0.35	20.05%	-16.26%
SWX:MASN	Micronas Semiconductor Holding AG	0.04%	0.00%	2.64%	11.93	-0.25	14.31%	-23.41%

Symbol	Issuer	Mean	Median	StandardDeviation	Kurtosis	Skeweness	Max	Min
SWX:MIKN	Mikron Holding AG	0.01%	0.00%	2.53%	8.26	0.82	13.91%	-13.55%
SWX:MOB	mobilezone holding ag	0.02%	0.00%	1.05%	9.91	-0.11	5.82%	-6.53%
SWX:MOBN	Mobimo Holding AG	0.00%	0.00%	0.81%	11.22	-0.96	4.09%	-6.07%
SWX:MYRN	Myriad Group AG	0.01%	0.00%	2.87%	13.06	0.07	16.13%	-22.31%
SWX:NBEN	NEBAG AG	0.00%	0.00%	1.90%	10.38	-0.20	12.11%	-10.36%
VTX:NESN	Nestlé AG	0.04%	0.00%	0.86%	5.58	0.02	4.49%	-3.77%
SWX:NEWN	New Value AG	-0.19%	0.00%	4.24%	10.56	0.66	32.03%	-21.66%
SWX:NEV	New Venturetec AG	0.02%	0.00%	5.37%	46.29	3.90	71.97%	-20.66%
SWX:NOBN	Nobel Biocare Holding AG	0.00%	0.00%	2.38%	10.93	0.10	14.43%	-17.86%
SWX:NIHN	NORINVEST HOLDING SA	-0.03%	0.00%	5.18%	15.13	0.90	44.27%	-36.07%
VTX:NOVN	Novartis AG	0.07%	0.08%	1.01%	6.90	0.10	6.56%	-4.81%
SWX:OERL	OC Oerlikon Corporation AG	0.11%	0.00%	2.15%	6.10	0.11	11.56%	-10.75%
SWX:ODHN	Orascom Development Holding AG	-0.11%	-0.14%	2.84%	5.72	0.34	14.58%	-10.61%
SWX:OFN	Orell Füssli Holding AG	-0.03%	0.00%	1.44%	11.27	0.11	9.53%	-10.54%
SWX:ORON	Orior AG	0.02%	0.00%	1.18%	6.69	-0.20	6.43%	-6.28%
SWX:OTI	OTI Energy SA	-0.01%	0.00%	7.32%	14.50	0.21	49.47%	-49.47%
SWX:PWTN	Panalpina Welttransport (Holding) AG	0.05%	0.00%	1.95%	8.97	0.60	13.74%	-7.83%
SWX:PARG	Pargesa Holding SA	0.02%	0.02%	1.41%	5.09	-0.28	4.87%	-6.99%
SWX:PGHN	Partners Group Holding AG	0.07%	0.00%	1.31%	8.14	-0.43	7.17%	-9.12%
SWX:PAXN	Pax Anlage AG	0.03%	0.00%	1.45%	7.76	-0.22	6.81%	-7.93%
SWX:PEAN	Peach Property Group AG*	-0.09%	0.00%	1.91%	10.56	0.69	16.44%	-7.55%
SWX:PEDP	Perrot Duval Holding SA	0.07%	0.00%	3.65%	21.73	1.51	28.29%	-19.37%
SWX:PM	Phoenix Mecano AG	-0.01%	0.00%	1.74%	8.54	0.16	11.29%	-10.54%
SWX:PEHN	Private Equity Holding AG	0.05%	0.00%	1.35%	11.28	0.59	11.28%	-7.30%
SWX:PSPN	PSP Swiss Property AG	0.03%	0.02%	0.90%	8.68	-0.70	3.40%	-6.83%
SWX:PUBN	PubliGroupe SA	0.07%	0.00%	2.37%	21.23	1.83	24.42%	-12.63%
SWX:REPP	Repower AG	-0.10%	0.00%	1.88%	4.39	-0.12	6.83%	-6.98%
SWX:RIEN	Rieter Holding AG	-0.02%	0.00%	2.49%	54.50	-3.52	11.95%	-37.80%
VTX:ROG	Roche Holding AG	0.07%	0.07%	1.14%	5.23	-0.30	4.28%	-5.16%
SWX:SANN	Santhera Pharmaceuticals Holding AG	0.23%	0.00%	5.64%	91.30	5.74	96.64%	-33.99%
SWX:SAHN	Schaffner Holding AG	0.04%	0.00%	1.82%	8.82	-0.13	9.91%	-12.31%
VTX:SCHP	Schindler Holding AG	0.04%	0.00%	1.27%	6.41	-0.14	5.90%	-6.31%
SWX:STRN	Schlatter Industries AG	-0.05%	0.00%	3.96%	10.87	0.29	27.48%	-24.03%
SWX:STLN	SCHMOLZ+BICKENBACH AG	-0.09%	0.00%	3.27%	6.74	-0.01	15.70%	-17.34%
SWX:SWTQ	Schweiter Technologies AG	0.03%	0.00%	1.50%	8.25	-0.59	6.26%	-10.22%
VTX:SGSN	SGS AG	0.04%	0.00%	1.26%	6.77	0.10	7.42%	-7.15%
SWX:SHPN	ShaPE Capital AG	0.04%	0.00%	1.58%	72.64	-4.86	7.55%	-24.69%
SWX:SFZN	Siegfried Holding AG	0.05%	0.00%	1.14%	5.27	0.10	4.84%	-4.98%
VTX:SIK	Sika AG	0.06%	0.08%	1.65%	5.97	-0.08	7.93%	-8.77%
VTX:SOON	Sonova Holding AG	0.01%	0.00%	1.81%	49.39	-2.68	13.00%	-25.81%
SWX:SGKN	St.Galler Kantonalbank AG	-0.02%	0.00%	1.15%	6.04	0.16	5.81%	-5.08%
SWX:STGN	Starrag Group Holding AG	0.02%	0.00%	1.86%	7.13	0.45	10.47%	-8.44%
SWX:STMN	Straumann Holding AG	0.00%	0.00%	1.89%	7.87	-0.12	8.69%	-13.56%
SWX:SUN	Sulzer AG*	-0.03%	-0.07%	1.35%	11.63	-0.14	7.80%	-7.85%
VTX:SLHN	Swiss Life Holding AG	0.08%	0.06%	1.86%	5.36	0.14	8.38%	-7.60%
VTX:SPSN	Swiss Prime Site AG	0.02%	0.05%	0.83%	8.99	-0.57	4.64%	-6.30%
VTX:SREN	Swiss Re AG	0.06%	0.07%	1.49%	6.33	-0.22	6.22%	-8.82%
VTX:SCMN	Swisscom AG	0.05%	0.05%	0.83%	5.39	-0.16	4.28%	-4.49%
SWX:SLOG	Swisslog Holding AG	0.04%	0.00%	1.71%	6.48	0.20	8.22%	-10.14%
SWX:SQN	Swissquote Group Holding Ltd	-0.02%	0.00%	2.14%	8.11	0.59	15.36%	-8.09%
SWX:SMET	Swmtl Holding AG in Liq	-0.17%	0.00%	8.44%	60.26	4.42	116.58%	-57.28%
VTX:SYNN	Syngenta AG	0.03%	0.03%	1.35%	5.12	-0.04	5.78%	-6.16%

Symbol	Issuer	Mean	Median	StandardDeviation	Kurtosis	Skeweness	Max	Min
SWX:TAMN	Tamedia AG	0.04%	0.00%	1.54%	7.94	0.72	9.18%	-6.34%
SWX:TECN	Tecan Group AG	0.04%	0.00%	1.65%	11.19	-0.25	12.93%	-12.66%
SWX:TEMN	Temenos Group AG	0.03%	0.00%	2.87%	26.14	-1.59	17.10%	-32.97%
SWX:UHRN	The Swatch Group AG	0.05%	0.03%	1.76%	5.06	-0.26	6.52%	-8.62%
SWX:TMX	THERAMetrics holding AG	-0.42%	0.00%	7.73%	11.82	0.54	60.61%	-43.66%
SWX:TOHN	Tornos Holding AG	-0.02%	0.00%	2.75%	37.94	2.32	37.67%	-16.41%
VTX:RIGN	Transocean Ltd	-0.04%	0.00%	2.16%	6.06	-0.03	11.34%	-12.47%
SWX:UBXN	u-blox Holding AG	0.12%	0.00%	2.13%	5.62	0.09	10.49%	-11.89%
VTX:UBSN	UBS AG	0.02%	0.00%	1.93%	7.32	-0.10	10.65%	-11.38%
SWX:USIN	USI Group Holdings AG	-0.21%	0.00%	5.33%	23.26	0.01	44.63%	-44.63%
SWX:VLRT	Valartis Group AG	-0.04%	0.00%	1.99%	5.96	0.31	9.73%	-9.36%
SWX:VATN	Valiant Holding AG	-0.08%	-0.08%	1.50%	8.76	-0.39	5.87%	-10.97%
SWX:VALN	Valora Holding AG	-0.01%	0.00%	1.66%	21.81	-1.50	7.41%	-19.31%
SWX:VAHN	Vaudoise Assurances Holding SA	0.07%	0.00%	1.47%	6.30	0.19	8.18%	-7.44%
SWX:VET	Vetropack Holding AG	-0.01%	0.00%	1.53%	8.62	0.08	10.84%	-8.81%
SWX:VILN	Villars Holding S.A.	0.00%	0.00%	1.85%	8.99	0.33	11.41%	-9.61%
SWX:VONN	Vontobel Holding AG	0.03%	0.00%	1.62%	5.63	0.22	9.78%	-5.68%
SWX:VZN	VZ Holding AG	0.07%	0.00%	1.50%	8.54	-0.07	8.27%	-8.43%
SWX:WKB	Walliser Kantonalbank	0.02%	0.00%	0.67%	5.29	0.27	3.70%	-2.82%
SWX:WARN	Warteck Invest AG	0.01%	0.00%	0.95%	4.86	0.23	5.45%	-4.25%
SWX:YPSN	Ypsomed Holding AG	0.03%	0.00%	1.30%	6.51	0.49	6.58%	-5.07%
SWX:ZEH	Zehnder Group AG	0.00%	0.00%	1.81%	13.67	-1.03	6.37%	-18.13%
SWX:ZUGN	Zug Estates Holding AG*	-0.01%	0.00%	1.10%	10.67	0.51	8.22%	-6.14%
SWX:ZG	Zuger Kantonalbank AG	0.01%	0.00%	0.83%	7.09	0.06	5.27%	-4.52%
VTX:ZURN	Zurich Insurance Group AG	0.02%	0.04%	1.36%	10.72	-0.31	9.97%	-8.00%

