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The Norwegian market for corporate control

-A study examining the impact of firm- and deal specific variables on bidder returns

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NORGES HANDELSHØYSKOLE

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Executive Summary

The purpose of this thesis is to investigate whether international empirical evidence on the bidder return puzzle applies to the Norwegian market for corporate control. Numerous studies show that the bidder's abnormal return on average is close to zero percent upon announcement of a merger, and three variables are acknowledged as explanatory variables of bidder returns; size, public status and method of payment. The sample consists of 268 completed Norwegian mergers and acquisitions from 1990 to 2010. Analyzing only abnormal return from public bidders, the target can be private, public or a subsidiary.

The average cumulated abnormal return within the three-day window (ACAR (-1, 1)) for the entire sample is 0.997%, while ACAR (-5, 5) is 1.248%. Small acquirers receive an ACAR (-1, 1) that is 1.475% higher than large acquirers.

Acquirers paying the target shareholders with cash receive an ACAR (-5, 5), that is 2.993% lower than that of acquirers paying with stock, and 2.511% lower than that of acquirers paying with both stock and cash. This is surprising, and could imply a capital gains tax penalty.

Companies acquiring private targets receive ACARs roughly 4% higher than those acquiring public targets, an ACAR (-1, 1) that is 1.524% higher than those acquiring subsidiaries.

All three variables have shown to be associated with the magnitude of abnormal bidder returns in this thesis, and are summarized in the table below.

Summary of empirical evidence		
Mean difference between:	ACAR (-1, 1)	ACAR (-5, 5)
Small and large	1.475%**	0.958%
Private and public	3.599%***	4.041%**
Private and subsidiaries	1.524%**	1.295%
Cash and stock	-0.475%	-2.993%*
Cash and mixed	-0.659%	-2.511%*

*** Statistically significant at the 99 percent level
**Statistically significant at the 95 percent level
* Statistically significant at the 90 percent level

Preface

This thesis is written in the fall of 2011, as part of our Master Thesis in Economics and Business Administration at The Norwegian School Economics. Though numerous hours have been spent reading academic research within the field, the majority of the work has been collecting and processing the data. To obtain the data set necessary to conduct the analysis, we have fortunately received crucial help. We want to thank Haakon Buer with Børsprosjektet for helping us obtaining the necessary stock data and for the quick responses to our frequent inquires, Aksel Mjøs for giving us access to SNF and NHH's databases containing accounting and business information on Norwegian companies, numerous employees from the acquiring companies in the data set for answering our e-mail requests, and most of all, Karin Thorburn, our thesis supervisor. Her academic guidance and the always relevant and quick feedback are much appreciated.

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1.0 Introduction

Corporate finance in general and mergers and acquisitions (M&A) in particular is a recurring course topic at the Norwegian School of Economics (NHH). Both authors find the complex field of M&A to be intriguing, and during the theory review the distribution of takeover gains was a central theme. Specifically, the reasons for low bidder returns are disputed, and therefore academically interesting. Hence, this thesis will look further into the bidder return puzzle in mergers and acquisitions. Extensive research has already been carried out on the subject of bidder returns, especially on US and European data, seeking to understand which factors affect the abnormal return of the acquiring company (Song and Walking 2005).

According to a collection of empirical articles a typical bidder return upon announcement is less than one percent while in comparison the target returns (including the runup period) is around 20 percent (E. B. Eckbo 2010). Berk and DeMarzo (2007) report the average price reaction upon announcement to be 15 percent for the target company, and once again one percent for the acquiring company. A study by Betton et al. (2008) found that the size of the bidder's total equity along with the target's public status are associated with low bidder return. The method of payment and merger waves are also explanatory factors, though this is disputed in the financial literature.

This thesis focuses solely on the Norwegian market for corporate control, seeking to test the size and public status, as well as the two more disputed variables; method of payment and merger waves. The Norwegian market for corporate control is defined as domestic takeovers; hence both the acquirer and target is registered in Norway. The thesis examines a broad set of firms across industries, and includes corporate takeovers between 1990 and 2010.[1] In this time period 1472 mergers and acquisitions were completed, while 268 transactions met the criteria set in this thesis.[2]

Often, an analysis of takeover gains also includes the gains that accrue to the target shareholders. However, with only 24 public targets dispersed over the sample period, an analysis of the target's takeover gains is not likely to be statistically significant and will add little value. The target's takeover gains are therefore not examined in this thesis.

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[1] The specific sample criteria will be presented in the section "Description of the data sample".
[2] Source: Thompson Financial SDC (Securities Data Corporation) mergers and acquisitions database.

1.1 Structure

The thesis consists of a review of relevant theories and empirical evidence, forming the theoretical framework. The research question and the hypotheses are based upon this empirical evidence. The methods used in the analyses are described in the next section, though a large part of this literature is presented in appendices. This is followed by a thorough description of the sample and test variables. The results from the analyses are presented in the end, with a discussion of the results. The conclusion summarizes the rejection or verification of the hypotheses and attempts to answer the research question which the hypotheses are based upon.

1.2 Research question and hypotheses

Research question

Does international empirical evidence on the bidder return puzzle apply to the Norwegian market for corporate control?

From the research question five testable, non-directional hypotheses have been formulated.

The main hypothesis

$\mathbf{H_{M0}}$**:** The bidder's return *is not* affected by a takeover announcement

$\mathbf{H_{MA}}$**:** The bidder's return *is* affected by a takeover announcement

Hypothesis I

$\mathbf{H_{I0}}$**:** The size effect *does not* affect the bidder's return

$\mathbf{H_{IA}}$**:** The size effect *does* affect the bidder's return

Hypothesis II

$\mathbf{H_{II0}}$**:** The method of payment *does not* affect the bidder's return

$\mathbf{H_{IIA}}$**:** The method of payment *does* affect the bidder's return

Hypothesis III

$\mathbf{H_{III0}}$**:** The target's public status *does not* affect the bidder's return

$\mathbf{H_{IIIA}}$**:** The target's public status *does* affect the bidder's return

Hypothesis IV

$\mathbf{H_{IV0}}$**:** A merger wave *does not* affect the bidder's return

$\mathbf{H_{IVA}}$**:** A merger wave *does* affect the bidder's return

The main null hypothesis implies that abnormal returns upon announcement are zero, while the null hypothesis in hypotheses I-IV implies that abnormal returns are not affected by the chosen variables.

2.0 Theoretical framework

This section of the thesis presents the theoretical framework that constitutes the basis for the hypotheses. The results from the analysis will be discussed in light of the theories and empirical evidence presented here. The theoretical framework consists of various selected theories and empirical findings, to a great extent presented in Chapter 15 in The Handbook of Empirical Corporate Finance (Betton, Eckbo and Thorburn 2008) and Corporate Takeovers Volume One and Two (E. B. Eckbo 2010).

2.1 The bidder return puzzle

The creation of synergies such as economies of scale, tax reduction and easy entry into new markets are some of the many reasons for why mergers are conducted. A large body of empirical evidence conclude that on average, merger activity create wealth for shareholders.

A puzzling fact is that the announcement induced synergy gains are mainly distributed to the shareholders of the target firm, instead of a more even split of the gains between the acquirer and the target. As Andrade et al. (2001) states: "*acquiring firm shareholders appear to come dangerously close to actually subsidizing merger transactions.*" Why does the biggest slice of the pie accrue to the target shareholders when, at first glance, it is the acquirer who seeks out the opportunity, creates most of the synergies, and usually takes on the main risks?

Bruner (2004) report that *"about 40% of roughly 50 studies report negative announcement returns to buyers; 60% report positive returns. When statistical significance is taken into account, the studies of returns to buyer firm shareholders show an even stronger positive bias 26% shows value destruction, 31% show value conservation and 46% show value creation."*

One of the explanations for this uneven split is the fierce competition for attractive targets; the gains are driven towards zero, and most of the synergies accrue to the target. Regardless, companies continue to acquire one another, and some deals create more value for bidders than others.

2.2 Definition of corporate takeovers

Takeover is a collective term applied to various transactions of stock between companies and can be defined as: *"A general term referring to transfer of control of a firm from one group of shareholders to another group of shareholders. Change in the controlling interest of a corporation, either through a friendly acquisition or an unfriendly, hostile, bid."* (Harvey 2011). In this thesis the term takeover is used for mergers and acquisitions. Other forms of transactions such as *management buy-outs (MBO)*, *leveraged buy-outs (LBO)* and *joint-ventures* are excluded.

The terms mergers and acquisitions are often used synonymously, though there is a theoretical difference. In a merger the two companies combined form a new entity as the stock of both companies are surrendered, while in an acquisition the acquiring company purchases the stock of the target company and only the target's stock is surrendered. However, in practice merger is the term most commonly used to avoid a negative impression (Finance 2011), and the distinction in the meaning of the two terms may not really matter, as the net result is often the same; two separate entities now operating under the same roof (Sherman and Hart 2006). In this thesis the terms *takeover*, *transaction*, *merger* and *acquisition* will be used synonymously.

Furthermore, many research papers use the term bidder's return – not acquirer's return. This distinction is most likely due to the fact that when a takeover is announced, it is (in most cases) not completed. Since it is not completed, the acquiring company is still just a bidder. Since the sample in this thesis only includes completed transactions, there will be no distinction between the two terms.

As stated above, a takeover refers to the transfer of control of a firm. This implies that the acquirer's initial stake in the target company must be less than 50%, and the stake after completion must be 50% or more.

2.3 The Norwegian market for corporate control

Takeovers can be classified as the market for corporate control (Manne 1965). Roughly 300 takeovers are reported to the Norwegian Competition Authorities each year (Sørgard 2010).[3] The Norwegian market for corporate control, dormant in the 1980s compared to the major US and European markets, picked up steam in the 1990s. In 2007, merging activity peaked at an all-time high, before the market was impacted in 2008 by the worldwide financial crisis. The number of deals listed in SDC that matches the sample criteria, as outlined later in the thesis, is shown in the figure 1 below.

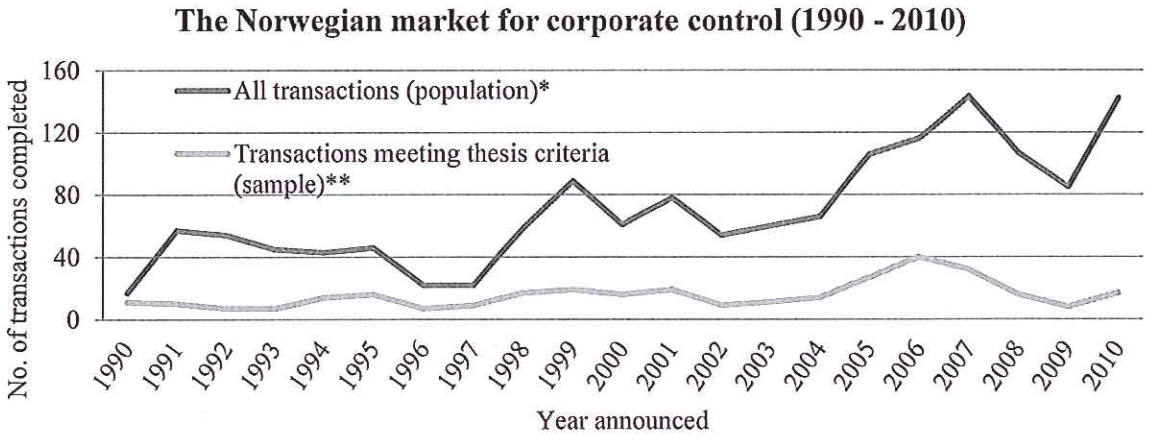

Figure 1: The Norwegian market for corporate control, from 1990 – 2010.

Both the tax regime and the legal requirements impact manager decisions, and potentially have implications for merger considerations. Although Norwegian authorities has made three revisions of the tax regime during the sample period, the marginal capital gains tax has been constant at 28 percent and the effective tax burden significantly lower thorough the period. Notably, the effective tax rate for private investors has been lower in the period from 1992 to 2006, than afterwards. Institutional investors have the option to carry forward tax and balance the tax burden against future losses, making the imposed tax ignorable. A more detailed report of the tax reforms during the sample period is found in appendix 1. The Norwegian Securities Trading Act seeks to ensure an open and orderly process in all acquisitions. To ensure that all shareholders are treated equally, an offer to purchase all the shares in the company (a mandatory bid) is triggered if a shareholder owns shares representing more than one third of the votes of a public company. A more detailed report of the Norwegian Securities Trading Act is found in appendix 2.

[3] In 2007, more than 500 takeovers were reported to the Norwegian Competition Authorities (The Norwegian Competition Authority 2011), while comparable numbers for 2010 was 400.

2.4 Comparison of the US and the domestic market for corporate control

When analyzing the Norwegian market for corporate control, it is reasonable to expect results that are in line with research conducted on the American merger market. The fluctuations at the Oslo Stock exchange is closely correlated to its American counterparts and the largest firms in Norway are involved in global industries such as oil, fish and IT. On the contrary, the US market is by far larger than the equity market in Norway, and the legal framework differs.

With regard to company size, the companies defined as large in a Norwegian context, would be defined as small or medium in an American context. Table 1 shows that the average market cap per firm listed at the Oslo Stock Exchange (OSEBX) was about 78 percent lower than the average firm listed at the New York Stock Exchange (NYSE) in 2010, and about 12 percent lower than firms listed at the NASDAQ. According to the World Federation of Exchanges (WFE), the same trend is also present from 1996 to 2010. Additionally, the overall equity market and trading volume is larger in the US Stock Exchanges.[4] Measured in investment flows in 2010, the NYSE is the largest exchange in the world with an investment flow of 208 billion dollar, enabling the companies to do larger deals. One may therefore expect that the size-effect has less impact in Norway compared to the US market.

Market cap per firms in USD millions			
	Nasdaq	NYSE	OSEBX
2010	1400	5985	1236
2009	1136	5087	955
2008	812	3058	563
2007	1308	6814	1425
2006	1234	5979	1222
2005	1139	6005	872

Table 1: Market cap by year at NASDAQ, NYSE and OSEBX.

The tax regulations in Norway are similar to those of the US, though the marginal tax rate on capital gains in the US ranged from zero to 28 percent in the sample period (IRS 2011). After the Taxpayer Relief Act was adopted in 1997, long term assets were taxed at a lower rate than short term gains (IRS 2011), which lowered the effective tax rate for the majority of investors.

Since cash payments trigger tax liabilities in both countries, it is reasonable to expect that share deals are preferred by the market. Moreover, since the tax payments in US are lower for most taxpayers, the analysis might show a stronger preference for stock deals in Norway compared to the US.

[4] Data provided by The World Federation of Exchanges (WFE Database 2010)

2.5 Basic economic reasoning for merger activity

From a microeconomic point of view there can be various incentives for a merger, but the common denominator in these motivations is the possibility of economic gain – creating value for shareholders, which is consistent with value-maximizing behavior. Hence, we find it useful to describe the basic economic reasoning for mergers. The value of the combined entity has to be higher than the added value of the separate entities; synergies have to be created by combining the entities (Brealey, Myers and Allen 2008). This section is based on standard textbooks in the field of corporate finance such as: *Principles of Corporate Finance* by Brealey, Myers and Allen (2008).

When the economic gain is positive, the merger is economically justified:

$$\begin{aligned} Gain &= PV_{AT} - (PV_A + PV_T) \\ &= \Delta PV_{AT} \end{aligned}$$

The acquirer (A) usually pays a premium above market value (PV) of the target (T) to convince the target shareholders to tender their shares.[5] The synergy value is distributed between the target and acquirer and thus, this premium has to be viewed as a merger cost for the acquiring company:

$$Merger\ cost = Offer\ price - PV_T$$

When calculating the costs of the merger in this manner, the distribution of merger gains between the target and the acquirer can be determined. The takeover should only take place if the acquirer's NPV is positive:

$$\begin{aligned} NPV_A &= Gain - Merger\ Cost \\ &= \Delta PV_{AT} - (Offer\ price - PV_T) \end{aligned}$$

When $NPV_A > 0$, the merger creates value for the acquiring shareholders, and should be reflected in the stock price fluctuations upon announcement of the transaction.

[5] Assuming the target is correctly valued.

2.6 Announcement returns

The bidder's stock price reaction upon the announcement of the merger can be used to gauge investors' assessment of whether the acquirer paid too much or too little for the target (Berk and DeMarzo 2007). The low announcement returns observed by e.g. Eckbo (2010) may imply that investors are skeptical about the value of the merger in a significant number of cases (Damodaran 2001).

Hietala et al. (2003) suggest that upon announcement it can be difficult to really assess the meaning of the market's reaction, as it reveals information about the synergies of the combined entity and the separate values of bidder and target and bidder overpayment. According to the authors, these effects are difficult to isolate.

Though this thesis focuses on short-term performance of mergers, studies of long-term performance of the post-merger firm show that the acquirer tends to underperform compared to its peers in a three-year period after an acquisition. To some degree, these findings validate investors' low estimates of synergy- and post-merger value creation (Clayman, Fridson and Troughton 2008). In short-term analyses the common way of measuring the acquirer's stock price reaction is through abnormal returns.

2.6.1 Abnormal returns

Abnormal returns are defined as "*the component of the return that is not due to systematic influences (market-wide influences). In other words, abnormal returns are above those predicted by the market movement alone*" (Harvey 2011). Hence, abnormal returns are those in excess of the return required by investors as predicted by an asset-pricing model (the expected return). Further, Harvey (2011) states that abnormal returns sometimes are confused with excess returns, which is the "*difference between asset return and riskless rate*". However, in this thesis the terms abnormal returns and excess returns will be used synonymously, as the financial literature on bidder returns use these two terms synonymously.

Financial literature often reports the abnormal return in terms of cumulative abnormal return (CAR) which is the sum of the difference between expected and actual return within the event window, and average cumulative abnormal return (ACAR).

2.6.2 Empirical evidence on bidder abnormal returns

A takeover announcement's effect on the bidder's return is not clear-cut, though numerous studies have been conducted. These studies indicate that roughly half of all bidding firms earn a negative excess return around the announcement date of the takeover (Damodaran 2001).

One of the most cited studies reports bidder excess returns of 4% around tender offers, but no excess returns around mergers (Jensen and Ruback 1983).

Another frequently cited study report a decline in acquirer excess returns from 4.4% (1960s) to 2% (1970s) to 1% (1980s) from 1962 until 1985 in tender offers (Jarrel, Brickley and Netter 1988).

A study of acquisitions spanning four decades (1973 – 1998) reports average abnormal bidder returns of -0.7% (Andrade, Mitchell and Stafford 2001).

A summary of a large body of evidence spanning four decades, reports the unconditional acquisition period return to be roughly zero or slightly negative (Song and Walking 2005).[6]

In a collection of more recent empirical articles, Eckbo (2010) reports a typical bidder return of less than 1% upon announcement.

The studies cited above all lead to the same conclusion; the bidder's abnormal returns are close to zero.

[6] Jensen and Ruback (1983), Jarrel, Brickley and Netter (1988), Jarrel and Poulsen (1989), and Andrade, Mitchell and Stafford (2001).

2.6.3 Why do acquirers overpay for their targets?

Explaining *why* the bidder's excess returns are low is one of the subjects intriguing financial research over the past decades, and a number of explanations have been offered.