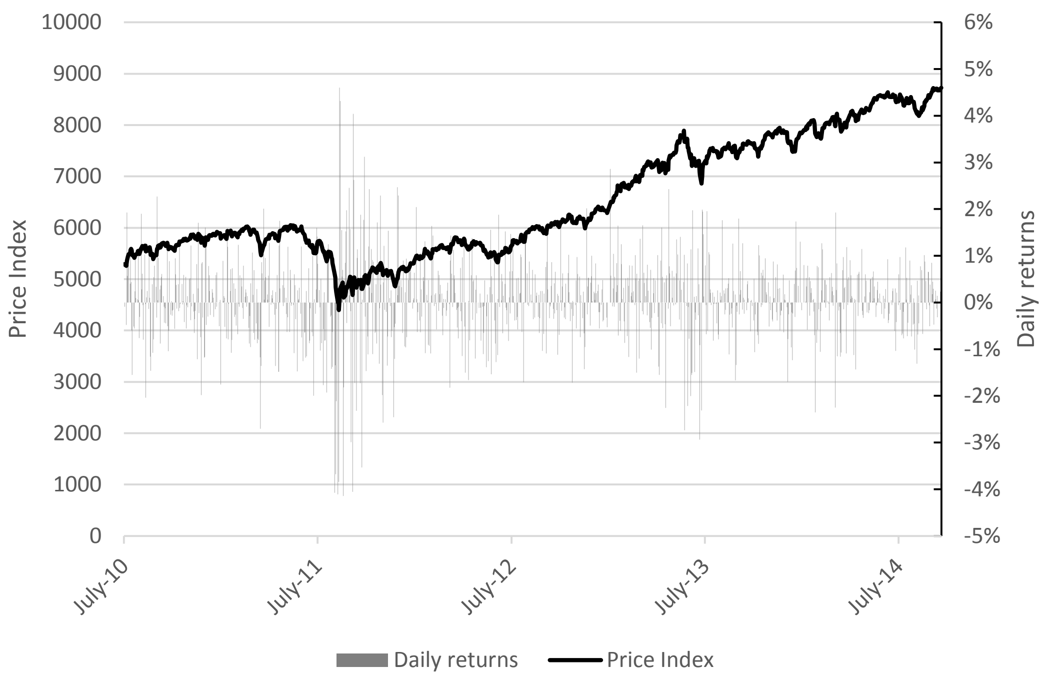
To apply an event study, a benchmark for the above listed securities is needed. The Swiss Performance Index (SPI) is chosen. The SPI contains practically all companies domiciled in Switzerland or the Principality of Liechtenstein which are traded on the SIX Swiss Exchange and possess a free float of at least 20%.[19] Table 3 shows the statistical characteristics of the daily returns and Figure 1 the performance of the Swiss Performance Index for the same period as the company securities in Table 2, from 1 July 2010 to 19 September 2014.

[19] http://www.six-swiss-exchange.com/indices/data_centre/shares/spi_en.html

Table 3: Statistical characteristics of the daily returns of the Swiss Performance Index (1 July 2010 - 19 September 2014)

Name	Mean	Median	Standard Deviation	Kurtosis	Skewness	Max	Min
SPI Index	0.05%	0.06%	0.90%	6.89	-0.34	4.60%	-4.15%

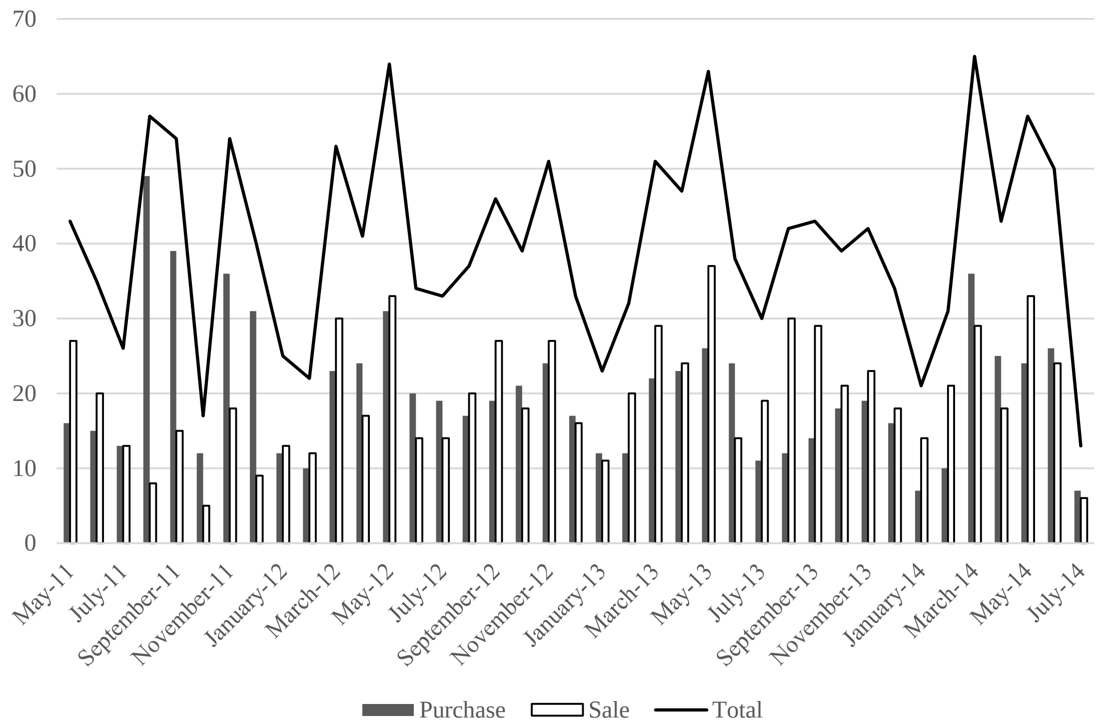
Figure 1: Performance of the Swiss Performance Index SPI (1 July 2010 - 19 September 2014)



4.3 Descriptive statistics

Figure 2 presents a histogram over the data sample time period, starting 16 May 2011 and ending 21 July 2014. It shows the number of executed management transactions per month, categorized into purchase and sale transactions. A line has been added to show the combined total number of insider deals. This line indicates a regular trading pattern, seemingly repeating itself from year to year with peaks from March to May and lows for January and February. The nominal values for these characteristic points remain arguably unchanged over the observed timeframe. Seemingly indicating a systematic investment approach.

Figure 2: Histogram of management transactions per month over the sample period (16 May 2011 – 21 July 2014)



Again regrouped into the two different transaction types plus the total of all deals, Table 4 offers a comprehensive overview on typical valuation figures. A total of 202 different companies were involved in 1568 transactions amounting to CHF 847,541,312. A sizable difference between the average purchase (CHF 300,950) and sale (CHF 785,040) transaction value can be observed, leading to a total volume of sale transactions (CHF 609,187,257) more than two-and-half times greater compared to purchase transactions (CHF 238,354,055). Sale transactions greatly exceeding purchase transaction is a fact also found in prior studies (see e.g., Aussenegg and Ranzi (2008)), suggesting that this is due to performance-related managerial remuneration in form of stock or stock options.

Table 4: Descriptive statistics of the management transactions sample

	Type of transactions		
	Purchase	***Sale***	***All***
No. of companies	180	155	202
No. of transactions	792	776	1568
Mean value	CHF 300,950	CHF 785,040	CHF 540,520
Median value	CHF 39,949	CHF 100,850	CHF 64,366
Total volume	CHF 238,354,055	CHF 609,187,257	CHF 847,541,312

As a comparison, the data sample collected by Gebhardt (2013) for the period from 2005 to 2011 in his study on management transactions in the Swiss stock market counted a total of 5029 deals: 2564 purchase transactions with an average value of CHF 437,039 and 2465 sale transactions with an average value of CHF 1,042,581. Dymke and Walter (2008) looked at insider deals in Germany between 2002 and 2005 and found 1402 purchases with a mean value of EUR 336,971 and 1255 sale transactions averaging EUR 784,959.

Listing management transactions by insider position, as provided by Table 5, reveals two different trading patterns for executives (Panel A) and non-executives (Panel B). Executive insiders sell securities more often than purchasing them and they do this at a relatively low mean value. Whereas, non-executive insiders are more involved with purchase than sale transactions. Their overall trading number is below the amount of executive deals. However, transactions values are considerably higher. This pattern could be a sign of stealth trading motives on the part of executive insiders. Barclay and Warner (1993) report that stealth trading consists of trying to hide the ultimate trading intention by breaking up transactions in smaller-sized deals. These numbers are confirmed by Gebhardt (2013) who also looked at management transactions in Switzerland by insiders' position. He too finds that executive managers are more active in trading, but the mean value of their deals is largely inferior to those of non-executive directors.

Table 5: Descriptive statistics of the management transactions sample by position of insider

Panel A: Executive position

	Type of transactions		
	Purchase	**Sale**	**All**
No. of companies	118	136	175
No. of transactions	376	568	944
Mean value	CHF 138,520	CHF 305, 530	CHF 230,910
Median value	CHF 30,000	CHF 97,522	CHF 64,625
Total volume	CHF 52,084,000	CHF 173,540,000	CHF 225,630,000

Panel B: Non-executive position

	Type of transactions		
	Purchase	**Sale**	**All**
No. of companies	142	85	163
No. of transactions	416	208	624
Mean value	CHF 447,760	CHF 2,094,400	CHF 996,660
Median value	CHF 47,387	CHF 111,610	CHF 61,514
Total volume	CHF 186,270,000	CHF 435,640,000	CHF 621,910,000

5 Methodology

5.1 Event study

The main approach applied in this thesis is the event study methodology, it is a versatile widely used statistical tool in different research areas, often employed to measure effects on stock price reactions prompted by an unexpected event. MacKinlay (1997) delivers a comprehensive example and guideline for the application of an event study in economics and finance, examining the abnormal returns after quarterly earnings announcements. McWilliams and Siegel (1997) look at several event studies with economic research topics, examining study designs and probing results for validity and relevance. As a conclusion to their paper, they come up with a detailed ten step structure recommended for use when implementing an event study. The procedure for the event study of this thesis then also closely follows the structure and steps described by McWilliams and Siegel (1997), together with the guideline by MacKinlay (1997).

The initial task of conducting an event study is to define the event of interest.[20] Event studies are commonly used to examine the information content of a multitude of different corporate finance events (e.g., announcement of mergers and acquisitions, debt or equity issues). For this study, the event is defined as the transaction date of an insider deal. The use of the announcement date as event would be preferable. However, this is not possible as the required date is not specified by SIX Swiss Exchange in management transaction notes.

The next step consists of defining the event window, the period over which stock prices of involved companies are analyzed. The duration of the event window should be adapted to the event of interest to fully capture the price effects of surrounding periods. In practice, the period of interest is often expanded to multiple days, including at least the day of the announcement

[20] MacKinlay (1997)

and the day after the announcement.[21] The event window was chosen to be 41 trading days: 20 pre-event trading days and 20 post-event trading days. Similar event studies on insider dealings (see e.g., Aussenegg and Ranzi (2008) or Andre and Dardas (2011)) have used an equivalent duration period. Figure 3 in section 5.2 below illustrates the complete timeframe for the event study.

Thereafter, selection criteria for inclusion or exclusion from the pool of examined firms are established. For example, by creating samples adhering to certain key characteristics (e.g., industry representation, market capitalization). Furthermore, sample collection may also be imposed by restrictions on data availability. For companies to be taken into consideration, they have to be listed by SIX Swiss Exchange, as the objective of the study in hand is the examination of management transactions influence on the Swiss stock market. Furthermore, company data has to withhold additional selection criteria detailed in the data cleaning process (cf. 4.1 Management transactions).

To determine the impact of the event of interest on security prices, abnormal returns need to be computed. MacKinlay (1997) defines the abnormal return as the actual ex post return of the security over the event window minus the normal return of the firm over the event window. The normal return is the expected return without conditioning on the event taking place. For a given company i and an event date τ, the abnormal return can be calculated with:[22]

$$AR_{i\tau} = R_{i\tau} - E(R_{i\tau}|X_\tau) \qquad (1)$$

where $R_{i\tau}$ is the actual return and $E(R_{i\tau}|X_\tau)$ the expected normal return with a given condition X_τ. The actual return $R_{i\tau}$ is derived directly from historic stock price data. To calculate the expected normal return $E(R_{i\tau}|X_\tau)$, a number of approaches exist. MacKinlay (1997) distinguishes between two model categories, statistical and economic. In contrast to statistical

[21] MacKinlay (1997)

[22] MacKinlay (1997)

models, economic models do not rely solely on statistical assumptions but are enhanced by economic restrictions. Economic models can deliver more precise calculations for expected normal returns but are more delicate in their application. McWilliams and Siegel (1997) note however that the standard approach for event studies is the market model, a statistical model.

5.2 Market model

The market model is a statistical one factor model based on the Single-Index Model (SIM) introduced by Sharpe (1964). Sharpe developed the SIM in an effort to simplify the Markowitz portfolio optimization by reducing the number of inputs needed. For a period t, the market model connects the return R_{it} of any given security i to the return of the market portfolio R_{mt}: [23]

$$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it} \qquad (2)$$

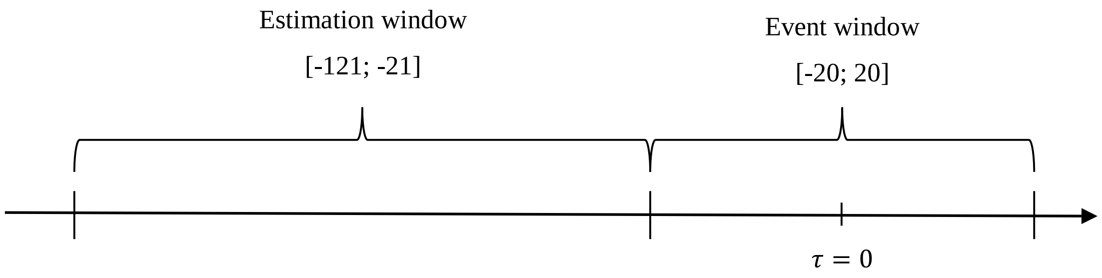
$$\text{With} \quad E(\varepsilon_{it} = 0) \qquad var(\varepsilon_{it}) = \sigma^2_{\varepsilon_t}$$

ε_{it} is the zero mean disturbance term, α_i the intercept and β_i the systematic risk of security i. MacKinlay (1997) recommends a broad based stock index to determine the return of the market portfolio. For the study at hand, the Swiss Performance Index (SPI) was chosen. This index is presented in detail in section 4.2 of this thesis. The parameters of the market model, α_i and β_i, are estimated with the help of an ordinary least squares (OLS) regression analysis of R_{it} on R_{mt}. The OLS regression is applied to a prior defined specific period of time called the estimation window. MacKinlay (1997) also notes that in order to prevent possible event triggered returns having an influence on normal returns measurement, the estimation window should not overlap with the event window. Again, in accordance with similar studies (see e.g.,

[23] MacKinlay (1997)

MacKinlay (1997) or Aussenegg and Ranzi (2008)), an estimation window of 120 days is chosen.

Figure 3: Timeline of the event study around the event date $\tau = 0$.



Combining formulas (1) and (2) shows that the abnormal return equals the disturbance term of the market model. Under the null hypothesis H_0, the event has no influence on abnormal returns and the following can be deducted for the event window, with $\hat{\alpha}_i$ and $\hat{\beta}_i$ being the estimated market model parameters for security i: [24]

$$AR_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau} \tag{3}$$

$$AR_{i\tau} \sim N(0, \sigma^2(AR_{i\tau})) \tag{4}$$

To examine a possible event influence on stock price behavior, abnormal returns must be aggregated over the event window. These aggregations can be executed for any given dates τ_1 to τ_2, contained in the event window. MacKinlay (1997) describes the result of this sum through time as the cumulative abnormal return CAR:

[24] MacKinlay (1997)

$$CAR(\tau_1, \tau_2) = \sum_{t=\tau_1}^{\tau_2} AR_{i\tau} \qquad (5)$$

As the CAR from one single observation generally does not convey a lot of useful information, this exercise is repeated for every event and security contained in the sample of management transactions. Next, for given dates τ and N events, mean values for the study sample are computed:[25]

$$\overline{AR_\tau} = \frac{1}{N} \sum_{i=1}^{N} AR_{i\tau} \qquad (6)$$

Calculating $\overline{AR_\tau}$ for every τ in the event window allows a quick overview of abnormal returns development over this critical time period. It also allows a first assessment of a potential event influence on security prices. Finally, the mean abnormal returns are aggregated over the full set of observations and given dates τ_1 to τ_2 to receive the mean cumulative abnormal return of the sample:[26]

$$\overline{CAR}(\tau_1, \tau_2) = \sum_{t=\tau_1}^{\tau_2} \overline{AR_\tau} \qquad (7)$$

To check if the computed results are statistically significant, a T-test and the Wilcoxon signed rank test are applied. Furthermore, as McWilliams and Siegel (1997) point out, an event study only delivers credible and meaningful results, if all of the following assumptions are valid: efficient market, unanticipated event and no confounding effects during the event window.