The winner's curse suggests that if more than one company with equal synergy opportunities enters into a bidding contest for the same target, the company that overestimates the potential synergies will enter the highest bid. The bid will then reflect overestimated synergies, hence be too high in relation to actual realized synergies. The bidder wins the bidding contest, but in reality loses (Thaler 1988).

The free-rider problem argues that when the number of shareholders is many and large-block shareholders are non-existent, minority shareholders free-ride on the decisions by other shareholders to tender their shares. The marginal minority shareholder only tender if the offer price is at or above the expected value of the share in the merged firm, and thus makes it difficult for the acquiring firm to make a profit (Grossman and Hart 1980).

The free cash flow hypothesis advocates that the acquirer's shareholders suffer agency costs as empire-building managements would rather spend the free cash flow in the market for corporate control than increase payout to shareholders (M. C. Jensen 1986).

The hubris hypothesis of corporate takeovers suggests that managers of bidding firms overestimate their own competence, or suffer from hubris.[7] Takeovers neither create nor destroy value as the wealth is simply redistributed from the overpaying acquirer's shareholders to the target's shareholders (Roll 1986).

Although the theories presented above are relevant, the main focus of this thesis is to examine how bidder return relates to the acquirer's size, the target's public status, method of payment and merger waves.

[7] The definition of hubris is extreme haughtiness, pride or arrogance. Source: Wikipedia, The Free Encyclopedia. (2011, October 2). *Wikipedia.* Collected October 11, 2011 from Hubris: http://en.wikipedia.org/wiki/Hubris

2.7 The size effect

The size effect is associated with low bidder returns (E. B. Eckbo 2010). The relationship between the target's size relative to the bidder's size and bidder returns has proved to be positive and statistically significant (Asquith, Bruner and Mullins 1982). The relationship being positive implies that bidder returns are higher when the difference in size between target and acquirer is smaller. The size effect can also be estimated separately without regard to the target's size, and shows that large acquirers have lower announcement returns than small acquirers.

When determining company size, various criteria can be applied. The most commonly used benchmark in studies of the size effect, applied by Asquith et al. (1982), Moeller et al. (2003) and Eckbo and Thorburn (2000) among others, is the market value of equity. For example, Moeller et al. (2003) define a large firm as a company with a market capitalization within the 25^{th} upper percentile of all listed firms at the relevant stock exchange

2.7.1 Empirical evidence on the size effect

Asquith et al. (1982) conduct a study on bidder returns and find that when the target's size is 50 percent of the bidder's size, the bidder's ACAR is 1.8% greater than when the target's size is only 10 percent of the bidder's size. These findings include both completed and uncompleted merges. Viewing the completed mergers separately result in an ACAR 4% greater than for uncompleted mergers.

A study of 12,023 acquisitions by American public firms from 1980 – 2001 (Moeller, Schlingemann and Stultz 2003) find that the announcement return is about 2% higher when the acquirer is a small firm, than when the acquirer is a large firm. This finding is independent of method of payment and whether the target is public or private. The study concludes that the size effect in bidder returns are "*robust to firm and deal characteristics, and it is not reversed over time.*" Eckbo (1986) documents that in the US, the acquiring firm is sometimes ten times larger than the target firm, while in Canada the size of acquirer and target is more similar. Also, Jarell and Poulsen (1989) find that the relative size of the targets to the acquiring firms plays a significant role in distributing the percentage gains in takeovers.

2.7.2 Why is a size effect observed?

Asquith et al. (1982) note a difficulty in the methodology of measuring CAR when the size of bidder and target is disparate. As an example, assume a transaction where the net present value accruing the acquirer is equal to 10% of the target's market value of equity. If the target and acquirer is of the same size (same market capitalization), the acquirer CAR should be 10%. However, if the acquirer's market capitalization were 20 times larger than the target's, the acquirer CAR would only be 0.5%. This implies that the measurement of CAR to large bidders can appear statistically insignificant, though the dollar gain in the above example is identical regardless of the acquirer's size relative to the target's size.

The example by Asquith et al. point to an important issue which has not yet been discussed in this thesis: the difference between relative and absolute gains. Moeller et al. (2003) reported an average equally weighted abnormal return of 1.1% in their sample, but an average dollar loss of 25.2 million (both upon announcement), which lead to the conclusion that a size effect might exists. Their explanation is that small firms make profitable, but small acquisitions while large firms make unprofitable, but large acquisitions thus resulting in an aggregate absolute loss, as the gains to the small firms are much smaller than the losses endured by the large firms. Further, Moeller et al. (2003) suggest that even though the equally weighted returns are usually applied in event studies, the value-weighted returns may lead to a different assessment. In their sample the value weighted return was -1.18%, in comparison to 1.1% (equally weighted). These findings imply that the low CAR observed in so many studies is not solely due to the methodology difficulties in applying CAR, but due to actual differences in profitability in acquisitions by large and small companies.

From this discussion a new question arises; *why do small acquirers make more profitable acquisitions than large acquirers?* Moeller et al. (2003) suggest that managers of large companies are more likely to suffer from hubris, and large companies are more likely to be overvalued (*the overvaluation hypothesis*). In addition, large companies are more likely to be further along in their life cycle, hence growth opportunities may be low though cash flow is high. This could imply that the effect of *the growth opportunities signaling hypothesis* and *the free cash flow hypothesis* is stronger for large companies than small companies. Furthermore, Moeller et al. (2003) claim that *the free-rider hypothesis* is more likely to be relevant for large companies with widely traded securities, as it would be costly to establish large short positions for small companies.

2.8 Method of payment

Various studies have shown diverging results in bidder returns around announcement relating to the method of payment. In takeovers the acquiring company can pay the target with all-stock, all-cash, various debt securities or a mix of securities and cash (Betton, Eckbo and Thorburn 2008).

2.8.1 Empirical evidence on method of payment and bidder returns

An early study of the US and UK markets (Franks, Harris and Mayer 1988) found that in the UK neither cash nor equity acquisitions give the bidder a significant abnormal return – the gains accrue to the target shareholders. In the US though, the bidders in cash acquisitions have a significant positive gain, while the bidders in equity acquisitions have significant losses.

Brown and Ryngaert (1991) find that the bidders of all-cash offers receive an abnormal return close to zero, while all-stock and mixed offers receive a significantly lower return (loss). There is no significant difference between the all-stock offers and the mixed offers.

A study of successful (completed) takeovers between 1972 and 1981 reports higher bidder returns upon announcement for all-cash offers, than all-stock offers. An example is an ACAR of -1.03%[8] in stock exchange offers, compared to a ACAR of 0.26%[9] in cash offers on announcement day (t = 0). The two-day ACAR (-1, 0) is -1.47%[10] on stock offers and 0.24%[11] on cash offers (Travlos 1987). Consistent with these findings; that stock offers have a negative announcement effect, Asquith et al. (1982) find that the returns of the bidding firms are positive for cash offers, but negative and significantly smaller for stock offers. Their sample is collected from roughly the same time as Travlos (1987), from 1973 – 1983, and shows the same trend. The average two-day announcement (-1, 0) excess return on stock offers is -2.4%, compared to 0.2% on cash offers.

Recent findings from the Canadian market confirm that ACAR is highest for all-cash bids and lowest for all-stock deals (Eckbo and Thorburn 2000). In a study including only non-hostile deals with a minimum deal size of five percent of bidder market value, Savor (2006) show that ACAR (-1,1) is -3.5% for all-stock bidders and 1% for all-cash bidders.

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[8] Significant at the 0.01 level (z = - 3.22)
[9] Not significant at conventional levels (z = 1.56)
[10] Significant at the 0.01 level (z = - 5.07)
[11] Not significant at conventional levels (z = 1.11)

2.8.2 Why does method of payment affect bidder returns?

Typically, cash offers are associated with hostile takeovers and high premiums, while stock offers are associated with friendly exchange offers and low premiums (Travlos 1987). In addition, most countries have capital gains taxes, which make cash deals more expensive for the selling shareholders as they are not able to delay their tax obligation. This would imply that cash offers demand a higher premium to compensate for the inconvenience of taxes (capital gains tax penalty) (Brown and Ryngaert 1991).

Although their research yields similar results as the evidence presented above in the UK and US markets, Franks et al. (1988) emphasize that the preference for cash deals in the UK were present before the introduction of capital gains taxes in 1965. Other theories might therefore help to shed light over the empirical findings.

Myers and Majluf (1984) introduced the theory of adverse selection. The fundamental assumption is that cash payment contains less asymmetric information – the value of one dollar is known, but the real value of the firm is not. When information asymmetries are present, investors might therefore hesitate to accept stock as payment. Travlos (1987) attributes his findings of higher bidder returns in cash deals to signaling effects. The equity-signaling hypothesis implies that financing the takeover with equity (common stock) conveys negative information about the acquirer. The negative information being overvalued equity. Consistent with the argument put forward by Myers and Majluf (1984), a price decline is observed around the announcement of seasoned equity offerings (SEO) (Asquith and Mullins 1986). The negative response happens because the market is unable to discriminate between shares that are issued due to overpricing and shares that are issued in order to raise capital. Building upon the theories of adverse selection, Brown and Ryngaert (1991) develop a model where the method of payment conveys information to the market about the real value of the bidder. Hansen (1987) also reports that bidders prefer to pay with shares when they find their own shares to be overpriced.

Contrary, Officer et al. (2009) show that uncertainty relating to the real value of the target results in lower abnormal announcement date returns for the acquirer. Including only deals over $50 million dollar, he report that if the acquirer uses stock as the sole payment, it moderates the negative effects of information asymmetries and yields positive abnormal returns.

2.9 The target's public status

Whether the target is a public or private company has shown to impact the magnitude of bidder announcement returns (Betton, Eckbo and Thorburn 2008). More specifically, the acquirer receives higher bidder returns when the target company is private, in contrast to public.

For clarification, a public company is defined as "*those corporations whose stock is traded on a stock market or exchange, providing shareholders the ability to quickly and easily convert their investments into cash*" while a private company is defined as "*a company whose shares do not trade on a public market*" (Berk and DeMarzo 2007).

2.9.1 Empirical evidence on target public status and bidder returns

Fuller et al. (2002) study 3,135 takeovers from 1990-2000, where the acquirer conducted multiple completed transactions. They report that bidder returns are significantly negative when the target is public and significantly positive when the target is private or a subsidiary. The ACAR (-2, 2) is –1%[12] when the target is public, and 2.08%[13] and 2.75%[14] for private targets and subsidiaries respectively. These are the aggregate values from all bids performed by the acquirer (of several target), but the ACARs from the separate bids show roughly the same result. In a large and unrestricted sample, Moeller et al. (2003) find comparable results.

When Faccio et al. (2006) examined mergers from 1996 to 2001 in Western European countries, the results were in line with American research. Acquirers of public firms earned a trivial ACAR of -0.38%, while acquirers of unlisted targets received an ACAR of 1.48%.

Including only completed acquisitions, Bradley and Sundaram (2006) report an ACAR of –0.7% when the target is public, and 1.9% when the target is private.

[12] Significant at the 5 % level
[13] Significant at the 1 % level
[14] Significant at the 1 % level

2.9.2 Why do private targets create higher values for acquiring shareholders?

60 to 70 percent of US acquisitions, and even a larger portion of European acquisitions, are deals where the target is private (Capron and Shen 2007). The fact that acquirers pay more for public firms than for private is widely recognized in the academic literature, and often labeled *the private firm discount*. As an example, Koeplin et al. (2000) reported that private companies sell their shares at a 20 to 30 percent discount compared to their public peers, measured by value multiples such as EBIT and EBITDA.

Fueller et al. (2002) suggest that the discount is due to liquidity; while public shareholders have the option to sell their shares in the market, a private firm or a subsidiary have more limited choices. However, a closely related hypothesis tested by Chang (1998), called *the limited competition hypothesis*, failed to get support in a sample of 281 mergers from 1981 to 1992.

Some empirical evidence suggests that prior target valuations are of importance. Examining target firms that withdraw from IPOs before they entered into a merger, Cooney et al. (2009) reports more positive bidder announcement returns. Intuitively, firms withdraw from an IPO because the value is too low. The reasoning behind the model is that targets with a prior low pricing, will bargain less aggressively than non-priced firms, and thus '*giving away*' value to the acquirer.

Bruner (2004) argues that bidders seeking to take over or merge with a public firm are being forced to pay a high premium, simply because the competition between bidders is fierce. With private firms, the opposite is true, because private firms and assets is a less competitive segment.

Capron and Shen (2007) conclude that the gain from buying a public firm is not universal, but depend on the strategic fit to the acquirer, degree of information asymmetry, negotiation skills, search cost and valuation differences.

2.9.3 Public status, method of payment and size

Hansen (1987) emphasize that the probability of stock as method of payment increases with the size of the bidder's assets as well as the size of the liabilities.

A compilation of studies by Betton et al. (2008) reports that the ACAR is negative in stock offers when the target is a public company. In fact, stock payment tends to cause a statistically significant price drop of 1% when the target is public. When the target is private, the abnormal bidder returns are positive.

A study by Moeller et al. (2007) of 4,322 takeovers from 1980-2002 report an ACAR (-1, 1) of 0.8% for the total sample, -2.3% and 0.7% in all-stock and all-cash deals, respectively, when the target is public, and 3.5% in all-stock deals when the target is private.

Applying a two-day window, Chang (1998) examines the difference in bidder ACAR upon announcement, and distinguishes between private and public targets, and all-stock and all-cash deals. He finds that ACAR is largest when the target is private and method of payment is stock (2.64%), and lowest when the targets is public and the method of payment is stock (-2.46%). Both results are statistical significant at the 1% level. Private targets that were acquired with cash resulted in an ACAR of 0.09%, and public targets acquired with cash resulted in an ACAR of -0.02%, both results statistically insignificant.

Applying a three-day window, Betton et al. (2008) examines the difference in bidders ACAR upon announcement, and distinguishes between public status, size and method of payment. They reports that ACAR is highest at 6.4% when the target is private, bidder is small and the deal is all-stock. ACAR is lowest at -2.2% when the target is public, the bidder is large and the deal is all-stock. Both results are significant at the 1% level. Large bidders acquiring public targets with all-cash receive an ACAR of -0.3%, while the small bidder's ACAR is even lower at -0.6%. Large bidders acquiring private targets with stock as the method of payment results in an ACAR 0.1%, and small bidders acquiring private targets with all-cash receive an ACAR of 17.6%.

2.10 Empirical evidence on merger waves

A merger wave is defined as a "*clustering in time of successful takeover bids at the industry- or economy level*" Betton et al. (2008). Notably, merger waves are highly correlated with high market valuation and stock market booms (Jovanovic and Rousseau 2001).

A large number of empirical studies seek to describe the nature of the different waves. The waves are typically labeled as the great merger wave in the late 1890s and early 1900s (O'Brian 1988), the conglomerate merger wave of the 1960 (Jensen and Murphy 1990), the re-focusing wave of the 1980s (M. C. Jensen 1986), and the global wave from 1994 to 2000 (Brady and Moeller 2007). More recent classifications of merger waves include the second global wave that started in 2003 and ended with the financial crisis of 2007 (Brady and Moeller 2007). Moeller et al. (2005) also report a merger wave between 1998 and 2001.

In a comprehensive study of merger waves from 1980 to 2001, Moeller et al. (2005) measure the dollar loss to acquiring-firm shareholders. They recognize that the bidder's shareholders lost massively in the years from 1998 to 2001, compared to the entire decade of 1980. They also recognize that acquiring-firm shareholders on average earned money from 1994 to 1997. On average, the bidder's ACAR within a three day window is positive over the entire time period (ACAR of 1.1% from 1980 to 2001), but lower in merger waves. In the contraction period from 1991 to 2001, the bidder's ACAR is 1.2%, while it is lower at 0.6% in the merger wave from 1998 to 2001. Relevant results are presented in table 2.

Moeller et al (2005)	
Year	CAR (-1,1)
1990	0.0095
1991	0.0279
1992	0.0186
1993	0.0182
1994	0.0153
1995	0.0126
1996	0.0157
1997	0.0136
1998	0.0094
1999	0.0086
2000	0.0036
2001	0.0026
1980–1990	0.0064
1991–2001	0.012
1998–2001	0.0069

Table 2: ACAR to bidders from 1990 to 2001, from Moeller et al.

Dong et al. (2006) study mergers from 1978 to 2000, between public firms with a transaction value above 10 million. Ranking firms by the price to residual-income and price to book ratios, they find that ACAR(-1,1) is on average 1.5% lower for bidding firms that are overvalued, compared to undervalued bidders. Assuming that on average, bidders as well as targets are overvalued in stock market booms, these findings are consistent with the merger wave theory.

2.10.1 Why are merger waves observed?

Many theories have been put forward to explain why merger activity clusters into waves. A selection of main theories, excluding agency theories, is presented below.

Coase (1937) argues that mergers are a response to changes in technology, which forces firms to change the size in order to stay competitive: "*It should be noted that most inventions will change both costs of organizing and the costs of using the price mechanism. In such cases, whether the invention tends to make firms larger or smaller will depend on the relative effect on these two costs*". Drawing upon this insight, Mitchell and Mulherin (1996) suggest that the M&A waves can be explained by economic, technological and regulatory shocks.

Harford (2005) explains the merger waves as a response to specific industry shocks that require "*large scale reallocation of assets*", and conclude that market liquidity, not manager's mispricing, is a key driver of merger waves. On the contrary, Rhodes-Kropf and Viswanathan (2004) advocate that private information can lead to increased M&A activity in bull markets, because managers of target firms misjudge the synergies and accept overvalued stocks as payment. Shleifer and Vishny (2003) arrive at the same conclusion, but their fundamental assumption is that rational managers understand how to benefit from market mispricing and conduct M&A transactions while their stock is overpriced.

2.10.2 Merger waves and size

Asquith et al. (1982), Moeller et al. (2005) and Betton et al. (2008) among others find that the size effect is strengthened during mergers waves. Asquith et al. (1982) formulates a time effect hypothesis suggesting the returns of bidding firms may be altered by time changes in the market for corporate control. These time changes can be changes surrounding legal restrictions and changes in merger activity. The hypothesis is supported in a sample from 1967 to 1969. Moeller et al. (2005) reports that the aggregate loss from 1998 to 2001 is driven by a small number of very large deals, which they characterize as "*wealth destruction on a massive scale.*" When excluding the deals with losses of $ 1 billion or more (2% of the entire sample), the aggregate shareholder wealth from 1998 to 2001 increased upon announcement. The conclusion must be that the size effect can partially be explained by a unique time effect. Betton et al. (2008) report that the bidder's size was particularly large in acquisitions during the merger wave of 1999 and 2000 and suggest that; "*the bidder size effect may also represent a unique time-period effect.*"

2.10.3 Merger waves and method of payment

Rhodes-Kropf & Viswanathan (2004) point out that in periods of merger waves, stock is the most common payment method. The effect is most significant in the acquisition wave of the late 1990s (Andrade, Mitchell and Stafford 2001). Contradicting the empirical evidence presented above, Betton et al. (2008) emphasize that mixed cash-stock-offers and all-stock bids was equally common in the period from 1980 to 2005.