[25] MacKinlay (1997)

[26] MacKinlay (1997)

5.3 Test statistics

To interpret mean and median cumulative abnormal returns in a meaningful way, results are tested for statistical significance with a parametric and a non-parametric test. MacKinlay (1997) presents a basic approach to test the null hypothesis that the abnormal returns are zero by defining the following parametric test statistic θ:

$$\theta \quad = \frac{\overline{CAR}(\tau_1,\tau_2)}{\sqrt{var(\overline{CAR}(\tau_1,\tau_2))}} \tag{8}$$

With

$$var\big(\overline{CAR}(\tau_1,\tau_2)\big) = \sum_{t=\tau_1}^{\tau_2} var(\overline{AR_\tau}) \tag{9}$$

$$var(\overline{AR_\tau}) = \frac{1}{N^2}\sum_{i=1}^{N} \sigma_{\varepsilon_i}^2 \tag{10}$$

The mean cumulative abnormal return variance $var\big(\overline{CAR}(\tau_1,\tau_2)\big)$ is computed by summing up the different mean abnormal return variances $var(\overline{AR_\tau})$ for the period τ_1 to τ_2. N is the number of events and for the determination of the variance of abnormal returns, $\sigma_{\varepsilon_i}^2$, the sample variance from the market model regression in the estimation window, is an appropriate choice[27].

For more powerful tests, MacKinlay (1997) recommends standardizing each abnormal return by dividing each abnormal return by an estimator of its standard deviation, which can be obtained from the regression model (2) over the estimation period:[28]

[27] MacKinlay (1997)

[28] MacKinlay (1997)

$$\sigma^2(AR_{i\tau}) = \sigma^2_{\varepsilon_t} \tag{11}$$

and

$$SAR_{i\tau} = \frac{AR_{i\tau}}{\sqrt{\sigma^2_{\varepsilon_t}}} \tag{12}$$

Following this suggestion, a standardized parametric test proposed by Boehmer et al. (1991) is chosen in this thesis. Kolari and Pynnönen (2010) present the BMP t-statistic t_{BMP}, as follows:

$$t_{BMP} = \frac{\overline{SCAR}(\tau_1,\tau_2)}{s/\sqrt{N}} \tag{13}$$

$\overline{SCAR}$ is the standardized mean cumulative abnormal return and s its standard deviation. $\overline{SCAR}$ is calculated by applying formulas (6) and (7) to the standardized abnormal returns $SAR_{i\tau}$ and s is calculated with the help of formulas (9) and (10).

To account for potential skewness in the abnormal return distributions, median differences are tested by employing a Wilcoxon signed rank test[29]. Kloke and McKean (2015) note that the difference between a t-test and a sign test is that the t-test statistic is a function of the distances of the sample items from zero (under the null hypothesis) in addition to their signs. The signed-rank Wilcoxon test statistic, however, uses only the ranks of these distances and is usually computed as the sum of the ranks of the absolute values of the observations:[30]

$$W^+ = \sum_{X_i>0} R|X_i| \tag{14}$$

[29] Aussenegg and Ranzi (2008)

[30] Kloke and McKean (2015)

Listed from low to high, $R|X_i|$ denotes the rank of the observations $|X_i|$.

In section 7 of this thesis, event study results are also further examined by employing a multivariate regression analysis. To detect any multicollinearity between the independent variables of the defined regression model the variance inflation factor (VIF) is calculated. The VIF measures the degree of inflation of an estimated regression coefficient due to multicollinearity and can be defined as:[31]

$$VIF = \frac{1}{1-R_i^2} \tag{15}$$

R_i^2 represents the proportion of variance in the independent variable i that is associated with the other independent variables in the regression model and O'Brien (2007) also reports that VIF values equal or higher than 10 are commonly viewed as indicator of high collinearity.

[31] O'Brien (2007)

6 Univariate analysis

6.1 All transactions

Before conducting the event study, the sample was sorted into two categories, purchase transactions and sale transactions. Figure 4 illustrates the results and shows the mean CAR development over the duration of the event period. Around $\tau = 0$, the transaction execution date, a clear reversal in security price behavior can be observed. After a pronounced mean CAR decline prior to the event, stocks purchased in management transactions start a rebound at $\tau = -1$. Sale transactions entail falling stock prices right at $\tau = 0$, after a short rally. These reactions seem to indicate that management transactions have a distinct influence on security prices. Furthermore, insiders appear to be contrarian investors.

Figure 4: Mean CARs for purchase and sale transactions over event period

Computed mean cumulative abnormal returns (CARs) over the event window [-20;20], with the event date at $\boldsymbol{\tau = 0}$. Sample consists of 792 purchase and 776 sale transactions. The period covered is May 2011 – June 2014.

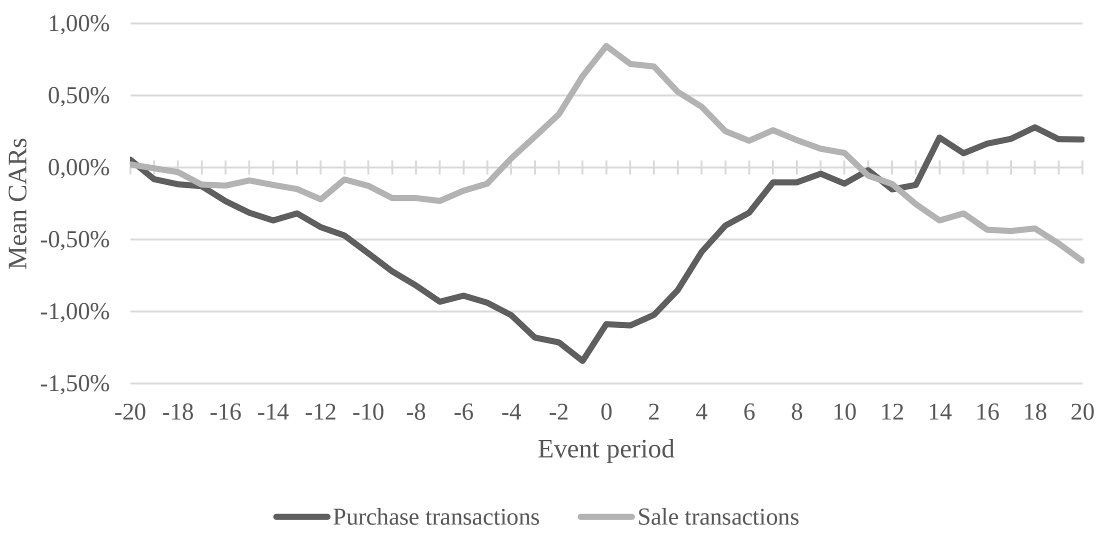


Table 6 presents the findings of the event study in more detail. The event window is divided into six different time periods to better illustrate average cumulated abnormal returns developing during the pre- and post-event window. Table 6 also lists median CARs along with the results obtained from performed T-tests and Wilcoxon signed rank tests with the intention to clarify the statistical significance. Panel A of Table 6 contains the results for sale transactions. In the 20 trading days following a sale of a security by an insider, the security shows a substantial average abnormal performance of -1.49% (significant at the 1% level). This fact could be a hint for managers trading based on inside information to minimize their losses. A possible contrarian investment style found in insiders, is backed by significant average gains of 0.80% in the 5 days leading up to the trade. Similar results can be found in Panel B for purchase transactions. Insiders tend to buy stock after a steady decline in abnormal performances averaging -1.40% in the 20 days prior to the event. The following 20 trading days, the newly bought stock has regained 1.28% (significant at the 1% level) on average. Raising fears of private enrichment by exploitation of inside information. Considering these results and their significance levels, *Hypothesis 1* can be accepted. Management transactions seem to have a significant influence on stock prices. Sales leading to subsequent negative performances and purchases triggering abnormal gains.

Table 6: Mean and median CARs for management transactions over different time periods

Panel A: Sale transactions						
No. of transactions = 776	**[-20;-1]**	**[-10;-1]**	**[-5;-1]**	**[0;5]**	**[0;10]**	**[0;20]**
Mean CAR	0.61%	0.76%	0.80%	-0.59%	-0.74%	-1.49%
T-test	2.229	4.158	5.446	-3.986	-3.822	-5.614
p-value	0.026	0.000	0.000	0.000	0.000	0.000
Median CAR	0.50%	0.40%	0.45%	-0.35%	-0.42%	-0.91%
Rank test p-value	0.009	0.000	0.000	0.000	0.000	0.000

Panel B: Purchase transactions						
No. of transactions = 792	**[-20;-1]**	**[-10;-1]**	**[-5;-1]**	**[0;5]**	**[0;10]**	**[0;20]**
Mean CAR	-1.40%	-0.75%	-0.45%	0.68%	0.98%	1.28%
T-test	-5.151	-3.677	-2.659	2.807	3.460	3.467
p-value	0.000	0.000	0.007	0.005	0.000	0.000
Median CAR	-1.07%	-0.62%	-0.34%	0.22%	0.30%	0.42%
Rank test p-value	0.000	0.000	0.000	0.007	0.005	0.005

These results can be compared to other event studies. The studies most suitable are Zingg et al. (2007) and Gebhardt (2013) as both use roughly comparable research designs and target the Swiss stock market. Table 7 provides a comparison. For purchase transactions, results of this thesis look similar to those found by Zingg et al. (2007). Both show a significant abnormal performance of 1.28% after 20 days and 1.59% after 30 days of trading following a transaction, respectively. Findings for sale transactions seem most comparable to Gebhardt (2013). Both studies indicate pronounced negative performances triggered by insiders selling company stock. Although, the numbers are of different magnitudes, all three studies show that trading based on presumed inside information generally leads to financial advantages in the Swiss stock market.

Table 7: Comparison of results with other similar studies

Panel A: Purchase transactions

Samples	Period	[-20;-1]	[-10;-1]	[0;10]	[0;20]	[0;30]
Own data	May 2011 - July 2014	-1.40%***	-0.75%***	98%***	1.28%***	n/a
Gebhardt (2013)	July 2005 - December 2011	-1.05%***	-0.67%***	0.21%*	0.25%	0.56%**
Zingg (2007)	July 2005 - December 2006	n/a	-1.21%***	0.84%***	n/a	1.59%***

Panel B: Sale transactions

Samples	Period	[-20;-1]	[-10;-1]	[0;10]	[0;20]	[0;30]
Own data	May 2011 - July 2014	0.61%**	0.76%***	-0.74%***	-1.49%***	n/a
Gebhardt (2013)	July 2005 - December 2011	0.48%***	0.62%***	-0.52%***	-1.19%***	-2.20%***
Zingg (2007)	July 2005 - December 2006	n/a	1.67%***	0.11%	n/a	-0.23%

*** 1% significance; ** 5% significance; * 10% significance

6.2 Relative to firm size

In order to analyze the impact firm size might have on mean CARs surrounding management transactions, two different categories are extracted from the data sample. Companies valued at a market capitalization equal or greater than 35% of all the valuations present in the total sample, are regrouped as *big* companies. Firms with a market capitalization in the bottom 35%

of the total sample, are defined as *small* companies. After taking the type of transaction into account, four sub-samples are obtained. Composed of: 201 purchase transactions in big companies, 376 purchase transactions in small companies, 353 sale transactions in big companies and 186 sale transactions in small companies.

Table 8 presents the results in four different panels. In the 20 trading days preceding a management security purchase in big companies, a considerable significant mean CAR of -2.53% is observed. This negative performance is followed by a significant 0.85% regain in the 20 trading days after the transaction execution. In contrast, purchase deals in small companies show a lesser significant negative performance pre-event of -0.83%, but have a higher significant mean CAR of 1.55% at the end of the event window. Though, the median CAR over the same period fails to reach required significance levels. Sales transactions in big companies lead to an average significant negative abnormal performance of -0.84% in the first 20 trading days post-event. For small companies, the equivalent significant mean CAR is considerably higher with -2.40%. In conclusion, deals in small companies seem to trigger more noticeable abnormal returns, having a greater influence than deals in big companies. Therefore, *Hypothesis 2* can be accepted.

Table 8: Mean and median CARs for management transactions over different time periods in relation to firm size

Panel A: Purchase transactions in big companies						
No. of transactions = 201	**[-20;-1]**	**[-10;-1]**	**[-5;-1]**	**[0;5]**	**[0;10]**	**[0;20]**
Mean CAR	-2.53%	-1.27%	-0.94%	0.33%	0.48%	0.85%
T-test	-5.705	-3.711	-3.260	1.536	1.814	2.015
p-value	0.000	0.000	0.013	0.126	0.071	0.045
Median CAR	-2.18%	-0.36%	-0.36%	0.32%	0.44%	1.30%
Rank test p-value	0.000	0.007	0.008	0.101	0.063	0.014

Panel B: Purchase transactions in small companies						
No. of transactions = 376	**[-20;-1]**	**[-10;-1]**	**[-5;-1]**	**[0;5]**	**[0;10]**	**[0;20]**
Mean CAR	-0.83%	-0.59%	-0.15%	0.82%	1.15%	1.55%
T-test	-1.969	-1.883	-0.562	1.792	2.213	2.361
p-value	0.050	0.061	0.475	0.074	0.028	0.018
Median CAR	-0.59%	-0.42%	-0.23%	0.11%	0.00%	0.21%
Rank test p-value	0.042	0.0203	0.203	0.376	0.280	0.194

Panel C: Sale transactions in big companies						
No. of transactions = 353	**[-20;-1]**	**[-10;-1]**	**[-5;-1]**	**[0;5]**	**[0;10]**	**[0;20]**
Mean CAR	0.95%	0.69%	0.70%	-0.31%	-0.33%	-0.84%
T-test	3.046	3.326	4.149	-2.421	-1.838	-3.013
p-value	0.002	0.000	0.000	0.016	0.067	0.003
Median CAR	0.72%	0.44%	0.45%	-0.33%	-0.24%	-0.54%
Rank test p-value	0.009	0.002	0.000	0.007	0.071	0.002

Panel D: Sale transactions in small companies						
No. of transactions = 186	**[-20;-1]**	**[-10;-1]**	**[-5;-1]**	**[0;5]**	**[0;10]**	**[0;20]**
Mean CAR	-0.15%	0.56%	0.54%	-1.67%	-1.57%	-2.40%
T-test	-0.185	1.062	1.274	-3.523	-2.812	-3.548
p-value	0.854	0.290	0.204	0.000	0.005	0.000
Median CAR	0.27%	0.24%	0.16%	-0.57%	-0.82%	-1.50%
Rank test p-value	0.952	0.348	0.481	0.000	0.001	0.000

This findings are also confirmed by other studies (see e.g., Gregory et al. (1997) or Aussenegg and Ranzi (2008)). The most plausible explanation given is that bigger firms are constantly monitored by a multitude of analysts, making it harder to keep information secret and riskier to exploit knowledge advantages in stock markets.

6.3 Relative to transaction size

Hypothesis 3 implies a link between transaction volume and abnormal performances around the disclosure of management transactions. The total data sample is again divided into four smaller sub-samples. *Big* purchases are classified as transactions with values equal or higher than 35% of all the transactions collected, *small* transactions possess the lowest 35% of transaction values. Panel A shows the results for 195 analyzed big purchase transactions in contrast to 371 small purchase transactions on Panel B. Panel C & D regroup abnormal performances for 354 big sale transactions, respectively 178 small sale transactions.

Obtained statistical significance levels and results of Wilcoxon signed rank tests prohibit any meaningful statements comparing big and small purchase transactions over the duration of the event window. The 0.97% mean CAR in the first 20 trading days after the disclosure of a big purchase insider deal fails to reach necessary significance levels in T-test results and the signed rank test for median CAR. The computed mean CAR of 1.27% for small purchases reaches a 5% significance level but fails the Wilcoxon signed rank test and the discrepancy between mean and median CAR casts doubts over the validity. However, both sets seem to follow *Hypothesis 1* by showing contrarian abnormal returns to pre-event price trends.

Results for sale transactions obtain more satisfactory results when testing statistical significance. Comparing the 20 trading days post event, big sale transactions have a significant mean CAR of -1.51% compared to a significant mean CAR of -1.89% for small sale transactions. In conclusion, *Hypothesis 3* cannot be accepted. There is no proof to suggest bigger transaction values trigger greater abnormal performances. In fact, looking at sale transactions, the contrary seems to be the case with small deals showing more pronounced declines post-event.

Table 9: Mean and median CARs for management transactions over different time periods in relation to transaction size

Panel A: Big purchase transactions						
No. of transactions = 195	**[-20;-1]**	**[-10;-1]**	**[-5;-1]**	**[0;5]**	**[0;10]**	**[0;20]**
Mean CAR	-1.00%	-0.00%	0.25%	0.94%	1.08%	0.97%
T-test	-1.798	-0.221	0.689	2.743	2.022	1.367
p-value	0.074	0.825	0.491	0.007	0.045	0.173
Median CAR	-1.29%	-0.61%	-0.00%	0.60%	0.53%	0.40%
Rank test p-value	0.003	0.197	0.807	0.019	0.031	0.162

Panel B: Small purchase transactions						
No. of transactions = 371	**[-20;-1]**	**[-10;-1]**	**[-5;-1]**	**[0;5]**	**[0;10]**	**[0;20]**
Mean CAR	-1.60%	-0.86%	-0.61%	0.37%	0.65%	1.24%
T-test	-4.046	-3.005	-2.507	0.795	1.325	1.985
p-value	0.000	0.003	0.013	0.427	0.186	0.048
Median CAR	-1.07%	-0.64%	-0.34%	0.00%	-0.00%	0.00%
Rank test p-value	0.000	0.000	0.007	0.541	0.546	0.626

Panel C: Big sale transactions						
No. of transactions = 354	**[-20;-1]**	**[-10;-1]**	**[-5;-1]**	**[0;5]**	**[0;10]**	**[0;20]**
Mean CAR	0.62%	0.73%	0.83%	-0.53%	-0.65%	-1.51%
T-test	1.858	3.177	4.770	-3.130	-2.668	-4.049
p-value	0.064	0.002	0.000	0.002	0.008	0.000
Median CAR	0.57%	0.43%	0.48%	-0.44%	-0.31%	-0.84%
Rank test p-value	0.038	0.002	0.000	0.002	0.030	0.000