The mispricing-theory put forward by Shleifer and Vishny (2003) suggests that target management accepts overvalued stocks as method of payment, as is often the case in periods with high stock market valuations. Notably, this model is not as robust when mixed offers are taken into account (Eckbo, Ronald and Heinkel 1990).

2.11 The explanatory variables summarized

Betton et al. (2008) are reported in detail throughout the previous sections, and is summarized in this section. Examining all the various variables discussed above, they find that the highest bidder ACARs occur when small bidders acquire private targets with cash within the period 1991 to 1995. The lowest bidder ACARs occur when large bidders acquire public targets paying with stock.

The average initial bidder announcement return within a three day window is 0.73% for the entire sample. Small bidders obtain a cumulative abnormal return of 0.4%, whereas large bidders result in a negative ACAR of -0.4%. Public targets causes a negative bidder ACAR (-0.8%), and private target result in a positive ACAR of 1.7%. All cash bids yield an ACAR of 0.8%, while all stock acquisitions results in a lower ACAR of 0.2%. Bidders that operated from 1991 to 1995 earned an ACAR of 1.7%, and bidder's active from 1996 to 2000 earned a lower ACAR of 0.7%.

An overview of the relevant empirical results presented in this section is found in appendix 3.

3.0 Methodology

The purpose of this chapter is to provide insight into how the analysis is methodologically designed, and to explain and advocate the methods and procedures applied to verifying or rejecting the null-hypotheses. The analysis is based on the event-study methodology, and has a descriptive design.

3.1 Validity and reliability

When determining the power of any analysis, it is important to consider the validity and reliability of the study. Validity concerns the accuracy of measuring what one intends to measure, hence it is the interpretation of the data itself that are validated, not the methods or tests applied on the data (Gripsrud, Olsson and Silkoset 2004). Reliability at a general level concerns the resumption of the analysis; will the analysis give the same results if it were to be repeated? To ensure high reliability it is important to focus on accuracy and precision (Gripsrud, Olsson and Silkoset 2004).

3.2 The event-study methodology

The event-study methodology was introduced by Fama et al. (1969), and has since become the standard method of measuring the price reaction of events and announcements on securities (Binder 1998). The methods chosen in the analysis is based on the two classical papers by Brown and Warner (1980) and Brown and Warner (1985) on event-study methodology.

3.2.1 Estimation period and event windows

In an event study, the estimation period and event window are important concepts. The estimation period are the trading days used to determine the individual companies' expected return, while the event window are the days in which the stock prices of the companies in the sample are examined.

The estimation period in this thesis (-200, -6) starts 200 trading days prior to the announcement and ends 6 trading days before the announcement (194 trading days). The estimation periods chosen in articles within the field varies from 136 to 239 trading days.[15]

[15] Brown and Warner (1985) use an estimation period of 239 trading days, Betton et al. (2008) use 136 trading days, while Fama et al. (1969) use between 100 and 300 months. Moeller et al. (2005), who studies serial acquires, use an estimation period of 199 trading days (-205, -6).

The analysis will measure the effect of a merger announcement (the event) within two event windows. Event-window one is a three-day event window (-1, 1), while event-window two is an 11-day event window (-5, 5). Day 0 is the day of the announcement. The lengths of the event-windows are in compliance with most of the studies compiled by Betton et al. (2008), and will better enable a comparison to other findings.

This estimation period and event windows are visually presented in figure 2.

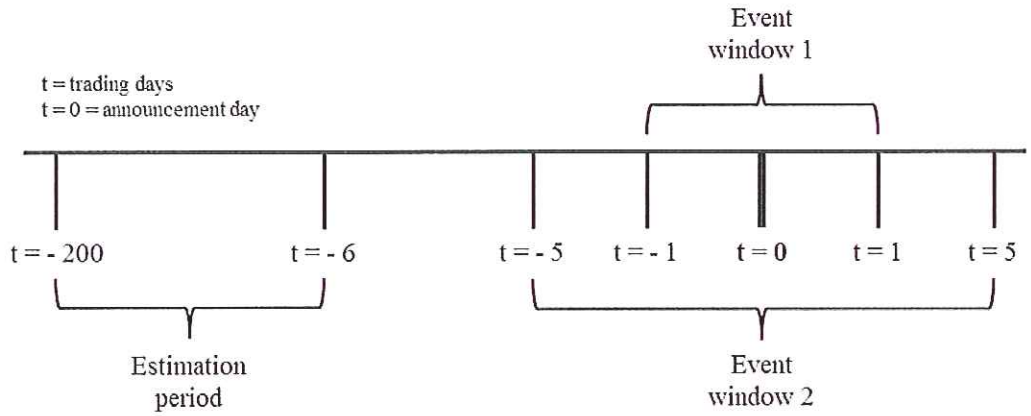

Figure 2: Estimation period and event windows

3.3 The market model

The market model is also referred to as the market and risk adjusted model by Brown & Warner (1980). It takes market-wide movements into account, and includes the systematic risk of each security in the sample.[16] The alpha (α) and beta (β) are parameters in the market model, estimated through ordinary least square regression (OLS)[17]. The model is also referred to as the OLS market model.[18] The alpha is the intercept between the regression line and the y-axis, while the beta is the slope of the regression line.

$$A_{it} = R_{it} - \alpha_i - \beta_i R_{mt}$$

Equation 1: The market model

[16] To get a better understanding for why other models are not applied, see appendix 4.
[17] The model parameters can also be estimated through other procedures than OLS regression. Examples are the Scholes-Williams- and Dimson-based procedures presented by Brown and Warner (1985). Their findings do however not convey that the alternative procedures are better or worse than the OLS procedure. Also, the OLS procedure is the dominant method used in practice, especially within economics and finance (Stock & Watson, 2003)
[18] For a thorough report on ordinary least square regression and the assumptions behind it, see appendix 4.

The market model predicts that part of the return on day t is independent from the market, while other parts are not. The intercept (α_i) is the part of the return which is independent of the market, while the slope multiplied with the market return ($\beta_i R_{mt}$) is dependent. The estimated abnormal return (A_{it}) in the market model is the realized return which cannot be explained by neither of the two factors.

3.4 Application of abnormal returns

A problem that may occur in simply applying abnormal returns (equation 1) on the announcement date to measure the merger's effect on the acquirer's stock price is that the information about the event may not have reached the market at the exact date of the official announcement. Information may have leaked prior to the announcement (partial anticipation), and additional information may have reached the market after the announcement date. In addition, the announcement date may actually be wrong, or information about the date may be incomplete.[19]

To account for these problems, Fama et al. (1969) employed a technique called cumulated average residual.[20] This technique is frequently used in event study methodology, and is referred to as cumulated abnormal return (CAR) and average cumulated abnormal return (ACAR). The CAR is easily computed from the abnormal returns estimated through the market model.

Equation 2 cumulates the abnormal returns for a single security within a given event window. In this thesis CAR windows are (-1, 1) and (-5, 5) as presented in figure 2. However, the interesting results are the average CAR for the entire sample, the ACAR, which is easily computed from the CAR.

$$CAR_{i(t_1,t_2)} = \sum_{t=1}^{T} AR_{it}$$

Equation 2: Cumulated abnormal returns

Equation 3 sums all CARs for every security in the sample, and divides it with the number of observations (events).

$$ACAR_{(t_1,t_2)} = \frac{1}{N}\sum_{i} CAR_{i(t_1,t_2)}$$

Equation 3: Average cumulated abnormal returns

[19] This will be further discussed in the presentation of the data sample.
[20] Fama et al. (1998) also discusses the application of BHAR (buy-and-hold abnormal returns), but argues that this CAR is favorable to BHAR.

3.5 Statistical testing

To test the hypotheses the ACAR must be subject to statistical testing. Statistical testing is conducted to determine the statistical significance of the results.[21]

3.5.1 The student t-test

The student t-test, normally referred to as simply t-test, is applied to test the hypotheses. The t-test is appropriate when the population is normally distributed or the sample size is sufficiently large, and when the standard deviation (σ) is unknown and has to be estimated from the data (the sample) (Weinberg and Abramowitz 2008).[22]

As an example, consider the main hypothesis in this thesis.[23] If the null-hypothesis is verified, the ACAR is not statistically different from zero, while a falsification means accepting the alternative hypothesis.[24] The relationship is described in equation 4.

$$H_0: \mu = c$$

$$H_{A1}: \mu \neq c \quad ; \quad H_{A2}: \mu < c \quad or \quad H_{A3}: \mu > c$$

H_0:μ = the null hypothesis
H_A:μ = the alternative hypothesis
c = a specified number (equal to zero for the main hypothesis)

Equation 4: Representation of null and alternative hypothesis, using t-test

3.5.2 The independent samples t-test

The difference between the one-sample t-test and the independent samples t-test is that the latter tests the difference in means between two variables, as opposed to testing whether one separate variable is significantly different from zero. This allows for testing whether the variables in each hypothesis are significantly different from one another. The tests are based on the same assumptions.

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[21] For a more detailed report on statistical testing and significance, view appendix 5.
[22] Weinberg & Abramowitz (2008) notes that sample sizes above N=30, is sufficiently large.
[23] H_{M0}: The bidder's return *is not* affected by a takeover announcement
H_{MA}: The bidder's return *is* affected by a takeover announcement
[24] The ACAR will be tested for two event windows (-1, 1) and (-5, 5), and may not lead to the same results.

3.5.3 Cross-sectional regression

A t-test is limited to testing a single variable, or two variables. It is, however, likely that the ACAR depends on several variables at the same time. This is tested through linear regression, also called cross-sectional regression, and the main principles are the same. The regression line is presented in equation 5.

$$X_i\emptyset = \emptyset_0 + \emptyset_1 \text{Public}_i + \emptyset_2 \text{Private}_i + \emptyset_3 \text{Cash}_i + \emptyset_4 \text{Stock}_i + \emptyset_5 \text{Unknown}_i + \emptyset_6 \text{Large}_i + \emptyset_7 \text{Merger wave}_i$$

Equation 5: Example cross-sectional regression line.

4.0 Description of the data sample

This section presents the data sample: the data collection process, the criteria chosen to select the sample and the variables needed for the analysis. The descriptive statistics of the sample will be presented separately.

4.1 The data collection process

The majority of the sample is obtained from The Securities Data Corporation (SDC), mergers and acquisitions database, from Thompson Financial. This is a renowned database, used in the majority of recent papers within this field of study.[25] However, a crosscheck with another database, Zephyr, revealed 45 transactions not listed in the SDC database.[26] These transactions were included in the sample, and the total number of transactions is 268.

Both SDC and Zephyr lack important information such as stock prices, number of shares, correct ticker numbers and method of payment which is needed for analytical purposes. The correct ticker numbers (needed for correct stock prices and number of shares) as well as method of payment was obtained from extensive research online, and contact with the Oslo Stock Exchange. The stock prices and number of shares were provided on request by Børsprosjektet[27], a database operated by The Norwegian School of Economics (NHH).

The majority of the data is collected through secondary sources. Secondary data is information collected by others; hence it is important to be aware of possible weaknesses. Error sources applicable to this thesis are especially non-sampling errors such as not having identified all the transactions in the sample, or a transaction being incorrectly included in the sample. (Gripsrud, Olsson and Silkoset 2004).

The former error source can occur if neither SDC nor Zephyr contains a complete list of all transactions. Although some transaction may still be left out or faulty registered, the usage of two independent sources somewhat reduces this risk. The latter error source may occur if SDC or Zephyr incorrectly registered a transaction. This error was detected, and several transactions were removed. For instance some acquirers listed as public were not listed at the time of the merger, or the stock was only traded at the OTC-list.

[25] SDC contains M&A transactions from 1985 and forwards. Hence studies conducted on samples before this year utilizes other sources.
[26] Zephyr contains M&A transactions from 1997 and forwards.
[27] http://mora.rente.nhh.no/borsprosjektet/

4.2 The sample criteria

The population for which this thesis seeks to make an inference is the Norwegian market for corporate control. The sample collected from this population is based on a set of criteria. The criteria are based on various studies presented in the *Theoretical framework* section. The final sample consists of 268 completed mergers and acquisitions from 1990 to 2010.

4.2.1 Geographical restrictions

This thesis aims to test international empirical evidence on the Norwegian market for corporate control; hence both acquirer and target must be registered in Norway. Whether the target or acquirer has domestic or international shareholders is not relevant.

4.2.2 Time period

The sample is collected from January 1st 1990 to December 31st 2010[28]. This ensures a sample with a sufficient time horizon to test for the effect of merger waves on the size effect, as well as a large enough sample to ensure sufficient statistical power. The latter will be determined in the analysis through the statistical significance of the results. The sample time period is not stretched further back due to few registered transactions before 1990 in SDC, and no transactions in Zephyr.

4.2.3 Deal type, status and value

Deal type is limited to mergers and acquisitions only. This excludes deals such as management buyouts (MBO), leveraged buyouts (LBO) and joint ventures. Deal status is limited to completed deals only; however, after controlling for this criterion in SDC, it appears that this merely excludes a handful of transactions. After careful consideration, the sample does not have a floor on deal value, mainly due to low deal values in acquisitions of private companies.

4.2.4 Public status

The acquiring companies must be public, and registered on the Oslo Stock Exchange at the time of the announcement, as well as 200 trading days prior to the announcement and 5 trading days after the announcement, which is the interval of the estimation period. The targets can be public, private or subsidiaries.

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[28] Date announced is within this interval.

4.2.5 Initial and final stake

The initial stake of the acquirer is limited to <50 percent; hence the acquirer cannot have a majority stake in the target company before announcement. The final stake is set at 100 percent; hence the acquirer must control 100 percent (or very close to 100 percent) of the target after the completion.

4.2.6 Data availability and liquidity of the stock

Every transaction in the analysis must have information on all variables, except for method of payment. Some transactions are excluded from the sample due to lack of information, or insufficient liquidity (the stock is simply not traded enough).

4.3 The test variables

The main hypothesis is based on the entire sample and the only data needed to test the hypothesis is the abnormal return in the event windows. This data is required to test all of the hypotheses. The remaining hypotheses seek to test the size effect, the effect of method of payment, the effect of the target's public status and the effect of merger waves.

4.3.1 Variables needed for the market model

The market model is designed to only need two external variables. Stock prices for each individual security and a proxy for the market return.

The stock-prices are, as mentioned, obtained from Børsprosjektet, and are adjusted for events such as dividend payments and stock splits.[29]

The market return in itself is unobserved, but since all acquiring companies are listed at the Oslo Stock Exchange, a Norwegian benchmark index is the best fit for the sample. BXLT is the benchmark index (OSEBX) that is linked against the total index (TOTX), and chosen after consulting with the statistic department of the Oslo Stock Exchange. The purpose of the linked indices is to provide time series that are longer than the current official indices offers.

[29] Before the entrance into the European common market in 1995, foreign ownership in Norway was limited to 33.4 percent of each firm. In order to be in compliance with the regulation, some firms of size had both A-stocks and F-stocks that were traded. Both stocks had voting rights, but only the F-stocks could be bought by foreigners. Seven firm and 15 deals in the sample had both A and F-stocks. After a manual scrutiny, the F-stocks are ignored, mainly due to low liquidity. Hence, all stock prices are for the common stock; A-stock.

4.3.2 The size effect

The size effect ultimately consists of two different variables. One is the bidder's size unrelated to the target, and the other is the bidder's size in relation to the target's size. The first size effect is defined as the market value of equity, and is collected six days prior to the announcement date. The acquiring companies are divided into two categories: large and small acquirers. A company is defined as large when the market capitalization of the company is in the 25th top quartile of the Oslo Stock Exchange in the announcement year. The company is defined as small when it is below the 25th top quartile. Appendix 7 displays the quartile calculated for each year. The market capitalization of all listed companies at the Oslo Stock Exchange is provided by Børsprosjektet. The second size effect is measured as the target's size relative to the bidder's size at different levels; 5, 10 and 20 percent of the acquirer's size. The target's size is obtained by using the deal value as a proxy.

4.3.3 Method of payment and target public status

Method of payment is divided into stock, cash, mixed and unknown. Data on method of payment was originally obtained from SDC and Zephyr, though both sources contained many unknowns. For this reason, additional data had to be collected manually through public sources such as newspapers and financial statements, as well as e-mail correspondence with the companies which had little public information on the deal in question. This data-collection process revealed erroneous classification in SDC and Zephyr for some of the transactions, and led to a review of all transactions.

The target's status is divided into three categories; public, private and subsidiary. This information was successfully obtained from SDC and Zephyr.

4.3.4 Merger waves and the tax effect

Two merger waves are observed in the Norwegian market for corporate control between 1990 and 2010. The waves are based on the entire population which the sample is drawn from. The first merger wave is from 1999 through entire 2000, and the second merger wave is from 2005 through entire 2008.

From 1990 to 2010 the marginal tax rate on capital gains remained constant at 28%, for individuals. However, due to tax reforms, the effective tax rates were much lower from 1992 until 2006, than afterwards. For companies, the effective capital gains taxes have been close

to zero through the entire sample period. Hence, the sample is divided into a period with high tax levels, 2007 to 2010, and a period with low tax levels, from 1992 to 2006. Transactions before 1992 are excluded, as only one acquisition was settled with cash.

4.3.5 Announcement date

Correct announcement dates are clearly crucial to the analysis, and provided by SDC and Zephyr. However, discrepancies were detected between the two databases. The transactions where the announcement dates differed have been manually checked through online searches, as well as with the Norwegian Competition Authorities.[30]

4.4 Sample summary

A list of all included transactions can be found in appendix 8. Figure 3 displays the transactions in the sample by year, while table 3 displays the distribution across the explanatory variables.[31]

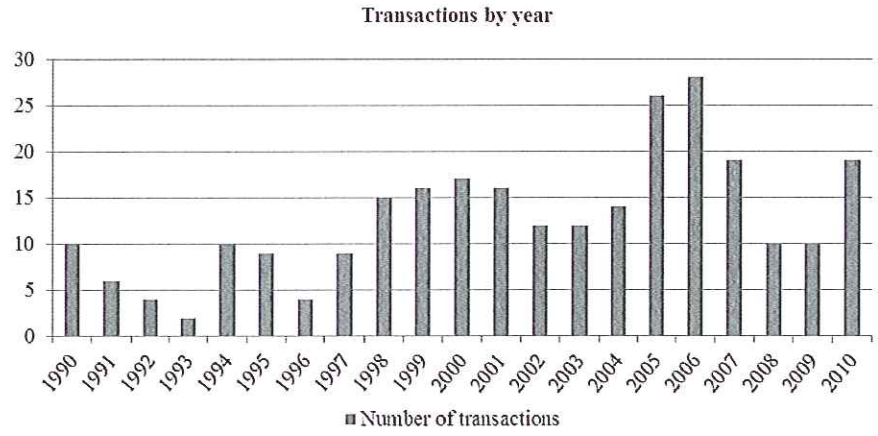

Figure 3: Number of transactions, by year

Method of payment	
Stock	70
Cash	69
Mixed	65
Unknown	64
Target status	
Public	24
Private	163
Subsidiary	81
Acquirer size	
Large	119
Small	149

Table 3: Overview of testing variables

[30] The Norwegian Competition Authorities' website only contains M&A information from 2004.
[31] For an overview of transactions and variables, view appendix 8.