Panel D: Small sale transactions						
No. of transactions = 178	[-20;-1]	[-10;-1]	[-5;-1]	[0;5]	[0;10]	[0;20]
Mean CAR	-0.21%	0.72%	0.69%	-1.13%	-1.27%	-1.89%
T-test	-0.259	1.377	1.671	-2.448	-2.354	-2.875
p-value	0.7962	0.170	0.097	0.015	0.020	0.004
Median CAR	0.24%	0.00%	0.27%	-0.32%	-0.68%	-1.13%
Rank test p-value	0.692	0.362	0.129	0.009	0.011	0.001

6.4 Relative to regulation upgrade

In this section, the possible influence of new insider trading regulations implemented in April 2013 on abnormal returns is analyzed. As *Hypothesis 4* in chapter 3 suggests, a diminished abnormal performance post-event is expected. To measure a possible impact, the data sample is first divided into two groups. The first groups contains transactions executed before 1 April 2013, transactions executed after this date are moved into the second group. This leads to 910 transactions executed between 16 May 2011 and 31 March 2013 in the first group and 658 transactions executed between 1 April 2013 and 21 July 2014 in the second group. Thus, there are 1.86 deals per working day before the insider trading regulations update and 1.93 deals per working day after it. No drastic change in management transactions frequency can therefore be observed.

In a second step, each of the two groups from step one is divided into purchase and sale transactions. Table 10 shows the computed cumulative abnormal returns. Panel A provides results for 494 purchase transactions before the update and Panel B contains results for 298 purchase transactions after the regulations update. 416 sale transactions that took place before the implementation of the new law are represented on Panel C with Panel D showing 360 transactions executed after the upgrade.

Table 10: Mean and median CARs for transactions before and after insider trading regulations update

Panel A: Purchase transactions before update in regulations						
No. of transactions = 494	[-20;-1]	[-10;-1]	[-5;-1]	[0;5]	[0;10]	[0;20]
Mean CAR	-2.14%	-1.27%	-0.79%	0.42%	0.69%	0.87%
T-test	-5.588	-4.589	-3.487	2.059	2.265	2.265
p-value	0.000	0.000	0.000	0.040	0.014	0.024
Median CAR	-1.55%	-0.99%	-0.50%	0.25%	0.30%	0.27%
Rank test	0.000	0.000	0.000	0.067	0.052	0.092

Panel B: Purchase transactions after update in regulations						
No. of transactions = 298	[-20;-1]	[-10;-1]	[-5;-1]	[0;5]	[0;10]	[0;20]
Mean CAR	-0.18%	0.12%	0.11%	1.12%	1.45%	1.97%
T-test	-0.453	0.448	0.452	2.029	2.467	2.628
p-value	0.651	0.654	0.652	0.043	0.014	0.009
Median CAR	-0.42%	-0.29%	-0.17%	0.21%	0.25%	0.91%
Rank test	0.164	0.315	0.298	0.046	0.0370	0.012

Panel C: Sale transactions before update in regulations						
No. of transactions = 416	[-20;-1]	[-10;-1]	[-5;-1]	[0;5]	[0;10]	[0;20]
Mean CAR	0.51%	0.57%	0.61%	-0.65%	-0.86%	-2.00%
T-test	1.609	2.749	3.474	-2.956	-3.057	-5.200
p-value	0.108	0.006	0.000	0.003	0.002	0.000
Median CAR	0.48%	0.24%	0.44%	-0.34%	-0.49%	-0.95%
Rank test	0.086	0.012	0.000	0.002	0.002	0.000

Panel D: Sale transactions after update in regulations						
No. of transactions = 360	[-20;-1]	[-10;-1]	[-5;-1]	[0;5]	[0;10]	[0;20]
Mean CAR	0.74%	0.99%	1.01%	-0.52%	-0.60%	-0.90%
T-test	1.570	3.135	4.199	-2.696	-2.296	-2.510
p-value	0.117	0.002	0.000	0.007	0.022	0.012
Median CAR	0.52%	0.51%	0.50%	-0.39%	-0.35%	-0.80%
Rank test	0.044	0.000	0.000	0.003	0.023	0.002

Looking at purchase transactions, before the implementation of new regulations a substantial significant negative performance in the 20 trading days pre-event of -2.14% can be observed. In contrast, for deals executed under the new insider trading rules only minimal pre-event abnormal performances are detected which also fail to reach meaningful statistical significance. Cumulative abnormal returns are significantly positive for transactions executed before and after the update of regulations. However, transactions which took place after the law upgrade exhibit a cumulative abnormal performance of 1.97% in the first 20 trading days post-event compared to 0.87% for transactions executed under the previous regulations. The corresponding median cumulative abnormal return figures show a similar development and rise from 0.27% to 0.91%.

Sale transactions before the update in regulations cumulate significant abnormal returns equaling -2% in the first 20 trading days post-event after having gained 0.61% in the 5 trading days leading up to the management transaction. Similarly, sale transactions after the implementation of new insider trading rules show significant positive abnormal returns of 1.01% 5 trading days pre-event but only a significant cumulative abnormal performance of -0.90% in the first 20 trading days after the disclosure of the management transaction. Median cumulative abnormal returns for the 20 first trading days following a management transaction increase from -0.95% to -0.80% after the new insider trading rules implementation.

To further analyze the possible impact of reviewed insider regulations, the differences in average abnormal performances following the update are calculated and tested for statistical significance. Mean CAR differences are obtained by subtracting the mean CAR before the legislation update from the mean CAR after the update for corresponding time periods. Table 11 shows the results for purchase transactions in Panel A and results for sale transactions are presented in Panel B. Purchase transactions display a significant mean CAR difference of 1.96% in the 20 trading days pre-event after the legislation update. The mean CAR difference for the first 20 trading days after an insider purchase deal also shows a positive development of 1.10% although it fails to reach a meaningful significance level. In general, sale transactions only show moderate mean CAR differences which also lack statistical significance. Except for the mean CAR difference during the first 20 trading days post-event, which exhibits a significant positive difference of 1.11%.

Table 11: Difference of mean CARs from management transactions after regulation update compared to before

Panel A: Purchase transactions						
	[-20;-1]	**[-10;-1]**	**[-5;-1]**	**[0;5]**	**[0;10]**	**[0;20]**
Mean CAR difference	1.96%	1.40%	0.91%	0.69%	0.75%	1.10%
T-test	3.522	3.351	2.584	1.382	1.298	1.448
p-value	0.000	0.000	0.010	0.167	0.195	0.148

Panel B: Sale transactions						
	[-20;-1]	**[-10;-1]**	**[-5;-1]**	**[0;5]**	**[0;10]**	**[0;20]**
Mean CAR difference	0.23%	0.42%	0.39%	0.13%	0.26%	1.11%
T-test	0.412	1.141	1.348	0.447	0.665	2.080
p-value	0.680	0.254	0.179	0.655	0.506	0.038

In conclusion, purchase and sale transactions show very different reactions to the implementation of the new insider trading regulations. Purchase transactions show higher abnormal returns post-event compared to sale transactions with reduced abnormal performances following a management transaction. For sale transactions, this fact is also underlined by a significant positive difference in mean CARs for the first 20 trading days post-event. Hence, *Hypothesis 4* is partially refuted but can be accepted for sale transactions. This result is consistent with findings from Degryse et al. (2014), who also observed lower abnormal performances for sale transactions after the implementation of the European Market Abuse Directive[32] in the Netherlands.

[32] Directive 2003/6/EC of the European Parliament and of the Council of 28 January 2003 on insider dealing and market manipulation (market abuse)

7 Multivariate regression analysis

A multivariate regression analysis, as recommended by MacKinlay (1997), is employed to determine eventual additional factors influencing abnormal performances following the execution of management transactions. This analysis also allows to possibly reinforce previous results of this thesis. The regression model is defined as:

$$MeanCAR[1;20]_i = \alpha + \beta_1 * Law_i + \beta_2 * Position_i + \beta_3 * ln(MarketCap)_i + \beta_4 * Frequency_i + \beta_5 * Momentum_i + \beta_6 * Prior\ sale_i + \beta_7 * Prior\ purchase_i + \beta_8 * Transaction\ size_i \quad (16)$$

$MeanCAR[1;20]_i$ is the average cumulative abnormal return for a given transaction i during the first 20 trading days after the public announcement of a management deal and was chosen as dependent variable for the multivariate regression analysis. In April 2013, Switzerland updated the legislation concerning insider dealings. To check, if this legal change had any effect on abnormal returns, the dummy variable Law is coded zero if the transaction was executed before the legal change, one if it took place after. The disclosure note of a management transaction also includes the insider's type of position, executive or non-executive. Jeng et al. (2003) suggest that executive members of organizations are more involved in daily operations and, therefore, are in possession of more valuable information. Hence, a dummy variable $Position$, equaling one for executives and zero for non-executives is used to measure a potential influence. In line with arguments presented in section 6.2 of this thesis, the firm size is taken into consideration as the natural logarithm of the market capitalization with variable $ln(MarketCap)$. A higher number of repeat transactions involving one and the same company might dissolve the information content of such transactions. Thus, $Frequency$ amounts to the number of insider deals during the previous 365 trading days in the same company. Givoly and Palmon (1985) and Noe (1999) present the idea that the stock price momentum prior to the transaction has greater influence on long-term abnormal performance and insiders' profits then the information content revealed by the transaction itself. In accordance with these propositions, $Momentum$ is the mean cumulative abnormal return in the 20 trading days before the execution of management transaction. $Prior\ Sale$ and $Prior\ Purchase$ take into account any purchase, respectively sale, transaction in the 20 trading days pre-event which were discarded during the sample collection process in order to eliminate possible interferences. In section 6.3, the influence of the transaction size is examined. $Transaction\ size$ follows the same categorization, equaling zero for transactions part of the lower 35% of total transaction values, two for those superior to 65% and one for the rest. α is the intercept of the multivariate regression and β_x the coefficients of the various independent variables.