5.0 OLS-regression analysis

The first analysis is estimating expected returns for each security in the sample, by applying the OLS market model. The daily stock data and benchmark index is transformed into log returns in Excel, while the regression is conducted in SPSS (the estimation of alpha and beta). The daily abnormal returns within the event windows and the ACAR are calculated in Excel. Appendix 10 displays the alpha, beta, R^2, R, ACAR (-1, 1) and ACAR (-5, 5) for each individual security.

For multiple acquirers, the alpha and beta estimates for the first acquisition is applied if the acquisitions overlap in the estimation period. This is to avoid an event in the estimation period, as this event could affect the alpha and beta estimates.

The statistical significance of the alpha and beta, as well as the overall fit of the regression model can be determined through the regression output[32] (Weinberg and Abramowitz 2008). However, since the analysis consists of 213 regression analyses, the reporting is limited to the R and R square (R^2) for each individual security. The overall fit of the model is determined through the R-value in the model summary. The R-value is the correlation between the actual and the predicted value of the expected return (Weinberg and Abramowitz 2008). The higher the R-value is, the better the fit of the model. The average R-value for all the securities in the sample is about 34 percent.

R^2 reports how much of the movements in the stock can be explained by the movements in the benchmark index, the BXLT. From the regression output it is clear that not all results are significant, however BXLT is the best available benchmark for the entire sample. As an assurance of this, a random sample of ten securities from the sample has been exposed to regression analysis using different benchmarks. The chosen benchmarks are the MSCI and NASDAQ. The results from this second regression analysis yield fairly equal alpha values, though lower R and R square for each of the securities in question. This strengthens the choice of the BXLT as the best proxy for market return.

[32] For example see appendix 10.

The simplest way to estimate the market beta is by using OLS regression with historic returns of each security and the market return. By using historical data and choosing an appropriate time window, there is a trade-off between statistical efficiency and the possibility that a company's risk has changed over time. As an example, changes in capital structure and the risk profile of a firm will alter its beta, and changes in a firm's size, such as mergers and acquisitions will also alter its beta risk. According to Wright (2011), analysts therefore typically adjust the historically-estimated beta and the estimation period, using their professional experience. A typical adjustment is the Bloomberg formula shown in equation four. This adjustment is disregarded in this thesis, and the original beta estimates obtained from the OLS regression is used.

$$\beta_{ADJUSTED} = 0.33 + 0.67\beta_{UNADJUSTED}$$

Equation 4: Common beta adjustment

More importantly, the beta measure might be subject to measurement error, because beta follows a mean reversal pattern, or in other words, is biased towards one (Blume 1975). Knowing that betas have a tendency to drift towards unity over time, a t-test where the beta values of all firms are set to one is included in the analysis of the main hypothesis, in order to test the robustness of the original beta estimates.

6.0 Descriptive statistics of sample

This section is limited to the descriptive statistics of the sample, *after* ACAR is calculated. Before initiating the analysis, the data should be cleansed for incorrect coding, extreme values and missing values. It is important to be aware of the existence of extreme values, although there is no definitive answer of whether to remove or keep extreme values (Gripsrud, Olsson and Silkoset 2004). After careful scrutiny the data does not contain any incorrect coding, nor does it contain any missing values. The transactions with incorrect coding or missing values have either been corrected or removed from the sample.

The transactions with extreme values are identified, though not removed from the sample as analyses will be conducted with and without extreme values.[33] The deals defined as extreme all had special circumstances, which are described in detail in appendix 12. For these deals, the bidders stock prices are influenced by other announcements on the same date, or a date close to the announcement date, like deal number 232 where the acquirer announced expansion into new markets at the same time. Hence it is difficult to determine how much of the stock fluctuations around the merger date can be contributed to the specific merger announcement.

The descriptive statistics reports and graphs are produced in SPSS, with and without extreme values, and can be viewed in full in appendix 13. Table 4 displays the descriptive statistics. The first two rows are with extreme values, and the two bottom rows are without extreme values.

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ACAR (-1, 1)	268	-.232	.629	.014	.073	2.693	.149	21.558	.297
ACAR (-5, 5)	268	-.454	1.133	.021	.130	2.835	.149	23.387	.297
ACAR (-1, 1)	260	-.232	.218	.009	.053	-.076	.151	2.635	.301
ACAR (-5, 5)	260	-.287	.289	.012	.084	.069	.151	1.656	.301

Table 4: Descriptive statistics, with and without extreme values

The skewness and kurtosis with extreme values are much higher than without, implying a more normally distributed sample without the extreme values.[34]

[33] To view the transactions with extreme values see appendix 10.
[34] Skewness is a measure of the asymmetry of the distribution (Weinberg and Abramowitz 2008), while kurtosis is a measure of how fat the tails in the distribution are, and of how peaked the distribution curve is (Field 2009).

7.0 Analysis and results from the t-tests

The t-tests are conducted in SPSS, but only the relevant results are displayed. An example of the SPSS output with interpretation can be found in appendix 14 and 15.

7.1 Main hypothesis, the bidder return puzzle

The bidder return puzzle implies that the bidder's return upon announcement of a takeover is zero or close to zero. This is based on results from numerous studies. The null hypothesis states that the bidder's return is not affected by a takeover announcement.[35] For the null hypothesis to be rejected, the ACAR must be significantly different from zero. The main hypothesis is tested on the entire sample, and the results are displayed in table 5.

Main hypothesis, the bidder return puzzle		
	Without extreme values	*With extreme values*
ACAR (-1, 1)	0.997 %	1.485 %
Two-tailed p-value	(0.003)***	(0.001)***
N	260	268
ACAR (-5, 5)	1.248 %	2.127 %
Two-tailed p-value	(0.018)**	(0.008)***
N	260	268

*** Statistically significant at the 99 percent level
**Statistically significant at the 95 percent level

Table 5: T-test results, main hypothesis

The null hypothesis is rejected for both event windows, with and without extreme values at the 95- or 99 percent confidence level. ACAR (-1, 1) is 1.485% and ACAR (-5, 5) is 2.127% with extreme values, while ACAR (-1, 1) is 0.997% and ACAR (-5, 5) is 1.248% without extreme values.

The rejection of the null hypothesis means accepting the alternative hypothesis; the bidder's return *is* affected by a takeover announcement. However, the ACAR's are, not surprisingly, still low compared to target announcement returns reported in other studies. Rejecting the null hypothesis with 95- or 99 percent certainty reduces the risk of committing a type I error, which is rejecting a true null hypothesis (probability 5 or 1 percent).

[35] H_{M0}: The bidder's return *is not* affected by a takeover announcement
H_{MA}: The bidder's return *is* affected by a takeover announcement

7.1.1 Beta equal to one

When the individual betas are set equal to one in the calculation of expected returns, the results are similar to the result based on the market model. The choice of model seems to have little impact on the aggregated results, which reduced the risk of erroneous expected returns. The results from the t-tests based on a beta equal to one are presented in table 6.

Main hypothesis, entire sample (beta = 1)		
	Without extreme values	With extreme values
ACAR (-1, 1)	1.031 %	1.505 %
Two-tailed p-value	(0.002)***	(0.001)***
N	260	268
ACAR (-5, 5)	1.125 %	1.995 %
Two-tailed p-value	(0.039)**	(0.013)**
N	260	268

*** Statistically significant at the 99 percent level
**Statistically significant at the 95 percent level

Table 6: T-test results, main hypothesis with beta equal to one

7.2 Hypothesis I, the size effect

The size effect consists of two variables, small and large acquirers. The size effect implies that small acquirers make more profitable acquisitions than large acquirers. The null hypothesis states that the size effect does not affect the bidder's return.[36] For this to be verified the mean difference between large and small acquirers must be significantly different from zero. The results from the t-tests are presented in table 7.

Hypothesis I, the size effect			
	Large	Small	Mean difference small and large
With extreme values			
ACAR (-1, 1)	0.370 %	2.375 %	2.005 %
Two-tailed p-value	(0.483)	(0.001)***	(0.021)**
N	119	149	268
ACAR (-5, 5)	1.033 %	3.000 %	1.967 %
Two-tailed p-value	(0.164)	(0.023)**	(0.192)
N	119	149	268
Without extreme values			
ACAR (-1, 1)	0.191 %	1.666 %	1.475 %
Two-tailed p-value	(0.702)	(0.000)***	(0.028)**
N	118	142	260
ACAR (-5, 5)	0.725 %	1.682 %	0.958 %
Two-tailed p-value	(0.286)	(0.032)**	(0.354)
N	118	142	260

*** Statistically significant at the 99 percent level
**Statistically significant at the 95 percent level

Table 7: T-test results, the size effect

Large acquirers show no significant ACARs with or without extreme values. Small acquirers show significant positive ACARs at the 95- and 99 percent level, with and without extreme values. ACAR (-1, 1) is 2.375% and ACAR (-5, 5) is 3.0% with extreme values, while ACAR (-1, 1) is 1.666% and ACAR (-5, 5) is 1.682% without extreme values. The mean difference between large and small acquirer's returns is significant at the 95 percent level within the three-day window, with and without extreme values, though not within the eleven-day window.[37]

[36] H_{I0}: The size effect *does not* affect the bidder's return
H_{IA}: The size effect *does* affect the bidder's return
[37] The size effect is also tested on the target's size relative to the bidder's size. The target's size is determined through the deal value. These tests conveyed no significant results.

The null hypothesis is rejected, as the acquirer's size does affect the bidder returns. The result from the three-day window is in compliance with previous studies, as small acquirers receive an announcement return roughly 2% higher than large acquirers.

7.3 Hypothesis II, method of payment

Method of payment consists of four variables: stock, cash, mixed and unknown. Empirical evidence from previous studies show that acquirers settling the deal with cash receive higher bidder returns than acquirers paying with stock. The null hypothesis states that the method of payment does not affect the bidder return.[38] The null hypothesis is rejected if the mean difference between the variables is significantly different from zero. The results from the t-tests are presented in table 8.

Hypothesis II, method of payment							
	Stock	Mean difference stock and cash	Cash	Mean difference cash and mixed	Mixed	Mean difference mixed and stock	Unknown
With extreme values							
ACAR (-1, 1)	2.382 %	1.403%	0.979 %	-0.721 %	1.701 %	-0.682 %	0.828 %
Two-tailed p-value	(0.032)**	(0.264)	(0.117)	(0.441)	(0.018)**	(0.599)	(0.451)
N	70	139	69	134	65	135	64
ACAR (-5, 5)	3.846 %	4.297%	-0.451 %	-3.605 %	3.154 %	-0.692 %	1.983 %
Two-tailed p-value	(0.027)**	(0.031)**	(0.643)	(0.049)**	(0.043)**	(0.763)	(0.335)
N	70	139	69	134	65	135	64
Without extreme values							
ACAR (-1, 1)	1.455 %	0.475%	0.979 %	-0.659 %	1.638 %	0.184 %	-0.126 %
Two-tailed p-value	(0.075)*	(0.640)	(0.117)	(0.484)	(0.024)**	(0.864)	(0.795)
N	65	134	69	133	64	129	62
ACAR (-5, 5)	2.542 %	2.993%	-0.451 %	-2.511 %	2.060 %	-0.483 %	0.943 %
Two-tailed p-value	(0.051)*	(0.065)*	(0.643)	(0.087)*	(0.063)*	(0.774)	(0.216)
N	65	134	69	133	64	129	62

*** Statistically significant at the 99 percent level
**Statistically significant at the 95 percent level
* Statistically significant at the 90 percent level

Table 8: T-test results, method of payment

[38] H_{II0}: The method of payment *does not* affect the bidder's return
H_{IIA}: The method of payment *does* affect the bidder's return

Acquiring a target using stock only show significant ACARs at the 90- and 95 percent confidence level, with and without extreme values. ACAR (-1, 1) is 2.382% and ACAR (-5, 5) is 3.846% with extreme values, while ACAR (-1, 1) is 1.455% and ACAR (-5, 5) is 2.542% without extreme values. Contrary, the ACARs for acquiring targets using cash only is not significantly different from zero. This supports the existence of a returns effect by method of payment, though reversed from previous empirical studies. When mixing cash and stock, the ACARs are significant at the 90- and 95 percent level. ACAR (-1, 1) is 1.701% and ACAR (-5, 5) is 3.154% with extreme values, while ACAR (-1, 1) is 1.638% and ACAR (-5, 5) is 2.060% without extreme values.

These results imply that cash deals give lower returns than stock and mixed deals, which would reject the null hypothesis. The mean difference between cash and stock as well as cash and mixed deals are significantly different from zero within the eleven-day window at the 90 percent level, though not within the three-day window. Acquirers paying with cash receive an ACAR (-5, 5) 2.993% lower than acquirers paying with stock, and 2.511% lower than acquirers paying with a mix of cash and stock. The mean difference between stock and mixed deals is not significantly different from zero.

The null-hypothesis is rejected, as method of payment does affect the bidder's returns. The direction of the results is, however, surprising. In international studies the effect is the opposite, as all-cash deals give the acquirer higher announcement returns than all-stock deals. It is debated whether cash deals give the acquirer a capital gains tax penalty. As tax levels in Norway are fairly high, this could be an explanatory factor for why cash deals clearly gave lower bidder returns between 1990 and 2010 in Norway. Also, effective tax levels have fluctuated due to differences in tax reforms. This will be further discussed and tested later.

7.4 Hypothesis III, target status

Target status consists of three variables: public, private and subsidiary. Extant empirical evidence shows that companies acquiring private targets receive a higher bidder return that companies acquiring public targets. The null hypothesis states that target public status does not affect the bidder return.[39] The null hypothesis is rejected if the mean difference between the variables is significantly different from zero. The results from the t-tests are presented in table 9.

[39] H_{III0}: The target's public status *does not* affect the bidder's return
H_{IIIA}: The target's public status *does* affect the bidder's return

Hypothesis III, target status						
	Public	Mean difference public and private	Private	Mean difference private and subsidiary	Subsidiary	Mean difference subsidiary and public
With extreme values						
ACAR (-1, 1)	-1.795 %	-4.361%	2.566 %	2.286%	0.280 %	2.075 %
Two-tailed p-value	(0.126)	(0.002)***	(0.000)***	(0.010)***	(0.642)	(0.113)
N	24	187	163	244	81	105
ACAR (-5, 5)	-2.017 %	-5.448%	3.431 %	2.702%	0.729 %	2.746 %
Two-tailed p-value	(0.219)	(0.009)***	(0.005)***	(0.073)*	(0.418)	(0.141)
N	24	187	163	244	81	105
Without extreme values						
ACAR (-1, 1)	-1.795 %	-3.599%	1.804 %	1.524%	0.280 %	2.075 %
Two-tailed p-value	(0.126)	(0.006)***	(0.000)***	(0.038)**	(0.642)	(0.113)
N	24	179	155	236	81	105
ACAR (-5, 5)	-2.017 %	-4.041%	2.024 %	1.295%	0.729 %	2.746 %
Two-tailed p-value	(0.219)	(0.027)**	(0.004)***	(0.255)	(0.418)	(0.141)
N	24	179	155	236	81	105

*** Statistically significant at the 99 percent level
**Statistically significant at the 95 percent level
* Statistically significant at the 90 percent level

Table 9: T-test results, target status

Acquiring private targets show positive ACARs significant at the 99 percent level with and without extreme values. ACAR (-1, 1) is 2.566% and ACAR (-5, 5) is 3.431% with extreme values, while ACAR (-1, 1) is 1.804% and ACAR (-5, 5) is 2.024% without extreme values. All of the extreme observations are found in deals where the target is private. Acquiring public targets or subsidiaries do not give a return significantly different from zero.

These results imply that the target's status does affect bidder returns. The mean difference between acquiring public and private targets is highly significant, and the mean difference between acquiring private targets and subsidiaries is also significantly different from zero. Acquiring a private target yields roughly a 4% higher ACAR than acquiring a public target, and roughly a 1.5% higher ACAR that acquiring a subsidiary.

These results reject the null hypothesis, as the targets status significantly affects the bidder's returns. The results are consistent with previous studies, as acquirers of private targets have significantly positive returns.

7.5 Hypothesis IV, merger waves

Merger waves are defined into two variables: either there was a merger wave, or there was not. Empirical evidence shows that during merger waves companies are more likely to be overvalued, and that overvalued acquirers receive a lower ACAR. Furthermore, overvalued acquirers are more likely to pay with stock. The null hypothesis states that a merger wave does not affect the bidder returns.[40] The null hypothesis is rejected if the mean difference between the variables is significantly different from zero. The results from the t-tests are presented in table 10.

Hypothesis IV, merger waves			
	Merger wave	No merger wave	Mean difference
With extreme values			
ACAR (-1, 1)	2.465 %	0.736 %	1.729 %
Two-tailed p-value	(0.000)***	(0.225)	(0.055)*
N	116	152	268
ACAR (-5, 5)	1.745 %	2.418 %	-0.673 %
Two-tailed p-value	(0.123)	(0.033)**	(0.672)
N	116	152	268
Without extreme values			
ACAR (-1, 1)	1.737 %	0.446 %	1.291 %
Two-tailed p-value	(0.002)***	(0.292)	(0.059)*
N	111	149	260
ACAR (-5, 5)	0.882 %	1.520 %	-0.638 %
Two-tailed p-value	(0.313)	(0.020)**	(0.557)
N	111	149	260

*** Statistically significant at the 99 percent level
**Statistically significant at the 95 percent level
* Statistically significant at the 90 percent level

Table 10: T-test results, merger waves

The results show a significantly higher ACAR within the three-day window during merger waves. A merger wave yields an ACAR (-1, 1) 1.291% higher than no merger wave. These results contradict the theory surrounding merger waves and bidder returns. The null hypothesis is, however, rejected based on these results.

[40] H_{IV0}: A merger waves *does not* affect the bidder's return

H_{IVA}: A merger waves *does* affect the bidder's return

As mentioned, overvalued acquirers are more likely to pay with stock than cash. To further test the merger wave hypothesis, the deals are separated based on method of payment. The results from the t-tests are presented in table 11.