Before applying the regression model, correlation matrices for the purchase transactions and sale transactions data samples are calculated. Correlation matrices help to check if there are any possible dependencies among the independent variables of the regression model. Table 12 provides the correlation matrix for purchase transactions in Panel A and sale transactions in Panel B. For purchase transactions, the highest correlation is found between $Frequency$ and $Prior\ Purchase$ with a coefficient of 0.49. For sale transactions, the highest coefficient equals 0.47 for the two variables $Transaction\ size$ and $ln(MarketCap)$.

Table 12: Correlation matrices for purchase and sale transactions

Panel A: Correlation matrix for purchase transactions

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1 Law	**1.000**	0.008	-0.019	-0.039	-0.127	-0.033	0.102	-0.077
2 Position	0.008	**1.000**	-0.038	0.209	-0.013	0.063	0.099	-0.152
3 ln(MarketCap)	-0.019	-0.038	**1.000**	-0.099	-0.089	0.054	-0.150	0.335
4 Frequency	-0.039	0.209	-0.099	**1.000**	0.103	0.254	0.489	-0.093
5 Momentum	-0.127	-0.013	-0.089	0.103	**1.000**	0.029	0.045	0.022
6 Prior Sale	-0.033	0.063	0.054	0.254	0.029	**1.000**	0.229	-0.011
7 Prior Purchase	0.102	0.099	-0.150	0.489	0.045	0.229	**1.000**	-0.123
8 Transaction size	-0.077	-0.152	0.335	-0.093	0.022	-0.011	-0.123	**1.000**

Panel B: Correlation matrix for sale transactions

Variables	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1 Law	**1.000**	0.054	0.014	-0.171	-0.005	-0.068	0.005	-0.098
2 Position	0.054	**1.000**	0.063	0.044	0.068	0.005	0.049	0.003
3 ln(MarketCap)	0.014	0.063	**1.000**	0.021	0.069	0.015	-0.002	0.468
4 Frequency	-0.171	0.044	0.021	**1.000**	0.039	0.361	0.289	0.004
5 Momentum	-0.005	0.068	0.069	0.039	**1.000**	0.005	0.015	0.039
6 Prior Sale	-0.068	0.005	0.015	0.361	0.005	**1.000**	0.201	-0.038
7 Prior Purchase	0.005	0.049	-0.002	0.289	0.015	0.201	**1.000**	-0.091
8 Transaction size	-0.098	0.003	0.468	0.004	0.039	-0.038	-0.091	**1.000**

Table 13 shows the computed results of the multivariate regression analysis, Panel A for purchase transactions and Panel B for sale transactions.

Table 13: Results of multivariate regression analysis for purchase and sale transactions

Panel A: Purchase transactions					
No. of transactions = 792	**Beta**	**T-Value**	**p-Value**	**VIF**	**Tolerance**
Intercept	0.0680	1.6273	0.1041		
Law	-0.0054	-0.7075	0.4795	1.0436	0.9583
Position	-0.0144	-1.9128	0.0561	1.0677	0.9365
Market Capitalization	-0.0019	-0.9065	0.3650	1.1641	0.8590
Frequence	0.0001	0.2350	0.8143	1.4231	0.7027
Momentum	0.2248	5.4369	0.0000	1.0370	0.9643
Prior sale	-0.0198	-1.1778	0.2393	1.0984	0.9104
Prior purchase	-0.0108	-0.9773	0.3287	1.3888	0.7201
Transaction size	-0.0022	-0.4514	0.6518	1.1645	0.8587
F-value		*5.1303*	*0.0000*		
Durbin-Watson	*2.2091*				
Adjusted R-squared	*4.03%*				

Panel B: Sale transactions					
No. of *transactions* = 776	**Beta**	**T-Value**	**p-Value**	**VIF**	**Tolerance**
Intercept	-0.0992	-3.2369	0.0013		
Law	-0.0113	-2.0962	0.0364	1.0517	0.9509
Position	-0.0008	-0.1349	0.8927	1.0154	0.9848
Market Capitalization	0.0046	3.0105	0.0027	1.2995	0.7695
Frequence	0.0003	1.1890	0.2348	1.2574	0.7953
Momentum	0.0789	3.7504	0.0002	1.0103	0.9898
Prior sale	-0.0094	-1.2121	0.2259	1.1662	0.8575
Prior purchase	-0.0305	-2.1603	0.0311	1.1189	0.8937
Transaction size	-0.0060	-1.5927	0.1116	1.3151	0.7604
F-value		*4.3922*	*0.0000*		
Durbin-Watson	1.9698				
Adjusted R-squared	*3.40%*				

The legal change in April 2013 does not have a significant influence on abnormal returns following purchase transactions. Results from section 6.4 suggest higher mean abnormal returns for purchase deals executed after the change in regulations, however, the mean CAR difference fails to reach a significant statistical level. The dummy variable $Position$ has a negative impact on the abnormal average return in the 20 trading days post-event (significant at the 10% level). Gebhardt (2013) found a similarly negative coefficient, although statistically insignificant. This would imply that purchase deals by non-executives have a higher information content to investors than those of executives. $Momentum$ shows the biggest impact of any variable with a coefficient of 0.22 and significant at the 1%-level. This result is confirmed by Gebhard (2013), who records an equally large and significant coefficient in his study on the Swiss stock market. $Prior\ Sale$ and $Prior\ Purchase$ have both a negative impact but lack required significance.

$ln(MarketCap)$, $Frequency$ and $Transaction\ size$ seem to be irrelevant. The Durbin-Watson statistic for the sample of purchase transaction is 2.21 and the adjusted R-squared comes to 4.03%.

In contrast to purchase transactions, the updated regulations on insider trading slightly influence abnormal performance after sale transactions. The coefficient is negative though, implying a negative abnormal performance even after the legal change. In section 6.4, the mean CAR difference confirms a significant diminished negative abnormal performance following the update in regulations but abnormal returns are still significantly negative. Also in contrast to purchases, the position of an insider has no meaningful effect and is consistent with Gebhardt (2013). However, $Momentum$ once again has the biggest and most significant coefficient, with a value of 0.079. The stock price trend in the 20 days leading up to a management transactions appears to be a major predictor for the development in the 20 trading days after the deal's execution. A purchase of the same security in 20 trading days prior to the event, also shows a significant negative influence on the mean cumulative abnormal return. This result is also confirmed by Aussenegg and Ranzi (2008) in their study into seven different European stock markets. Outside investors may attribute a higher content of private information to the contradicting transactions of insiders selling company securities after recent purchases. $ln(MarketCap)$ displays a minimal influence with a beta of 0.005 but is significant at the 5% level. $Prior\ Sale$, $Frequency$ and $Transaction\ size$ show no considerable influence. For sale transactions, the Durbin-Watson statistic is 1.97 and the adjusted R-squared equals 3.40%.

The numbers obtained for the variable $Momentum$ deserve a closer look. The multivariate regression analysis finds significant positive influencing factors for purchase as well as sale transactions. This fact sort of contradicts the evidence provided on Figure 4 in section 6.1 of this thesis, as the figure shows contrary market reactions to the trend observed during the 20 trading days preceding a transaction. However, Gebhardt (2013) who found similar results in a multivariate regression analysis also performed a more detailed univariate analyses. He finds that purchase transactions following a price run-up pre-event continue to show a positive abnormal performance post-event. In the same way, sale transactions after pre-event price declines continue to show a negative abnormal performance post-event. This would indicate that management transactions not always provoke trend contradicting abnormal performances as suggested by Figure 4. Givoly and Palmon (1985) and Noe (1999) provide comparable evidence that some portion of abnormal performances post-event cannot be directly connected to management transactions.

8 Conclusion

This thesis examines the influence of management transactions on stock returns in Switzerland. The Swiss Government introduced the first insider trading laws 15 years ago in an effort to create a fair and transparent stock market. Analyzing abnormal returns enables to illustrate possible impacts of management transactions and eventual exploitations of insider information. The method applied to determine abnormal returns is the event study. The period of examination runs from May 2011 until July 2014. After a thorough cleaning process, the data sample contains 792 purchase transactions and 776 sale transactions. In Switzerland, a public disclosure obligation for insider deals was introduced in 2005. The latest update to this legislation came into effect in April 2013, thus in the middle of the above mentioned examination period.

In accordance with the literature and the majority of comparable studies, this thesis shows the clear influence of management transactions on stock prices. Purchase and sale transactions show significant mean cumulative abnormal returns following the public disclosure of an insider deal. Considering these returns, fears that insiders exploit private information for personal enrichment seem valid. Abnormal performances relative to firm size are also examined. Deals in smaller companies trigger more pronounced reactions compared to larger firms and, thus, indicates a higher informational asymmetry. A fact supported by findings of previous studies and generally explained by the amount of attention attracted by bigger companies from financial analysts around the world. Abnormal performances relative to transaction size did not reveal conclusive evidence of a specific pattern, except reinforcing generally significant negative returns found after sale transactions. An update in insider trading regulations introduced in April 2013 seems to have reduced the negative abnormal performance following sale transactions. Abnormal performances triggered by purchases have grown, however.

Also, in line with the literature, results show generally a contrarian investment style by insiders, buying securities after negative trends and selling them after rallies. However, the multivariate regression analysis helps to discover the sizeable influence of stock price momentum on cumulative average abnormal returns. This could indicate that some abnormal returns can, at least partially, be predicted by pre-event stock momentum and that management transactions have a more limited influence. This subject has not received a lot of attention in the literature yet and has only been mentioned in a few select studies (e.g., Givoly and Palmon (1985), Noe (1999) and Gebhardt (2013)), although these findings question the long-term impact of information content derived from public disclosures of management transactions and would, therefore, merit further research.

9 References

Aktas, N., de Bodt, E., & Van Oppens, H. (2008). Legal insider trading and market efficiency. *Journal of Banking & Finance, 32*(7), S. 1379-1392.

Anderson, R., Reeb, D., Zhang, Y., & Zhao, W. (2013). The efficacy of regulatory intervention: Evidence from the distribution of informed option trading. *Journal of Banking & Finance*(37), S. 4337-4352.

Andre, G., & Dardas, K. (2011, June). Are Directors' Dealings Informative? Evidence from European Stock Markets. *Financial Markets and Portfolio Management, Volume 25*(Issue 2), 111-148.

Aussenegg, W., & Ranzi, R. (2008). Legal Corporate Insider Trading and the Price Impact of Private Information: Evidence for Germany. *The Open Business Journal*(I), 40-52.

Ball, R., & Brown, P. (1968). An Empirical Evaluation of Accounting Income Numers. *Journal of Accounting Research, 6*, S. 159-178.

Barclay, M., & Warner, J. (1993). Stealth trading and volatility - Which trades move prices? . *Journal of Financial Economics* , S. 281-305.

Betzer, A., & Theissen, E. (2009). Insider trading and corporate governance: The case of Germany. *European Financial Management, 15*(2), S. 402-429.

Bhattacharya, U., & Daouk, H. (2002). The World Price of Insider Trading. *The Journal of Finance, 57*(1), 75-80.

Boehmer, E., Musumeci, J., & Poulsen, A. (1991). Event-study methodology under conditions of event-induced variance. *Journal of Financial Economics, 30*, S. 253-272.

Carlton, D., & Fischel, D. (1983). The Regulation of Insider Trading. *Stanford Law Review, 35*(5), S. 957-895.

Chang, C.-Y. (2013). The market response of insider transferring trades and firm characteristics in Taiwan. *Emerging Markets Review, 16*, 131-144.

Degryse, H., de Jong, F., & Lefebvre, J. (2014). An Empirical Analysis of Legal Insider Trading in The Netherlands. *De Economist, 162*(1), S. 71-103.

Del Brio, E., Miguel, A., & Perote, J. (2002). An investigation of insider trading profits in the Spanish stock market. *The Quarterly Review of Economics and Finance, 42*, S. 73-94.

Dickgießer, C. (2010). *Directors' Dealings, Market Efficiency, and Strategic Insider Trading in the German Stock Market.* Dissertation, Technische Universität München.

Dymke, B., & Walter, A. (2008). Insider Trading in Germany - Do Corporate Insiders Exploit Infoarmation? *Official Open Access Journal of VHB, 1*(2), S. 188-205.

Fama, E. F. (1969). Efficient Capital Markets: A Review of Theory and Empirical Work. *The Journal of Finance*, *25*(2), S. 383-417.

Fidrmuc, J., Goergen, M., & Renneboog, L. (2006). Insider trading, news releases and ownership concentration. *The Journal of Finance, 61*(6), S. 2931-2973.

Finnerty, J. E. (1976). Insiders and market efficiency. *Journal of Finance*, *31*(4), S. 1141-1148.

Fisher, L., Jensen, M., & Roll , R. (1969). The Adjustement of Stock Prices to New Information. *International Economic Review, 10*, S. 1-25.

Friederich, S., Gregory, A., Matatko, J., & Tonks, I. (2002). Short-run Returns around the Trades of Corporate Insiders on the London Stock Exchange. *European Financial Management*, *8*(1), S. 7-30.

Gebhardt, A. (2013). *Essays on management transactions – Evidence from Switzerland.* Difo-Druck GmbH.

Givoly, D., & Palmon, D. (1985). Insider Trading and the Exploitation of Inside Information: Some Empirical Evidence. *The Journal of Business*, *58*(1), S. 69-87.

Gregory, A., Matatko, J., & Tonks, I. (1997). Detecting information from directors' trades: Signal definition and variable size effects. *Journal of Business Finance & Accounting, 24*(3), S. 309-342.

Jaffe, J. (1974). Special Information and Insider Trading. *The Journal of Business*, *47*(3), S. 410-428.

Jeng, L. A., Metrick, A., & Zeckhauser, R. (2003). Estimating the Returns to Insider Trading: A Performance-Evaluation Perspective. *The Review of Economics and Statistics, 85*(2), S. 453-471.

Jensen, M. C. (1978). Some Anomalous Evidence Regarding. *Journal of Financial Economics, 6*(3), S. 98-101.

Kloke, J., & McKean, W. J. (2015). *Nonparametric Statistical Methods Using R.* Boca Raton: CRC Press.

Kolari, J., & Pynnönen, S. (2010). Event Study Testing with Cross-sectional Correlation of Abnormal Returns. *The Review of Financial Studies, 23*(11), S. 3996-4025.

Kolasinski, A., & Li, X. (2010). Are corporate managers savvy about their stock price? Evidence from insider trading after earnings announcements. *Journal of Accounting and Public Policy, 29*(1), 27-44.

Krauskopf, L. (1991). Comments on Switzerland's Insider Trading, Money Laundering, and Banking Secrecy Laws. *Berkeley Journal of International Law, Vol. 9*(No. 1).

Lakonishok, J., & Lee, I. (2001). Are insider trades informative. *The Review, 14*(1), S. 79-111.

Lin, J.-C., & Hows, J. S. (1990). Insider Trading in the OTC Market. *The Journal of Finance, 45*(4), S. 1273-1284.

MacKinlay, A. (1997, March). Event Studies in Economics and Finance. *Journal of Economic Literature, Vol. 35*(No. 1), 13-39.

Manne, H. G. (1966). *Insider Trading and the Stock Market.* New York: The Free Press.

McWilliams, A., & Siegel, D. (1997). Event Studies in Management Research: Theoretical and Empirical Issues. *The Academy of Management Journal, 40*(3), S. 626-657.

Noe, C. (1999). Voluntary disclosures and insider transactions. *Journal of Accounting and Economics*(27), S. 305-326.

O'Brien, R. (2007). A Caution Regarding Rules of Thumb for Variance Inflation Factors. *Quality & Quantity*(41), S. 673-690.

Ravina, E., & Sapienza, P. (2010). What Do Independent Directors Know? Evidence from Their Trading. *The Review of Financial Studies, 23*(3), 962-1003.

Seyhun, N. H. (1986). Insiders' profits, costs of trading, and market efficiency. *Journal of Financial Economics, 16*(2), S. 189-212.

Sharpe, W. F. (1964). Capital Asset Prices: A Theory of Market Equilibrium under conditions of risk. *The Journal of Finance, 19*(3), S. 425-442.

Tong, W., Zhang, S., & Zhu, y. (2013). Trading on inside information: Evidence from the share-structure reform in China. *Journal of Banking & Finance, 37*, 1422-1436.

Wielhouwer, J. (2013). When is public enforcement of insider trading regulations effective? *International Review of Law and Economics*(34), S. 52-60.

Wong, M. C., Cheung, Y.-L., & Wu, L. (2000). Insider Trading in the Hong Kong Stock Market. *Asia-Pacific Financial Markets, 7*(3), S. 275-288.

Zingg, A., Lang, S., & Wyttenbach, D. (2007). Insider trading in the Swiss stock market. *Swiss Journal of Economics and Statistics, 143*(3), S. 333-364.

10 List of figures

11 List of tables

12 Abbreviations

AR	Abnormal return
BMP	Boehmer-Musumeci-Poulsen
CAR	Cumulative abnormal return
cf.	*Latin:* confer (“compare”)
CHF	Swiss franc
DMT	Disclosure of Management Transactions
EU	European Union
e.g.	*Latin:* exemplī grātiā (“for example”)
HTML	HyperText Markup Language
ISIN	International Securities Identification Number
MATLAB	Computing environment and programming language
No.	Number
OLS	ordinary least squares
p.	Page
SIM	Single-Index Model
SPI	Swiss Performance Index
U.S.	United States
U.K.	United Kingdom
VIF	Variance inflation factor