Hypothesis IV, merger waves and method of payment						
	Stock	Mean difference stock and cash	Cash	Mean difference cash and mixed	Mixed	Mean difference mixed and stock
With extreme values						
Merger wave						
ACAR (-1, 1)	5.270 %	3.489 %	1.781 %	-0.571 %	2.352 %	-2.918 %
Two-tailed p-value	(0.006)***	(0.089)*	(0.067)*	(0.689)	(0.036)**	(0.165)
N	33	65	32	61	29	62
ACAR (-5, 5)	6.883 %	7.258 %	-0.375 %	-1.820 %	1.444 %	-5.438 %
Two-tailed p-value	(0.019)**	(0.028)**	(0.810)	(0.432)	(0.402)	(0.102)
N	33	65	32	61	29	62
No merger wave						
ACAR (-1, 1)	-0.194 %	-0.479 %	0.286 %	-0.890 %	1.176 %	1.369 %
Two-tailed p-value	(0.870)	(0.738)	(0.727)	(0.473)	(0.214)	(0.364)
N	37	74	37	73	36	73
ACAR (-5, 5)	1.137 %	1.654 %	-0.517 %	-5.047 %	4.530 %	3.394 %
Two-tailed p-value	(0.570)	(0.481)	(0.677)	(0.067)*	(0.067)*	(0.280)
N	37	74	37	73	36	73
Without extreme values						
Merger wave						
ACAR (-1, 1)	2.710 %	0.929 %	1.781 %	-0.571 %	2.352 %	-0.358 %
Two-tailed p-value	(0.041)**	(0.558)	(0.067)*	(0.689)	(0.036)**	(0.830)
N	29	61	32	61	29	58
ACAR (-5, 5)	2.682 %	3.057 %	-0.375 %	-1.820 %	1.444 %	-1.237 %
Two-tailed p-value	(0.225)	(0.256)	(0.810)	(0.432)	(0.402)	(0.654)
N	29	61	32	61	29	58
No merger wave						
ACAR (-1, 1)	0.443 %	0.158 %	0.286 %	-0.761 %	1.047 %	0.604 %
Two-tailed p-value	(0.665)	(0.904)	(0.727)	(0.665)	(0.276)	(0.544)
N	36	73	37	72	35	71
ACAR (-5, 5)	2.430 %	2.947 %	-0.517 %	-3.086 %	2.569 %	0.140 %
Two-tailed p-value	(0.125)	(0.141)	(0.677)	(0.947)	(0.080)*	(0.105)
N	36	73	37	72	35	71

*** Statistically significant at the 99 percent level
**Statistically significant at the 95 percent level
* Statistically significant at the 90 percent level

Table 11: T-test results, merger waves and method of payment

The number of companies paying with stock during a merger wave (33 firms) does not differ particularly from the number of companies paying with stock outside of a merger wave (37 firms). This could indicate that the definition of merger waves in Norway in this thesis is incorrect or it could indicate that the companies in fact were not overvalued during the merger waves. If the latter is true, then the theory on merger waves and bidder returns is not applicable to the Norwegian market for corporate control, or there are other reasons for using stock as a payment method.

Table 11 does however convey some interesting results. Paying with cash during the merger waves defined in this thesis gives the acquirer a significantly positive ACAR within the three-day window of 1.781%, while the ACARs outside the merger waves are not significantly different from zero. The bidder returns in cash deals from the entire sample were not significantly different from zero either. This could be explained by other differences in deal characteristics, which we will examine further in the cross-sectional regression below.

7.6 Comparison of variables

The previous t-tests tested the variables independent of one another. These t-tests combine the variables acquirer size, target status and method of payment to see if any connections between the variables can be made. The unknown category in method of payment and the targets status as a subsidiary is not included in this t-test. The former due to the unexplainable results this variable actually gives and the latter due to the previous insignificant results. The results from the t-tests are presented in table 12.

	Public targets			Private targets		
			With extreme values			
Large acquirers	**N**	**ACAR (-1, 1)**	**ACAR (-5, 5)**	**N**	**ACAR (-1, 1)**	**ACAR (-5, 5)**
Stock	5	-3.822%*	-2.343%	12	4.200%	5.479%
Cash	4	-4.401%	-7.105%**	21	1.964%**	1.203%
Mixed	2	-3.487%	-3.852%	9	2.244%	4.011%
Small acquirers						
Stock	8	1.194%	-0.827%	30	2.906%	3.576%
Cash	-	-	-	24	2.726%**	0.229%
Mixed	3	-2.334%	1.420%	32	2.444%**	5.827%**
			Without extreme values			
Large acquirers	**N**	**ACAR (-1, 1)**	**ACAR (-5, 5)**	**N**	**ACAR (-1, 1)**	**ACAR (-5, 5)**
Stock	5	-3.822%*	-2.343%	11	2.634%	2.571%
Cash	4	-4.401%	-7.105%**	21	1.964%**	1.203%
Mixed	2	-3.487%	-3.852%	9	2.244%	4.011%
Small acquirers						
Stock	8	1.194%	-0.827%	26	1.401%	1.569%
Cash	-	-	-	24	2.726%**	0.229%
Mixed	3	-2.334%	1.420%	31	2.340%**	3.655%**

**Statistically significant at the 95 percent level
* Statistically significant at the 90 percent level

Table 12: Comparison of t-test results between variables

Large companies acquiring public targets by offering stock as payment receive a negative ACAR within the three-day window, significant at the 90 percent level. The ACAR (-1, 1) is -3.822%, with and without extreme values. Large acquirers separately had returns not significantly different from zero, while acquirers paying with stock actually had significant positive returns. This implies that the target's status as public is a stronger explanatory variable of low bidder returns compared to acquirer size and method of payment.

Large companies acquiring public targets by offering cash as payment receive a negative ACAR within the eleven-day window, significant at the 95 percent level. The ACAR (-5, 5) is

-7.105%, with and without extreme values. Ones again this implies that the target's status as public is the main explanatory variable of the negative bidder returns, as both large companies and companies paying with cash separately had returns not significantly different from zero.

Large companies acquiring private targets by offering cash as payment receive a positive ACAR within the eleven-day window, significant at the 95 percent level. The ACAR (-5, 5) is 1.964%, with and without extreme values. Companies acquiring private targets showed significant positive ACARs at the 99 percent level, when tested separately. This implies that the target's status as private is associated with positive bidder returns, since the variables large and cash were not significantly different from zero.

Small companies acquiring private targets by offering cash as payment receive a positive ACAR within the three-day window, significant at the 95 percent level. The ACAR (-1, 1) is 2.726%, with and without extreme values. Small acquirers separately received an ACAR (-1, 1) of 1.666% without extreme values and 2.375% with extreme values, both significant at the 99 percent level. Companies acquiring private targets separately received an ACAR of 1.804% without extreme values and 2.566% with extreme values, both significant at the 99 percent level. As cash deal returns were not significantly different from zero, the ACAR (-1, 1) of 2.726% implies that the acquirer's size being small and target being private are associated with positive bidder returns.

Small companies acquiring private targets by offering a mix of cash and stock receive positive ACARs significant at the 95 percent level. ACAR (-1, 1) is 2.444% and ACAR (-5, 5) is 5.827% with extreme values, while ACAR (-1, 1) is 2.34% and ACAR (-5, 5) is 3.655% without extreme values. Mixed deals tested separately showed significantly positive bidder returns; hence these results are not surprising.

The results from the t-tests cited above confirm the findings in previous studies. The targets status as public or private has clearly been an explanatory variable of bidder returns in the Norwegian market for corporate control from 1990 to 2010. The acquiring company's size as a main explanatory variable is also supported, as small companies receive higher bidder returns than large companies regardless of target status and method of payment. The cross-sectional regression will provide further testing of these findings.

7.7 Hypothesis II, method of payment and the tax effect

The null hypothesis on method of payment was rejected, as stock- and mixed deals receive a significant positive return, while cash deals do not. However, this result is not in compliance with previous studies. To further investigate this issue, the sample is divided into two sub-samples based on capital gains tax-levels, as states in the sample description section. The results from the t-tests are presented in table 13.

Hypothesis II, method of payment								
	Without extreme values				*With extreme values*			
	Stock	Cash	Mixed	Unknown	Stock	Cash	Mixed	Unknown
				1992 - 2006				
ACAR (-1, 1)	0.819%	0.530%	1.744%	-0.001%	1.335%	0.530%	1.744%	-0.001%
Two-tailed p-value	(0.559)	(0.569)	(0.089)*	(0.999)	(0.361)	(0.569)	(0.089)*	(0.999)
N	35	25	36	41	36	25	36	41
ACAR (-5, 5)	4.193%	-0.644%	1.648%	0.503%	4.962%	-0.644%	1.648%	0.503%
Two-tailed p-value	(0.059)	(0.675)	(0.281)	(0.538)	(0.032)**	(0.675)	(0.281)	(0.538)
N	35	25	36	41	36	25	36	41
				2006 - 2010				
ACAR (-1, 1)	2.273%	1.098%	2.132%	-0.011%	3.834%	1.098%	2.132%	-0.123%
Two-tailed p-value	(0.005)***	(0.192)	(0.068)*	(0.991)	(0.061)*	(0.192)	(0.068)*	(0.891)
N	24	43	24	18	28	43	24	19
ACAR (-5, 5)	1.552%	-0.243%	3.144%	1.279%	3.904%	-0.243%	3.144%	-1.150%
Two-tailed p-value	(0.222)	(0.852)	(0.092)*	(0.482)	(0.221)	(0.852)	(0.092)*	(0.702)
N	24	43	24	18	28	43	24	19

*** Statistically significant at the 99 percent level
**Statistically significant at the 95 percent level
* Statistically significant at the 90 percent level

Table 13: T-test results, method of payment, before and after 2006

The results from this t-test gives little insight into why stock deals give the bidder higher returns than cash deals. The cash deals are not significantly different from zero in either time period. One can however see that number of acquirers paying with cash is higher between 2006 and 2010, than before. Approximately 40 percent of the deals announced between 2006 and 2010 were all-cash deals, while only 22 percent were all-stock deals. Between 1992 and 2006 roughly 18 percent were all-cash deals, while 25 percent were all-stock deals. This effect contradicts the argument previously made, that cash deals were more expensive after 2006, if one assumes rationality. The difference in number of all-cash deals before and after 2006 could also be explained by the high number of unknown payment methods before 2006. Even though these results are not significant it does not naturally infer that there is no capital

gains tax penalty. The differences in international research and the results from hypothesis II, may be due to higher tax levels in Norway. This is however, not something which will be subject to further investigation.

A result that is interesting, however, is the difference in return for all-stock deals before and after 2006. Apparently, paying with stock before 2006 gave higher returns than after 2006, as viewed in table 13. The logical explanation for this is missing though, but it leads to another question; whether bidder returns has changed over the sample period.[41]

7.8 Industry

In addition to testing the hypotheses, and possible explanations for those results, the acquirer's ACAR is tested between industries.[42] Unfortunately few results are significantly different from zero and few of the industry means are significantly different from one another. The only conclusion one can draw from these analyses is that acquirers within the wholesale industry seems to perform better with an eleven-day window than several of the other industries. The wholesale acquirers are also the only ones with ACARs significantly different from zero, ACAR (-1, 1) is 2.45% and ACAR (-5, 5) is 6.19%, both significant at the 90 percent level. When the extreme values are excluded, acquirers within agriculture also receive ACARs significantly different from zero. ACAR (-1, 1) is 3.05% and ACAR (-5, 5) is 3.9%, both significant at the 95 percent level. The results are based on 14 acquirers within wholesale and 13 acquirers within agriculture.

7.9 Absolute gains

The acquirer's average absolute gains have also been tested within the three-day window. The sample mean is NOK 14.6 million with extreme values and NOK 14.9 million without extreme variables. There is a significant difference in absolute gains between large and small acquirers, as large acquirers receive an average absolute gain of NOK 17.7 million with extreme values and 18 million without extreme values. Small acquirers receive an average absolute gain of NOK of 12.1 million with extreme values and 12.2 million without extreme values. This is intuitively logical as large acquirers have the means to perform larger deals. It is however, contradictory to the relative losses, where small acquirers receive a 2% higher

[41] This test is presented in appendix 16, though there are no significant differences between time periods.
[42] A test between vertical, horizontal and conglomerate mergers has also been conducted, but conveyed no significant difference in mean between the three types of mergers.

ACAR than large acquirers. It is also contradictory to previous empirical findings from the US market. When looking further into this issue, it seems that this entire effect can be contributed to one single company; Marine Harvest (Pan Fish). When this company is excluded from the sample the results are opposite. Hence, the acquirer's size as a main explanatory variable of low bidder returns is still valid.

Testing absolute gains against merger waves conveyed some interesting results. The first merger wave, from 1999 through 2000, gave acquirers and average absolute gain significantly different from time periods with no merger waves, as well as the second merger wave. However, the results can, once again, be contributed to one single acquirer; Marine Harvest (Pan Fish). They made four large acquisitions within the first merger wave, in total contributing NOK 29.5 billion. When these deals are excluded, the results are not significant.

8.0 Analysis and results from the cross-sectional regression

The cross-sectional regressions are conducted in SPSS, with dummy variables equal to the test variables. Two regression lines have been computed to test the variables against one another. In the first regression line the targets status as public or private is tested against subsidiaries, stock and cash deals are tested against mixed deals, large acquirers against small, and merger wave against no merger wave. In the second regression line the targets status as public or subsidiary is tested against private targets, stock and mixed deals against cash deals, small acquirers against large, and no merger wave against merger waves.[43] The results from form the linear regression is displayed in table 14.

Cross-sectional regression						
	Public	Private	Stock	Cash	Large	Merger wave
With extreme values						
Coefficient (ACAR (-1, 1))	-0.027	0.019	0.010	-0.006	-0.013	0.012
p-value	(0.118)	(0.061)*	(0.439)	(0.605)	(0.166)	(0.204)
Coefficient (ACAR (-5, 5))	-0.035	0.026	0.011	-0.035	-0.016	-0.013
p-value	(0.263)	(0.144)	(0.612)	(0.124)	(0.351)	(0.416)
Without extreme values						
Coefficient (ACAR (-1, 1))	-0.027	0.012	0.002	-0.006	-0.008	-0.013
p-value	(0.032)**	(0.115)	(0.829)	(0.489)	(0.265)	(0.416)
Coefficient (ACAR (-5, 5))	-0.035	0.013	0.010	-0.025	-0.007	-0.009
p-value	(0.086)*	(0.273)	(0.522)	(0.089)*	(0.557)	(0.380)
	Public	Subsidiary	Stock	Mixed	Small	No merger wave
With extreme values						
Coefficient (ACAR (-1, 1))	-0.046	-0.019	0.016	0.006	0.013	-0.012
p-value	(0.005)***	(0.061)*	(0.193)	(0.605)	(0.166)	0.204
Coefficient (ACAR (-5, 5))	-0.061	-0.026	0.046	0.035	0.016	0.013
p-value	(0.036)**	(0.144)	(0.040)**	(0.124)	(0.351)	(0.416)
Without extreme values						
Coefficient (ACAR (-1, 1))	-0.039	-0.012	0.080	0.006	0.008	-0.009
p-value	(0.001)***	(0.115)	(0.366)	(0.489)	(0.265)	(0.197)
Coefficient (ACAR (-5, 5))	-0.047	-0.013	0.034	0.025	0.007	0.009
p-value	(0.012)**	(0.273)	(0.020)**	(0.089)*	(0.557)	(0.380)

*** Statistically significant at the 99 percent level
**Statistically significant at the 95 percent level
* Statistically significant at the 90 percent level

Table 14: Results from the cross-sectional regression

[43] The variable in method of payment denoted unknown is included in the analysis, though not reported due to the irrelevance of the variable.

When the extreme values are included, companies acquiring private targets receive a 1.9% higher ACAR (-1, 1) than those acquiring subsidiaries. While companies acquiring public targets receive a 4.6% lower ACAR (-1, 1) and a 6.1% lower ACAR (-5, 5) than those acquiring private targets. When excluding the extreme values, the two latter results are somewhat lowered though still significant. Companies acquiring public targets also receive a 2.7% lower ACAR (-1, 1) and a 3.5% lower ACAR (-5, 5) than those acquiring subsidiaries, when excluding the extreme values. These results confirm the rejection of the null hypothesis regarding target status, as the targets status is clearly an explanatory variable of bidder returns.

Companies settling the deal with cash receive a 2.5% lower ACAR (-5, 5) than companies paying with a mix of cash and stock, when the extreme variables are excluded. Companies paying with stock receive a 4.6% higher ACAR (-5, 5) than companies paying with cash. This value is somewhat lowered when excluding the extreme variables from the analysis, though still significant. As with target status, these results confirm the rejection of the null hypothesis regarding method of payment, and also confirm the direction of the results. Cash deals still give a lower bidder return than stock deals.

The cross-sectional regression conveys no significant results regarding acquirer size or merger waves. The former is reversed from the findings in the t-tests. This does not however mean that the null hypothesis regarding acquirer size should be accepted; only that target status and method of payment are stronger explanatory variables of bidder returns. [44]

[44] Other regression lines have been tested, but yield the same results. The only deviation is that size has explanatory power when tested only against target public status. Size, however, loses its explanatory power when other variables are included.

9.0 Analysis weaknesses

The analysis conducted above has two clear weaknesses. These are to some extent discussed throughout the thesis, but are summarized here.

The first main weakness of this thesis, and of any event analysis such as this, is the estimation of expected returns. All of the analyses are crucially dependent on a good estimation of expected returns. This thesis has applied the OLS market model, though also tested the main hypothesis using a beta equal to one. The results were fairly equal. Also, OLS regression is conducted with various proxies for the market return, where the BXLT is proven most appropriate. Both authors are content with the chosen methods, but aware of the difficulties and limitations in estimating expected returns through.

The second main weakness of the analysis is the sample, or more precisely, the collection of data. This process has been challenging, as no database contains all the information needed, and some of the information collected from the databases has been proven erroneous. Whether all the deals matching the sample criteria are included, is unknown. The usage of two databases somewhat reduced this risk, though it does not eliminate it. Also, with regards to the estimation period, as well as the event windows, some of the announcement returns has proved to probably be influenced by other factors such as other acquisitions or events. The eight extreme value deals identified somewhat reduces this risk, though it does not eliminate it. Whether other deals are also influenced by other events either in the estimation period, or the event windows is unknown, as it would represent extensive research eliminating this risk.

10.0 Conclusion

The research question formulated in this thesis is "*Does international empirical evidence on the bidder return puzzle apply to the Norwegian market for corporate control?*"

The main null hypothesis regarding the sample mean was clearly rejected, as the sample ACARs were significantly different from zero. From the formulation of the hypothesis this implies that there is no bidder return puzzle. This is, however, not entirely correct. Even though the null hypothesis is rejected, the ACARs are still very low. As this thesis makes no analysis on the target's return, it is impossible to infer that the acquirer's ACARs are lower than the target's ACARs. By reviewing empirical evidence from numerous other studies though, the implication is still there; the question concerning why bidder returns are low is still present.

Null hypothesis I regarding the size effect was rejected, as small acquirer's receive an ACAR (-1, 1) approximately 2% higher than large acquirers. In the cross-sectional regression however, the size effect was not significant. Hence, there are other variables that explain more of the bidder's return than the size of the acquirer. The conclusion drawn from this is that the acquirer's size does affect the bidder's return, though it is not one of the main explanatory variables in the Norwegian market for corporate control.

Null hypothesis II regarding method of payment was also rejected, though the results were contradictory to previous studies. Acquirers paying with cash received an ACAR (-5, 5) about 4% lower than those paying with stock, and 3.6% lower than those paying with a mix of stock and cash. The cross-sectional regression proved that method of payment also was one of the explanatory variables of low bidder returns. The tests seeking to resolve the direction of the results; stock deals being valued higher than cash deals, were unfortunately unsuccessful. It is possible however, that the differences in the international research and this analysis can be contributed to relatively high capital gains taxes in Norway compared to other countries.

Null hypothesis III regarding the target's public status was, as the others, rejected. Companies acquiring private targets receive higher ACARs than those acquiring public firms (4 – 6% higher) or subsidiaries (2 – 3% higher). The cross-sectional regression proved that the targets public status was the strongest explanatory variable of bidder returns.

Null hypothesis IV regarding merger waves was verified. There were no differences in ACARs whether there was a merger wave, or not. This result may be due to erroneous estimated merger waves, or the effect may simply not exist in the Norwegian market for corporate control.

The strongest explanatory variable of positive bidder returns is when small companies acquire private targets with a mix of stock and cash. This composition yields an ACAR (-5, 5) of 5.8%. The strongest explanatory variable of negative bidder returns is when large companies acquire public targets using cash. This yields an ACAR (-5, 5) of -7.1%.

The answer to the research question is that with regard to the size effect and the target's public status the international empirical evidence appear to apply to the Norwegian market for corporate control. But in the case of method of payment and merger waves, the international empirical evidence does not seem to apply to the Norwegian market for corporate control.

11.0 Suggestions for future research

In order to properly adjust for partial anticipation (information leakage), and analyzing the impact this potentially has on the bidder's ACAR, an analysis of the run-up and markup-period would be interesting. This would in practice imply different event windows and estimation periods.

A larger sample, for instance from the 1970s or the 1980s would be of interest, although it might be difficult to obtain the necessary information, as gathering deal specific information on the deals from the early 90s in this sample proved to be especially difficult. Another suggestion is to change the sample criteria from this thesis, and compare the results. In particular, including foreign targets would enable a comparison between Norwegian and foreign acquisitions.

Moreover, it would be interesting to test for other variables in general, such as toeholds, shareholder composition, and various size variables, such as assets or liabilities. The only possible limitation is the collecting of data.

Another suggestion for further research is Norwegian serial acquirers. It has become clear that some Norwegian companies are frequent acquirers of both Norwegian and foreign targets. Also, there is extensive academic research within this narrow subject, which could form an appropriate basis for some hypotheses on the Norwegian market for corporate control.

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Appendix 1 - Capital gains taxes in Norway from 1990 to 2010

Capital gains taxes may impact how the market values cash deals compared to stock deals and mixed deals. Within the sample period, the Norwegian tax system has been subject to three reforms; in 1992, 2004 and 2006. This section outlines the general changes in capital gains taxes for individuals and companies. The changes are mainly related to the effective tax rates, not the marginal tax rate on capital gains, as this has remained constant at 28 percent from 1992.

Before 1992, the tax system had high marginal tax rates, but in practice, the proportion of income subject to tax could be significantly reduced. According to Hansen (2011), the taxable income could be as low as one to five percent of actual income, and thus the tax on capital gains and income were mainly symbolic in nature.

With the revision of the tax system in 1992, capital gains became subject to a marginal tax rate of 28 percent. In order to avoid double taxation on capital gains such as retained earnings, a compensation deduction for capital gains called the RISK-method was introduced. The purpose of RISK was to adjust the shareholder's initial investment value so the same income was not taxed both in the company when they were earned, and when the shareholder sold the stocks. Thus, positive RISK-values reduced the amount that was subject to tax when the stock was sold. RISK-values could also become negative, if the company paid out more than the current year's profit. (St.meld nr. 41 (1998) 1998)

In the period after 1992, the gap between the tax level of personal income and capital gains taxes were significant, with taxable income subject to 55 percent to 67 percent tax and capital gains taxed at 28 percent, making it profitable to report income as capital gains. As an example, the review conducted by the Tax Commission (NOU 2003: 9, Section 11.4) pointed out that the choice of business form for many were driven by tax considerations. The tax reform of 2006 aimed to level the tax system, and capital gains, beyond a pre-set tax exempt limit, became subject to general taxation for personal investors (St.meld. nr. 11 (2010-2011) 2011).

The shareholder model, the exemption method and the shielding basis

The exemption method and the shareholder model were introduced in 2004 and 2006, respectively. The exemption method is aimed to prevent double taxation of income in corporate structures. Together with the shareholder model it has ensured that the income is taxed once in the corporate sector, and that the share of income in excess of a return equivalent to the risk-free rate of interest is taxed when shares are sold. (St.meld. nr. 11 (2010-2011) 2011)

With some exceptions, the shielding basis corresponds in principle to the cost of shares and accrues to the owner of the shares at the end of the fiscal year. According to Hansen (2011) dividends within the allowance limit are tax free. Unused deductions can be carried forward against future dividends or profits from shares of the same share. The ability for unused return

shielding ceases when shares are sold, and cannot be offset against the share of income from other shares. The return allowance from previous years, which is still unused at year end are included in the screening basis the following year.

The shielding basis depends upon the shielding rent that is set by the Ministry of Finance. The table below shows the shielding interest rate from 2006 to 2010; an average 2.4 percent for shareholders and 3.4 for limited companies (Skatteetaten 2006-2010).

Shielding interest rate						
	2006	2007	2008	2009	2010	*Average*
The shareholder model	2,1 %	3,3 %	3,8 %	1,3 %	1,6 %	*2,4 %*
Limited companies	3,0 %	4,6 %	5,2 %	1,8 %	2,2 %	*3,4 %*

Source: Skatteetaten

According to Hansen (2011) the financial structure in the firms were changed due to the impending tax reform. In order to avoid tax on dividend, equity is no longer mainly distributed as dividend, but as repaid loan or repayment of equity capital. When equity is distributed as repayment of equity capital, the cost price for the shares is reduced, and the shielding basis and opportunities to pay tax free dividends in the future are foregone.

Appendix 2 - The Norwegian Securities Trading Act, Chapter 6

In chapter six of the Norwegian Securities Trading Act (Norwegian: Verdipapirhandelloven) (Lovdata 2011) the laws surrounding mandatory and voluntary offers in an acquisition is listed. The laws are there to ensure an open and orderly process in acquisitions; all shareholders shall be treated equally, and it shall be opened for higher bids from other interested parties.

A mandatory bid is triggered if a shareholder through acquisition owns shares representing more than 1/3 of the votes in a listed company, cf. §6-1 1. paragraph. This shareholder is obliged to make an offer to buy the remaining shares in the company. §6-2 provides certain exceptions to this requirement. The mandatory bid obligation is not incurred by the acquisition in the form of compensation by merger or acquisition of the corporation or the public, cf. §6-2 1. paragraph no. 3. There are also exemptions for certain institutions, cf. §6-3.

If there is an agreement of a mandatory bid, the person that has or will have the duty to make an offer has to immediately notify the Credit Authorities (Norwegian: Kredittilsynet) and the company, cf. §6-8 1. paragraph. The sale of the shares shall be made within four weeks after the offer obligation was triggered, cf. §6-9, and §6-11 and §6-12 set deadlines for acceptance of the offer and the deadline for the submission of new offers. The offer itself, and its requirements are presented in §6-10.

This law ultimately implies that some Norwegian takeovers of publicly listed companies (target listed), may not be economically motivated, but occurred due to the laws surrounding mandatory offers. As this probably applies to a very small number of deals in the sample the authors will not take further notice of the issue in this thesis.

Appendix 3 – Comparable empirical research*

Takeover gains - full sample

Authors	Description	Sample period	ACAR	N	Bidder return
Officer (2003, 2004)	Attempted mergers and tender offers betwen public firms	1988-2003	(-3,3)	2511	-1.2 %
Eckbo (1986)	Horisontal mergers in Canada	1964-1983	(-1,0)	1,683	1.66%
Jarell and Poulsen (1986)	Tender offer bids	1963-1986	(-2,1)	461	0.70%

Size

Authors	Description	Sample period	ACAR	N	Large	Small	Total sample
Moeller, Schlingenmann and Stulz (2003)	Deal value $1 mill and 1% of acquireres asset	1980-2001	(-1,1)	12,023	0.1%	2.3%	1.1%
Asquit, Bruner and Mullins (1982)	Serial aqcuireres and the market reaction to first four merger bids	1963-1979	(-20,1)	158	+4.1%**	1.7%*	0.9%
Eckbo and Thorburn (2000)	Domestic and U.S. bidder firms, Canadian targets	1964-1983	(-1,1)	1,800	-	4.0%*	

Method of payment

Authors	Description	Sample period	ACAR	N	Cash	Mixed	Stock
Savor (2006)	Nonhostile bids. Deal size is 5% of bidders market value	1990-2000	(-1,1)	1,484	1.0%	-	-3.5%
Eckbo and Thorburn (2000)	Performance of domestic and U.S. (foreign) bidder firms acquiring Canadian targets	1964-1983	(-1,1)	329 *	3.1 %	5.10%	2.9%
Frank, Harris and Myer (1988)	Biased towards large firms, UK and US	1965-1985	Month 0	I ,900	1.3%	-	1.0%
Brown and Ryangaert (1991)	Tax effects, US firms	1981-1986	(-1,0)	268	-0.1%	-2.48%	-2.7%
Travlos (1985)	Bidding firms engaged in successful takeovers	1972-1981	(-1,0)	167	0.2%***	-	-1.5%
Asquit, Bruner and Mullins (1982)	Serial aqcuireres and the market reaction to first four merger bids	1973-1983	(-1,0)	158	0.2%	-	-2.4%

Public status

Authors	Description	Sample period	ACAR	N	Private	Public	Subsidiary
Fueller, Netter and Stegemoeller (2002)	Minimum 5 succesful control bids within 3 year, deal size $1 mill	1990-2000	(-2,2)	3135	2.1%	-1.0%	2.8%
Bradley and Sundaram (2006)	Completed acquisitions	1990-2000	(-2,2)	12476	1.9%	-0.7%	-
Officer, Poulsen, and Stegemoller (2009)	Deal value above $50	1995-2004	(-1,1)	2,679	3.8%	-1.3%	-
Moeller, Schlingenmann and Stulz (2003)	Deal value $1 mill and 1% of acquireres asset	1980-2001	(-1,1)	12,023	-0.37%	-3.2%	
Faccio, McConnell, and Stolin (2006)	Deal value $5 mill	1996-2001	(-2,2)	4,429	1.48%	-0.38%	-

Public status and method of payment

			ACAR			Private	Public
Chang (1988)		1981-1992	(-1,0)	281	Stock	0.09%	-0.02%
					Cash	2.64%	2.46%
Moeller, Schlingenmann and Stulz (2007)	Deal value $1 mill and 1% of acquireres asset	1980-2002	(-1,1)	4,322	Stock	3.5%	-2,3%
					Cash	-	0.7%

Merger waves

Authors	Description	Sample period	ACAR	N	1991-2001	1998-2001
Moeller, Schlingenmann and Stulz (2005)	Merger wave defined from 1998 to 2001	1978-2000	(-1,1)		1.2%	0.6%
Asquit, Bruner and Mullins (1982)	Merger wave from 1967 to 1969	1963-1979	(-20,1)	158	1963-1969	1967-1969
					4.4%	1.7%

* Only the academical articeles comparable to our main findings is presented

** Only the '309 smallest firm

***Not significant

Betton, Eckbo and Thorburn (2008) summarized - sample period 1980 to 2005

Sample	*n*	*Public targets* CAR (-1,1)	n	*Private targets* CAR (-1,1)
Large bidders				
All-stock	769	-2.21%	445	0.10%
All-cash	439	-0.30%	88	0.26%
Small bidders				
All-stock	495	-0.06%	872	6.46%
All-cash	190	3.05%	184	1.76%

Full sample

		n	ACAR (-1,1)
Public target		6,301	-0.87%
Private target		9,868	1.76%
All-cash		1,875	0.81%
All-stock		5,189	0.25%
No merger wave	1991-1995	3,654	1.69%
Merger wave	1996-2000	5,464	0.74%

Appendix 4 - The model choice – estimating expected returns

A single security's price performance can only be considered abnormal relative to a particular benchmark; hence the expected returns must be estimated through a model. The problem, which makes the choice of model important, is that "*all models for expected returns are incomplete descriptions of the systematic patterns in average returns during any sample period*" (Fama 1998, 291). Fama (1998) refers to this as a bad-model problem, however it is less serious in short event windows, since daily expected returns are close to zero and thus has little effect on the measurement of abnormal returns. The expected returns in this thesis are measured from daily returns within the estimation period, but applied in the short event windows displayed in figure 2.

Brown & Warner (1980) and (1985) outline three different models to estimate expected returns; the mean adjusted returns model, the market adjusted returns model and the market and risk adjusted returns model, all consistent with the capital asset pricing model (CAPM) under different assumptions.

Since the further analysis considers abnormal returns, not expected returns, all equations are designed to solve for abnormal returns.[45]

The mean adjusted returns model

The model is based on the assumption that single securities have constant systematic risk, as well as a stationary efficient frontier. Hence it makes no explicit risk adjustments.

$$A_{it} = R_{it} - \bar{R}_i$$

Equation: The mean adjusted returns model

A_{it} is the abnormal return - the stock movement that is unexplained by the market for security i at day t, R_{it} is the arithmetic observed (actual) return for security i at day t and $\bar{R}_i$ is the simple average observed return for security i.

According to Brown & Warner (1980) the mean adjusted returns model is used by Masulis (1978), however this method is missing important variables present in the other two methods outlined by Brown & Warner.

[45] The equations could easily be turned around to solve for expected returns, by including this variable in the equation. See section on Ordinary least square regression.

The market adjusted returns model

This model is based on the assumption that all securities have systematic risk of unity, hence it corrects for market-wide movements while assuming the same systematic risk (= 1) for all securities when measuring abnormal returns.

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

Equation: The market adjusted returns model

The only difference from the mean adjusted returns model is that the simple average for security i is replaced by the return on the market index (R_{mt}).

According to Brown & Warner (1980) this method is used by several academics and shows fairly similar results as the mean adjusted returns model. However it fails to account for the differences in systematic risk between different securities.

Brown & Warner (1985) showed that event studies with large number of observations (events) were not very sensitive to the choice of estimation model used to estimate abnormal returns, and argues neither for nor against any of the methods outlined. The market model is the most commonly used estimation method in event study methodology, and applying the method in this thesis will better enable comparisons to other findings. Thus, the market model is the model that will be applied in this thesis and will be exposed to further discussion.

Appendix 5 - Ordinary least square regression

The OLS model is a linear regression model, and according to Stock & Watson (2003, 98) "*the OLS estimator chooses the regression coefficients so that the estimated regression line is as close as possible to the observed data, where closeness is measured by the sum of the squared mistakes made in predicting Y given X*". Hence, Y is the dependent variable while X is the independent.

The sum of the squared prediction mistakes can be presented as follows:

$$\sum_{i=1}^{n}(Y_i - b_0 - b_1X_i)^2$$

Equation: The sum of the squared prediction mistakes in OLS regression

The predicted value of Y given X can be presented in the OLS regression line as follows:

$$\hat{Y}_i = \hat{\beta}_0 + \hat{\beta}_1 X_i$$

$\hat{Y}_i$ = The estimated expected return

$\hat{\beta}_0$= The alpha (α) (the intercept)

$\hat{\beta}_1$= The beta (β) (the slope)

X_i= The market return

Equation: The OLS regression line

However, not everything is explained through the equation above, hence there is a residual. The residual is the distance between the regression line and the average value of Y (Wenstøp 2006), and can be presented as follows:

$$\hat{u}_i = Y_i - \hat{\hat{Y}}_i$$

$\hat{u}_i$= The abnormal return

Y_i = The observed return

Equation: The residual in OLS regression

The OLS parameters $\hat{\beta}_0$ and $\hat{\beta}_1$ could be computed by repeated trial and error, until you find those parameters that minimizes the total squared mistakes. However, this would be tedious, and fortunately there is statistical software such as SPSS which streamline these calculations (Stock and Watson 2003).

The least square assumptions

When applying the OLS market model, there are certain assumptions that need addressing. These assumptions are crucial to understanding whether the regression coefficients are useful estimates – or not (Stock and Watson 2003). Since the dependent (the stock prices) and the independent (the market return) variables are time series data, and OLS regression is used to forecast expected returns (time series forecasting), the assumptions somewhat differs from the standard OLS assumptions.

First, the time series are first analyzed after computing the changes in logarithms (logarithmic returns also denoted simply log returns) (Stock and Watson 2003). This is not an assumption, though nevertheless important. Abnormal returns should (in average) be zero and normally distributed. The variance in abnormal returns should be constant (absence of heteroscedasticity), and the abnormal returns from day to day should be uncorrelated (absence of autocorrelation) (Gripsrud, Olsson and Silkoset 2004). As long as the time series are adjusted for events in the estimation period, the abnormal returns should be zero.

Another assumption is that all time series are drawn from a stationary distribution (Stock and Watson 2003). In practice this does not pose a challenge in this analysis, since the estimation period is close to the event windows. The random variables should be independently and normally distributed when the amount of time separating them becomes large (Stock and Watson 2003). Brown & Warner (1985) notes that the market model is best applied on monthly data, since daily stock returns deviates more from normality than monthly returns. Daily data have fatter tails and are usually not normally distributed. However, with many observations the central limit theorem based on probability theory, states that the assumption of normality should be fulfilled. Thus, the market model can be applied on daily data, even though skewness and kurtosis exists.

The four moments of the market return and abnormal returns should be nonzero and finite. If the data contains extreme observations, the OLS parameters may be dominated by these extremes, though this assumption should hold if there are no other events in the estimation period. Another assumption is the constancy of alpha and beta over time. They are estimated from the estimation period, but applied within the event windows. By using an estimation-period as close to the event window as possible, the assumption of constant parameters becomes more reliable. In addition, the estimation of parameters from daily data is complicated by non-synchronous trading (Brown and Warner 1985). In the presence of non-synchronous trading, the estimates of beta can be biased. Brown & Warner (1985) find that the failure to account for non-synchronous trading has little impact on the result, and thus can be ignored when applying the market model. The OLS residuals sum to zero, and as such the bias in beta is compensated for a bias in alpha.

To conclude, the OLS market model is appropriate for the purposes of estimating the expected returns for each security in the sample.

Appendix 6 – Statistical testing

The one-sample t-test

The one-sample t-test is designed to construct a confidence interval and to test the null-hypothesis.[46] The null-hypothesis is tested through the computation of the t-value or the p-value. These values are a measure of the statistical significance at a given confidence level (normally 95 percent is an acceptable level).

As an example consider the main hypothesis in this thesis.[47] If the null-hypothesis is verified, the ACAR is not statistically different from zero, while a falsification means accepting the alternative hypothesis.[48] The relationship is described in the equation below.

$$H_0: \mu = c$$

$$H_{A1}: \mu \neq c \quad ; \quad H_{A2}: \mu < c \quad or \quad H_{A3}: \mu > c$$

H_0:μ = the null hypothesis
H_A:μ = the alternative hypothesis
c = a specified number (equal to zero for the main hypothesis)

Equation: Representation of null and alternative hypothesis, using t-test

The computation of the t-value is presented in the equation below. The difference between a z-test and the t-test lies in this equation and the one below that. A z-test applies the standard deviation from the population, not the sample. Hence, the standard deviation must be known and equal in all samples, which in practice is seldom true. As this is not the case for the population in this analysis, the t-test is applied. The equations are easily computed through SPSS.

[46] This section is based on Weinberg & Abramowitz's (2008) description of the one-sample t-test.
[47] H_{M0}: The bidder's return *is not* affected by a takeover announcement
H_{MA}: The bidder's return *is* affected by a takeover announcement
[48] The ACAR will be tested for two event windows (-1, 1) and (-5, 5), and may not lead to the same results.

$$t = \frac{\bar{X} - \mu}{\frac{\hat{\sigma}}{\sqrt{N}}} = \frac{\bar{X} - \mu}{\hat{\sigma}_{\bar{X}}}$$

t = the sample mean deviation from μ (t-value)
$\bar{X}$ = the sample mean
$\hat{\sigma}$ = the sample standard deviation
N = total number of observations in the sample

Equation: T-statistic for the one-sample t-test

$$\hat{\sigma} = \sqrt{\frac{\sum(X_i - \bar{X})^2}{N - 1}}$$

X_i= a single observation in the sample
N – 1 = the number of degrees of freedom

Equation: The estimation of the standard deviation

Statistical significance

Gripsrud et al. (2004), notes the importance of separating between theoretical significance and statistical significance. Results may be statistically significant, but that does not automatically make them theoretically significant. Gripsrud et al. point out that with large samples some results are almost always statistically significant, even though the relationship between the variables are meaningless. This demands criticism and awareness from the researcher.

An issue in t-tests is whether to use one-tailed or two-tailed significance values. This is determined through the hypotheses. If the alternative hypotheses makes no inference about the mean value in a positive or negative direction (non-directional hypothesis), the two-tailed significance values are applied. The one-tailed significance value is denoted 2α, the two-tailed significance value is denoted α, and the confidence level is denoted $1 - \alpha$.[49]

In the main null-hypothesis the t-value implies the number of standard errors above or below the hypothesized mean of zero. If $t > t_\alpha$ the null hypothesis is falsified, and if $t < t_\alpha$ the null hypothesis is verified. The value t_α is the critical t-value at a given confidence level. For instance, if the number of observations is 61, the number of degrees of freedom is 60. The null-hypothesis is to be tested at a 95 percent confidence level, which gives a t-value of 2.00. If the observed $t > 2.00$ the hypothesis is falsified, while an observed $t < 2.00$ means the

[49] These alpha values are not connected to the alpha values presented in the OLS regression.

hypothesis is verified. SPSS presents the one-tailed t-value and the two-tailed p-value. Since the hypotheses are non-directional the two-tailed p-value is used in the analysis.

The two-tailed p-value is presented in the SPSS output, or it can be computed from the t-value[50]. At a 95 percent confidence level the two-tailed p-value ≥ 0.05 (α) for the hypothesis to be verified, if the p-value < 0.05 the hypothesis is falsified.

Type I and II errors

Due to the nature of statistical tests, the results are seldom free from errors. Hence, the term significance level is introduced, implying that the hypothesis is verified or falsified with a percentage of certainty. This allows for type I and type II errors. (Gripsrud, Olsson and Silkoset 2004).

A type I error is when a test rejects a true null-hypothesis, while a type II error is when a test fails to reject a wrong null-hypothesis. The table below presents the four possible situations from t-testing.

	H_0 is falsified	H_0 is verified
H_0 is true	Type I error Probability = α	Correct decision Probability = 1 - α
H_0 is false	Correct decision Probability = 1 - β	Type II error Probability = β

Table: Type I and type II errors[51]

A hypothesis falsified with 95 percent certainty, would have an alpha of five percent. Hence, it is a five percent chance that the hypothesis was wrongly falsified (that a type I error was committed). Alpha level > ten percent (confidence level < 90 percent) is seldom used. The probability of committing a type I error is, naturally, given from the confidence level chosen.

The beta is the probability of committing a type II error, while $1 - \beta$ is *the power of the test*. The power of the test is seldom set lower than 0.80 (β seldom higher than 0.20), but this is not a value one can compute in t-tests, as it depends on the population mean being known. The probability of committing a type II error can however be computed at given values of μ, σ^2 and n. Fortunately, Cohen's d (the effect size) solves the issue of estimating the beta.

[50] Use a table showing t-distributions to locate t-value as close to the computed as possible at the correct number of degrees of freedom. This gives a one-tailed significance value or a two-tailed significance value by multiplying with 2.

[51] Note that alpha and beta is used in a different setting than in the OLS regression, and denotes different contents.

The effect size

The effect size measures of the magnitude of the obtained results from the t-test (it complements the p-value), and can determine whether a statistically significant result may also be practically significant. Assume the main hypothesis is rejected; the results are statistically significant different from zero. This does not convey by which amount μ differs from the hypothetical mean of zero. The confidence intervals gives some insight, while Cohen's *d* gives insight independent of sample size.

$$d = \frac{\bar{X} - \mu}{\hat{\sigma}}$$

d = Cohen's d
$\bar{X}$ = the observed mean
μ = the hypothesized mean
$\hat{\sigma}$ = the sample standard deviation

Equation: Cohen's d

As mentioned, Cohen's *d* solves the issue of estimating the beta. At a 95 percent confidence level, Cohen developed a rule of thumb for the size of *d*, ensuring a power $(1 - \beta)$ of 0.80. For a sample size of 196 or more, $d \leq 0.20$, is considered a small effect size (a real effect, which can only be seen through careful study).

Appendix 7 – Acquirer size, 25th upper percentile

This appendix displays the calculated 25th upper percentiles of the Oslo Stock Exchange for each year in the sample period.

Year	25th upper percentile
2010	kr 4,471,900,065
2009	kr 3,867,207,907
2008	kr 1,942,998,868
2007	kr 4,944,034,593
2006	kr 5,037,884,618
2005	kr 3,627,929,520
2004	kr 2,653,073,414
2003	kr 1,595,224,037
2002	kr 994,581,937
2001	kr 1,605,470,524
2000	kr 1,865,790,214
1999	kr 1,823,975,250
1998	kr 1,193,809,438
1997	kr 2,100,531,303
1996	kr 1,669,841,198
1995	kr 1,332,382,680
1994	kr 1,465,187,522
1993	kr 1,412,693,414
1992	kr 665,324,994
1991	kr 806,004,620
1990	kr 1,068,448,830

Appendix 8 – List of sample transactions

This list displays all transaction in time sequence. The number in the first column is the number used to identify the transaction. The other lists will only contain this number, not the names and date of announcement. Due to exclusion of transactions, as well as companies performing transactions on the same date, several numbers are "missing".

Transaction number	Announcement date	Aquirer name	Target name
1	1/18/1990	Christiania Bank	Sunnmørsbanken
2	1/25/1990	Fokus Bank A/S	Tromsbanken
3	4/4/1990	Christiania Bank	Sørlandsbanken
4	5/22/1990	Vard A/S	Bassoe
5	5/31/1990	Nora Industrier A/S	Tou A/S
6	6/6/1990	Storebrand ASA	Uni Forsikring
7	6/15/1990	Hafslund Nycomed AS	Collett-Marwell Hauge A/S
8	6/29/1990	Vard A/S	Scandi Line
9	8/9/1990	Fokus Bank A/S	Rogalandsbanken A/S
11	12/10/1990	Dyno Industrier AS	Panco Edelplast A/S
12	1/29/1991	Norsk Data AS	Data-Consult A/S
13	6/20/1991	Dyno Industrier AS	Hamax A/S-Plastic Comp Plant
14	6/24/1991	Orkla Borregaard A/S	Nora Industrier A/S
15	6/27/1991	Fokus Bank A/S	Oppdal Hotels
16	10/1/1991	Ambra	IM Skavgen-Tankship Jarabella
17	11/28/1991	Den Norske Banken ASA	Realkreditt AS
19	2/12/1992	Bergesen DY A/S	IM Skaugen AS-Berge Forest
20	3/26/1992	Norsk Hydro ASA	Mobil Oil A/S Norge(Mobil)
21	11/19/1992	Elkem ASA	Ila og Lilleby Smelteverker
22	12/23/1992	Saga Petroleum AS	DNO Olje
23	6/30/1993	Saga Petroleum AS	Petrobras Norge AS
24	9/30/1993	Awilco Shipping(Anders Wilhel)	GNO(Awilco ASA)
25	1/10/1994	Farstad Shipping AS	KS Far AHTS
26	3/16/1994	Olav Thon Eiendomsselskap ASA	Agora Kjopesenter(Den Norske)
27	3/23/1994	Unitor A/S	Ticon Isolering AS
28	3/28/1994	Avantor AS	Gjelsten & Røkke Eiendom
29	4/28/1994	Vital Forsikring A/S	Skanska Norge AS
30	5/5/1994	Helicopter Service AS	Scancopter AS
31	6/30/1994	Havtor	Smolnyy Gas Carrier
32	7/12/1994	Helicopter Service AS	Braathen Helikopter & Lufttransport AS
34	8/16/1994	Industri og Skipsbanken	Oslo Securities
35	11/15/1994	Norgeskreditt Holding AS	Finansbanken ASA(Sparebanken)
36	2/14/1995	Havtor	Kvaerner A/S-Gas Carrier Fleet
37	2/27/1995	Avenir ASA	Teknisk Data Informatikk AS
38	3/13/1995	Wilrig A/S	Wilrig A/S
39	3/31/1995	Norske Skogindustrier ASA	Agnes Fabrikker
40	5/15/1995	Den Norske Banken ASA	Vital Forsikring A/S
41	5/24/1995	Unitor A/S	GF Marine
42	9/7/1995	Schibsted ASA	Oslonett
45	11/15/1995	Bergesen DY A/S	Havtor
46	11/17/1995	Rieber & Son ASA	Dacapo A/S (Orkla Borregaard)
48	1/12/1996	UNI Storebrand A/S	Steen & Strom Invest-Shopping
49	3/14/1996	SE Labels AS	Delta Label Systems Ltd

50	3/22/1996	Industri og Skipsbanken	Finansbanken ASA(Sparebanken)
51	9/2/1996	Merkantildata ASA	MBS Fjerndata
52	1/16/1997	Hafslund ASA	SkanKraft Holdings AS
53	1/31/1997	Blom ASA	CreditInform
54	4/1/1997	RingCom ASA	Stentofon ASA
55	7/31/1997	Finansbanken ASA	Skipskreditforeningen
56	10/20/1997	Petroleum Geo-Services ASA	Awilco-Floating Prodn,Storage
57	10/30/1997	Visma ASA	Micro BO
58	12/4/1997	Olav Thon Eiendomsselskap ASA	Bergesen DY A/S-Info-Rama
59	12/4/1997	Agresso Group ASA	ErgoSoft
60	2/13/1998	Norsk Vekst ASA	Safelift Holding A/S
61	4/6/1998	DSND	Seateam Technology ASA
62	6/1/1998	Agresso Group ASA	IT Infotechnik
63	6/25/1998	Jotul ASA	Kvalsethpeisen AS
64	7/22/1998	Den Norske Banken ASA	American Express Norge-Nor Ops
65	9/2/1998	Merkantildata ASA	Info-Software AS
66	9/26/1998	Color Line A/S	Larvik-Ferry & Airline Ops
67	11/5/1998	Merkantildata ASA	Case Telesystemer AS
68	11/16/1998	Thrane-Gruppen ASA	CRI-Gruppen ASA
69	11/19/1998	Avenir ASA	BITS
70	11/26/1998	Agresso Group ASA	Datorisering Norge AS
71	11/30/1998	Merkantildata ASA	CMA Holding Norge AS & Consulting Group Holding AS
73	1/6/1999	Storebrand ASA	Finansbanken ASA
74	1/15/1999	Schibsted ASA	Bladkompaniet AS
75	3/27/1999	Veidekke ASA	Norske Staalbygg(Ole Karlsen)
76	4/9/1999	Hitec ASA	Kvaerner Marine Automation AS
77	4/29/1999	Veidekke ASA	Block Berge Bygg A/S
78	4/29/1999	Storebrand ASA	Oslo Reinsurance Co ASA
79	4/29/1999	Merkantildata ASA	TelCall AS
80	4/30/1999	Alphatron Industrier ASA	Kitron ASA
81	5/14/1999	Bergesen DY A/S	Scantank Offshore AS
82	8/27/1999	Narvesen A/S	Friman AS
83	9/24/1999	TANDBERG Television ASA	News Digital Systems-Digital
84	11/25/1999	Pan Fish ASA	Aukra Seafood AS & Delfa AS
86	12/13/1999	Itera ASA	Objectwares A/S
87	12/16/1999	Moelven Industrier ASA	Forestia AS-Timber Activities
88	1/1/2000	AF Gruppen ASA	Broeder Holstad AS
89	2/28/2000	Merkantildata ASA	Avenir ASA & Provida A/S
91	3/1/2000	Itera ASA	Xit Group AS
92	4/17/2000	Merkantildata ASA	Getronics NV-Nordic Operations
93	6/13/2000	Pan Fish ASA	Seafood Group
94	6/19/2000	Software Innovation ASA	SBS-Doculive Unit(Siemens AS)
95	7/28/2000	Teco Maritime ASA	Stromme Ships Services AS
96	9/8/2000	CorrOcean ASA	Safetec Nordic AS(Hubro AS)
97	11/7/2000	Narvesen A/S	Rema 1000 International AS
98	11/14/2000	Otrum Electronics ASA	Telenor AS-Hotel Television
99	1/15/2001	Roxar ASA	Fluenta AS
100	2/12/2001	Skeie Drilling & Production	Procon Engineering AS(Prosafe)
101	3/26/2001	Skeie Drilling & Production	AS Stalprodukter
102	4/23/2001	FrontLine Ltd	Mosvold Shipping A/S
103	5/18/2001	Software Innovation ASA	Ementa
104	6/1/2001	Itera ASA	Nesthood-Multimedia Activities
105	6/4/2001	Webcenter Unique ASA	Ephorma-Social & Health Svcs

106	6/6/2001	Itera ASA	Ahead Consulting AS
107	7/4/2001	Itera ASA	marchFIRST Norway AS
108	7/6/2001	Intellinet ASA	Cegal AS
109	7/13/2001	Hafslund ASA	Vattenfall Norge AS
110	8/16/2001	Software Innovation ASA	Wnet Partner AS
111	11/28/2001	Aker Maritime ASA	Kvaerner ASA
112	11/30/2001	Den Norske Bank Holding ASA	Acta Link(Acta Holding ASA)
113	12/5/2001	Olav Thon Eiendomsselskap ASA	Gardermoen Park AS
114	12/31/2001	Schibsted ASA	Maison Interior & Design Mag
115	1/2/2002	Aktiv Kapital ASA	Storebrand Finans A/S
116	1/8/2002	Visma ASA	Regnskapskontoret Vest AS
117	3/20/2002	Fjord Seafood ASA	Fjord Domstein Holding-Assets
118	4/16/2002	Tech Holding ASA	OfficeShop AS
119	4/23/2002	Schibsted ASA	Tique Magazine
120	7/3/2002	Orkla ASA	Ullern Avis
121	7/29/2002	Visma ASA	Oko-Data
122	10/15/2002	Expert Eilag ASA	Coop Power(Coop Norge AS)
123	11/18/2002	ABG Sundal Collier Norge ASA	Acta Real Estate
124	1/21/2003	Hexagon Composites ASA	Raufoss Alternative Fuel
125	2/3/2003	Visma ASA	Scenario Professional ASA
126	2/27/2003	Sandnes Sparebank	Acta Bank ASA
127	3/18/2003	Den Norske Bank Holding ASA	Gjensidige NOR ASA
128	4/7/2003	Merkantildata ASA	EDB Bergen
129	5/7/2003	Rieber & Son ASA	Nopal AS
130	10/9/2003	Visma ASA	Client Computing Norge AS
131	10/27/2003	Leroy Seafood Group ASA	Nye Midnor AS
132	11/25/2003	Otrum ASA	Scandic Hotel Stavanger
133	12/5/2003	WiCom ASA(NOW 44799H)	Smartnet AS
134	3/1/2004	Aker Kvaerner ASA	Aker Kvaerner ASA & Aker Kvaerner Yards ASA
136	7/12/2004	Tomra Systems ASA	TiTech VisionSort AS
137	7/30/2004	Aktiv Kapital ASA	Olympia Capital ASA
138	8/10/2004	Altinex ASA	Sola Laboratorium AS
139	10/18/2004	Visma ASA	Ajourit AS
140	10/19/2004	Pan Fish ASA	Vestlax Hirtshals A/S
141	10/21/2004	EDB Business Partner ASA	IBM Norge-Outsourcing Op
142	11/3/2004	Helgeland Sparebank	Sparebanken Rana
143	11/19/2004	Solstad Offshore ASA	TFDS Offshore
144	11/24/2004	EDB Business Partner ASA	Capgemini-Infrastructure Mgt
145	12/17/2004	Northern Oil ASA	NaturGass(USA)AS
146	1/24/2005	Stromme ASA	Maritime Equipment AS
147	2/9/2005	Hands ASA	Completo AS
148	2/17/2005	Consorte Group ASA	Xtractor AS
149	2/18/2005	PSI Group ASA	Init Rekvisita AS
150	5/3/2005	TeleComputing ASA	IT Broker AS
151	5/24/2005	Findexa AS	RosaIndex ASA
152	6/16/2005	C Tybring-Gjedde ASA	Andvord AS
153	6/16/2005	Orkla ASA	Collett Pharma AS
154	6/21/2005	Leroy Seafood Group ASA	Aurora Salmon AS
155	7/15/2005	TeleComputing ASA	Stim Computing
157	10/19/2005	Bjorge ASA	Holta & Haaland Instrumenterin
159	11/3/2005	Hands ASA	nett23 as
160	11/9/2005	Bjorge ASA	Naxys AS
161	11/10/2005	NextGenTel AS	Agder Energi AS-ADSL Assets

162	11/17/2005	Kongsberg Gruppen ASA	Norcontrol IT
163	11/25/2005	Data Respons ASA	Centrex AS
164	12/15/2005	Goodtech ASA	Cronus Holding AS
165	12/19/2005	EDB Business Partner ASA	TAG Systems AS
166	12/22/2005	Stromme ASA	Tesma Holding AS
167	1/16/2006	EDB Business Partner ASA	Avenir AS & Spring Consulting Group
170	2/13/2006	EDB Business Partner ASA	Software Tech Integration AS
171	3/24/2006	Sinvest ASA	Beta Drilling AS
172	3/31/2006	Fast Search & Transfer ASA	Kopek AS
173	4/3/2006	International Maritime Exch	NOS ASA
174	4/7/2006	Consorte Group ASA	Intelecom AS
175	4/24/2006	Leroy Seafood Group ASA	Fossen AS
176	5/11/2006	International Maritime Exch	M3
177	5/22/2006	Blom ASA	ScanRope Holding AS
178	5/24/2006	Sinvest ASA	Ocean HeavyLift ASA
179	5/29/2006	Eltek ASA	Nera ASA
180	6/2/2006	AF Gruppen ASA	Energi & Miljoteknikk AS & Holst & Bra AS
182	6/9/2006	Mamut ASA	Active 24 ASA
183	6/21/2006	International Maritime Exch	Nena AS
184	7/3/2006	MediStim ASA	Kir-Op AS
185	7/7/2006	Telenor ASA	Maritime Communication Partner
186	10/18/2006	Cermaq ASA	Langfjordlaks AS
187	12/5/2006	Sparebanken Vest	Fokus Bank AS-Sogn Og Fjordane
188	12/8/2006	Borgestad ASA	JH Bjorklund AS & Kay Lindegaard AS
190	12/11/2006	Simrad Optronics ASA	Vinghog AS
191	12/13/2006	Goodtech ASA	Triple S
192	12/18/2006	Statoil ASA	Norsk Hydro ASA
193	12/21/2006	Cermaq ASA	Hammerfest Lakseslakteri AS & Polarlaks AS
195	12/22/2006	Schibsted ASA	Aftenposten AS & Bergens Tidende AS & Fædrelandsvennen AS
198	12/27/2006	Kongsberg Gruppen ASA	Sense Intellifield
199	12/31/2006	Norsk Vekst ASA	Sonans AS
200	1/22/2007	TTS Group ASA	ICD Projects AS
201	1/30/2007	Component Software Group ASA	Business Logic A/S
202	2/26/2007	Leroy Seafood Group ASA	Veststar AS
203	2/27/2007	Natural ASA	Aker BioMarine ASA
204	3/12/2007	Ignis ASA	Datametrix AS
206	4/30/2007	TTS Group ASA	Sense EDM AS
207	5/9/2007	Sparebanken Rogaland	Vagen Drift AS & Vagen Eiendomsforvaltning AS
209	6/15/2007	Data Respons ASA	Digitas AS
210	6/26/2007	Teco Coating Services ASA	Unitech Ship Service AS
211	7/6/2007	Telenor ASA	Mobyson AS & Talkmore Holding AS
213	7/27/2007	StepStone ASA	Recruiter Norge AS
214	8/16/2007	Petroleum Geo-Services ASA	Roxicon AS
215	10/23/2007	DnB NOR ASA	SkandiaBanken Bilfinans AS
216	10/24/2007	Grenland Group AS	Elteka Teknikk AS(was 83632Y)
217	11/7/2007	Vizrt Ltd	Escenic AS
218	12/5/2007	Inmeta ASA	Spranget Solutions AS

219	12/20/2007	Simtronics ASA	Etech Process AS
220	1/1/2008	Sparebanken Vest	Ottesen & Dreyer AS
221	1/9/2008	EDB Business Partner ASA	IS Partner AS
224	3/14/2008	AKVA Group ASA	Idema aqua AS
225	3/27/2008	Mamut ASA	KlubbenOnline
227	6/3/2008	Inmeta ASA	Exense Consulting AS
228	6/23/2008	Telenor ASA	Datametrix AS
232	11/12/2008	ODIM ASA	Sunnmore Elektro AS
234	4/1/2009	Aker Solutions ASA	Midsund Bruk AS
235	5/7/2009	DnB NOR ASA	Kid Interior AS
236	6/4/2009	Goodtech ASA	Intercontrol AS
237	6/25/2009	Codfarmers ASA	NAP Marine AS
239	12/21/2009	Acta Holding ASA	Axir AS
240	12/22/2009	Atea ASA	Uni Networks Ltd
241	1/6/2010	24SevenOffice ASA	Phonzo AS
242	1/14/2010	Goodtech ASA	Fleximatic AS
244	2/10/2010	Vizrt Ltd	Adactus AS
245	3/16/2010	Norway Pelagic ASA	Emy Eiendom AS & Emy Fish AS
247	4/26/2010	Atea ASA	Impact Europe Norge AS
248	5/12/2010	Atea ASA	Dropzone ASA
249	5/25/2010	SalMar ASA	Reistad Eiendom AS
250	5/26/2010	Sparebank 1 SR-Bank	Kvinnherad Sparebank
251	5/27/2010	Inmeta ASA	Osiris Data Holding AS
252	6/7/2010	EDB Business Partner ASA	ErgoGroup AS
253	8/19/2010	Kongsberg Gruppen ASA	Odfjell Consulting AS
254	11/1/2010	Havila Ariel ASA	Biohus AS
255	11/29/2010	Atea ASA	Umoe IKT AS
256	11/30/2010	Inmeta ASA	Crayon Group AS
257	2/21/1998	Merkantildata ASA	Rubik AS
258	6/4/1999	Bonheur ASA	First Olsen Tankers Ltd
259	3/25/2000	Byggma ASA	Fibo-Trespo
260	5/4/2000	Kongsberggruppen ASA	Navia ASA
261	6/22/2000	Norwegian Applied Technology ASA	Devold Amt AS
262	1/8/2002	Den Norske Bank ASA	Skandia Asset Management
265	12/17/2002	Kongsberggruppen ASA	Sensit AS
267	5/13/2003	Hardanger Sunnhordlandske Dampskibselskap ASA	Haugaland Billag AS
268	6/19/2003	Orkla ASA	Nordstjernen Holding AS
269	2/25/2004	Aktiv Kapital ASA	Aktiv Kapital Asset Investments AS
270	11/17/2004	Byggma ASA	Rolf Dolven AS
271	11/24/2004	Sparebank 1 Midt-Norge	Romsdals Fellesbank ASA
272	4/13/2005	Sparebanken Møre	Krogsveen Raknes AS
297	4/14/2005	Sparebanken Møre	Paulsen & Bakke AS
273	5/4/2005	Dof ASA	GeoconsultAS
274	5/10/2005	Data Respons ASA	Certified Computer Technology AS
275	10/10/2005	Pan Fish ASA (Marine Harvest)	Aqua Farms AS
276	11/22/2005	Stromme ASA (Eitzen Maritime Services AS)	Tesma Holding AS
277	11/3/2006	Hardanger Sunnhordlandske Dampskibselskap ASA	Gaia Trafikk AS
278	3/2/2007	Nordialog ASA	Genpoint AS
279	6/18/2007	Komplett ASA	Torp Computing Group ASA
280	1/29/2008	AF Gruppen ASA	Tempero Energitjenester AS

281	10/21/2008	Sparebank 1 Nord-Norge	Glitnir Bank ASA
282	6/25/2009	Sparebanken Vest	Sauda Sparebank
283	6/29/2009	Norway Pelagic ASA	Fryseriet AS
284	3/15/2010	Wilh Wilhelmsen Holding ASA	Wilh Wilhelmsen ASA
286	7/1/2010	Arendals Fossekompani ASA	World Wide Mobile Communication AS
287	9/28/2010	Veidekke ASA	Entreprenør M Kristiseter AS
288	03-26-1998	Merkantildata ASA	ADB-Partner & GG Data & Netco
291	12-25-1998	Merkantildata ASA	Cag Lan International AS
292	3/6/2000	Itera ASA	Zema AS
293	3/28/2000	Itera ASA	Compendia AS
294	7/21/2000	Pan Fish ASA (Marine Harvest)	Global Fish AS
295	8/16/2000	Pan Fish ASA (Marine Harvest)	Welcon Pelagic AS
299	12/22/2008	Sparebank 1 Nord-Norge	Hurtigruten ASA
300	11/5/2009	Goodtech ASA	Haco Hydrogeologi og avløpskompetanse AS
301	6/22/2010	Inmeta ASA	Visiti AS
302	3/23/1999	Den Norske Bank ASA	Postbanken
303	12/19/1997	Hafslund ASA	Haram Energi
304	12/20/2002	DNB Holding ASA	Nordlandsbanken
305	5/4/2005	Ecuanor AS	Rocksource Geotech AS
306	10/21/2010	SalMar ASA	Marius Eikremsvik AS
307	8/25/2009	Aker Exploration ASA	Det Norske Oljeselskap ASA

Appendix 9 – Variables (method of payment, size & target status)

Transaction number	Target status	Method of Payment	Size
1	Private	Unknown	Large
2	Public	Stock	Small
3	Private	Stock	Large
4	Private	Mixed	Large
5	Private	Stock	Large
6	Private	Stock	Large
7	Private	Mixed	Large
8	Private	Mixed	Large
9	Public	Mixed	Small
11	Private	Unknown	Large
12	Private	Stock	Small
13	Subsidiary	Unknown	Large
14	Public	Stock	Large
15	Private	Unknown	Small
16	Subsidiary	Cash	Small
17	Private	Mixed	Small
19	Subsidiary	Unknown	Large
20	Subsidiary	Unknown	Large
21	Private	Cash	Small
22	Subsidiary	Unknown	Large
23	Subsidiary	Unknown	Large
24	Subsidiary	Cash	Small
25	Private	Mixed	Small
26	Private	Cash	Large
27	Private	Mixed	Large
28	Private	Stock	Small
29	Subsidiary	Cash	Small
30	Private	Unknown	Large
31	Private	Unknown	Small
32	Subsidiary	Unknown	Large
34	Private	Unknown	Small
35	Subsidiary	Stock	Large
36	Subsidiary	Stock	Large
37	Private	Stock	Small
38	Public	Stock	Small
39	Private	Unknown	Large
40	Public	Cash	Large
41	Private	Unknown	Large
42	Private	Unknown	Large
45	Public	Stock	Large
46	Subsidiary	Unknown	Large
48	Subsidiary	Unknown	Large
49	Private	Mixed	Small
50	Subsidiary	Mixed	Small
51	Private	Mixed	Small
52	Private	Unknown	Large
53	Private	Mixed	Small
54	Public	Stock	Small

55	Private	Mixed	Small
56	Subsidiary	Mixed	Large
57	Private	Stock	Small
58	Subsidiary	Unknown	Large
59	Private	Stock	Small
60	Subsidiary	Cash	Large
61	Public	Stock	Large
62	Private	Stock	Large
63	Private	Unknown	Small
64	Subsidiary	Unknown	Large
65	Private	Stock	Large
66	Subsidiary	Unknown	Small
67	Private	Cash	Large
68	Public	Stock	Small
69	Private	Mixed	Small
70	Private	Mixed	Large
71	Private	Mixed	Large
73	Public	Cash	Large
74	Private	Unknown	Large
75	Private	Unknown	Small
76	Subsidiary	Cash	Small
77	Private	Cash	Small
78	Public	Cash	Large
79	Private	Cash	Large
80	Public	Stock	Small
81	Private	Unknown	Large
82	Subsidiary	Unknown	Large
83	Subsidiary	Mixed	Large
84	Private	Mixed	Small
86	Private	Stock	Small
87	Subsidiary	Stock	Small
88	Private	Unknown	Small
89	Public	Mixed	Large
91	Private	Mixed	Small
92	Subsidiary	Stock	Large
93	Private	Unknown	Large
94	Subsidiary	Mixed	Small
95	Private	Stock	Small
96	Subsidiary	Stock	Small
97	Subsidiary	Stock	Large
98	Subsidiary	Stock	Small
99	Subsidiary	Mixed	Small
100	Subsidiary	Cash	Small
101	Private	Unknown	Small
102	Public	Cash	Large
103	Privat	Mixed	Small
104	Subsidiary	Mixed	Small
105	Subsidiary	Unknown	Small
106	Subsidiary	Mixed	Small
107	Subsidiary	Cash	Small
108	Subsidiary	Stock	Small
109	Subsidiary	Mixed	Large
110	Private	Mixed	Small
111	Private	Stock	Large

112	Subsidiary	Unknown	Large
113	Private	Unknown	Large
114	Private	Unknown	Large
115	Subsidiary	Mixed	Large
116	Private	Mixed	Large
117	Subsidiary	Mixed	Large
118	Private	Stock	Small
119	Private	Unknown	Large
120	Private	Unknown	Large
121	Private	Cash	Large
122	Subsidiary	Unknown	Large
123	Subsidiary	Cash	Small
124	Subsidiary	Unknown	Small
125	Private	Cash	Small
126	Subsidiary	Stock	Small
127	Public	Mixed	Large
128	Subsidiary	Cash	Small
129	Subsidiary	Cash	Large
130	Private	Cash	Large
131	Subsidiary	Stock	Small
132	Subsidiary	Unknown	Small
133	Private	Mixed	Small
134	Public	Stock	Large
136	Subsidiary	Mixed	Large
137	Subsidiary	Mixed	Large
138	Private	Unknown	Large
139	Subsidiary	Cash	Small
140	Subsidiary	Stock	Small
141	Subsidiary	Unknown	Large
142	Public	Stock	Small
143	Subsidiary	Unknown	Small
144	Subsidiary	Unknown	Large
145	Private	Stock	Small
146	Private	Mixed	Small
147	Private	Stock	Small
148	Private	Stock	Small
149	Private	Mixed	Small
150	Private	Mixed	Small
151	Subsidiary	Mixed	Large
152	Private	Stock	Small
153	Subsidiary	Mixed	Large
154	Subsidiary	Mixed	Small
155	Private	Cash	Small
157	Private	Cash	Small
159	Private	Stock	Small
160	Private	Unknown	Small
161	Subsidiary	Cash	Small
162	Private	Unknown	Large
163	Private	Stock	Small
164	Private	Mixed	Small
165	Private	Unknown	Large
166	Subsidiary	Stock	Small
167	Public	Unknown	Small
170	Private	Mixed	Small

171	Subsidiary	Unknown	Large
172	Private	Unknown	Large
173	Public	Mixed	Small
174	Subsidiary	Cash	Small
175	Private	Stock	Large
176	Private	Cash	Small
177	Private	Mixed	Small
178	Subsidiary	Unknown	Large
179	Public	Mixed	Small
180	Private	Mixed	Small
182	Public	Cash	Small
183	Private	Cash	Small
184	Private	Mixed	Small
185	Private	Unknown	Large
186	Private	Cash	Large
187	Subsidiary	Cash	Small
188	Private	Cash	Small
190	Private	Cash	Small
191	Private	Cash	Small
192	Public	Stock	Large
193	Private	Cash	Large
195	Subsidiary	Mixed	Large
198	Private	Cash	Large
199	Private	Unknown	Small
200	Private	Cash	Small
201	Private	Mixed	Small
202	Subsidiary	Stock	Large
203	Subsidiary	Stock	Small
204	Subsidiary	Cash	Small
206	Private	Mixed	Small
207	Subsidiary	Unknown	Small
209	Private	Stock	Small
210	Private	Mixed	Small
211	Subsidiary	Unknown	Large
213	Private	Cash	Small
214	Private	Cash	Large
215	Subsidiary	Unknown	Large
216	Subsidiary	Mixed	Small
217	Private	Stock	Small
218	Private	Stock	Small
219	Private	Mixed	Small
220	Private	Unknown	Small
221	Subsidiary	Cash	Large
224	Private	Cash	Small
225	Private	Cash	Small
227	Public	Stock	Small
228	Subsidiary	Unknown	Large
232	Private	Unknown	Small
234	Subsidiary	Cash	Large
235	Subsidiary	Cash	Large
236	Private	Mixed	Small
237	Private	Stock	Small
239	Private	Stock	Small
240	Private	Cash	Large

241	Private	Mixed	Small
242	Private	Cash	Small
244	Private	Cash	Small
245	Subsidiary	Mixed	Small
247	Subsidiary	Cash	Large
248	Private	Cash	Large
249	Private	Cash	Large
250	Private	Stock	Large
251	Private	Mixed	Small
252	Subsidiary	Stock	Small
253	Subsidiary	Cash	Large
254	Subsidiary	Unknown	Small
255	Subsidiary	Mixed	Large
256	Private	Stock	Small
257	Private	Stock	Large
258	Private	Unknown	Large
259	Private	Cash	Small
260	Private	Cash	Large
261	Private	Stock	Small
262	Private	Cash	Large
265	Private	Cash	Large
267	Private	Cash	Small
268	Private	Unknown	Large
269	Private	Cash	Large
270	Private	Unknown	Small
271	Private	Cash	Small
272	Private	Stock	Small
297	Private	Stock	Small
273	Private	Mixed	Small
274	Private	Cash	Small
275	Private	Cash	Small
276	Private	Stock	Small
277	Private	Mixed	Small
278	Private	Stock	Small
279	Private	Stock	Small
280	Private	Stock	Small
281	Private	Cash	Small
282	Private	Stock	Small
283	Private	Cash	Large
284	Private	Unknown	Large
286	Private	Cash	Small
287	Private	Unknown	Large
288	Private	Stock	Large
291	Private	Cash	Large
292	Private	Stock	Small
293	Private	Stock	Large
294	Private	Mixed	Large
295	Private	Stock	Large
299	Private	Cash	Small
300	Private	Mixed	Small
301	Private	Mixed	Small
302	Private	Mixed	Large
303	Private	Cash	Large
304	Private	Cash	Large

305	Private	Stock	Small
306	Private	Cash	Large
307	Public	Stock	Small

Appendix 10 – Alpha, beta, ACAR (-1, 1) & ACAR (-5, 5)

This list displays the alpha and beta values obtained through ordinary least square regression in SPSS, as well as the average cumulated abnormal return (ACAR) calculated in Excel. The values in red are the values defined as extreme. To locate the exact transaction the numbers belong to, use the transaction number and view appendix 8.

Transaction number	Alpha	Beta	R^2	R	ACAR (-1, 1)	ACAR (-5, 5)
1	-0.00100	1.057	0.428	0.654	1.638%	-0.014%
2	-0.00100	0.876	0.283	0.532	-1.358%	-0.547%
3	-0.00100	1.057	0.428	0.654	1.982%	0.336%
4	-0.00100	1.457	0.477	0.691	-0.968%	-0.483%
5	-0.00100	0.656	0.211	0.46	1.454%	-0.247%
6	0.00000	1.325	0.494	0.703	0.891%	0.154%
7	0.00000	1.071	0.534	0.731	-0.081%	0.468%
8	-0.00100	1.457	0.477	0.691	-0.435%	-0.467%
9	-0.00100	0.876	0.283	0.532	-1.557%	0.210%
11	0.00100	1.37	0.331	0.575	-1.065%	0.884%
12	0.00000	0.614	0.057	0.238	1.237%	-1.116%
13	0.00100	1.37	0.331	0.575	-3.103%	0.479%
14	0.00100	1.388	0.432	0.657	-0.429%	-0.284%
15	-0.10000	1.061	0.05	0.223	20.987%	10.303%
16	0.00000	0.915	0.095	0.309	2.368%	-0.419%
17	-0.01300	2.4	0.153	0.392	1.894%	6.652%
19	0.00000	1.15	0.692	0.932	-1.207%	-0.393%
20	-0.00100	1.028	0.587	0.766	0.653%	0.776%
21	-0.00400	2.651	0.371	0.609	2.219%	0.153%
22	0.00100	1.368	0.743	0.862	0.228%	-0.428%
23	0.00100	1.368	0.743	0.862	-1.898%	-0.181%
24	0.00600	0.992	0.068	0.26	-1.809%	-0.284%
25	-0.00010	1.256	0.184	0.429	-2.419%	-0.688%
26	0.00200	0.669	0.091	0.301	0.010%	-0.779%
27	0.00200	0.742	0.142	0.367	0.281%	0.112%
28	-0.00200	1.585	0.202	0.45	-0.199%	0.969%
29	-0.00010	0.626	0.355	0.355	-0.494%	-0.602%
30	0.00000	0.981	0.287	0.536	0.910%	0.028%
31	0.00000	0.538	0.026	0.161	-0.295%	0.120%
32	0.00000	0.981	0.287	0.536	0.070%	-0.162%
34	0.00000	0.291	0.032	0.18	-0.257%	0.520%
35	0.00009	0.677	0.143	0.379	0.188%	0.122%
36	0.00000	0.538	0.026	0.161	0.100%	0.554%
37	0.00100	0.568	0.03	0.173	-1.487%	-0.741%
38	0.00300	1.713	0.178	0.421	-1.946%	-0.147%
39	0.00100	1.27	0.331	0.575	-0.760%	-0.077%
40	0.00100	1.112	0.335	0.579	-1.296%	-0.911%
41	-0.00200	0.948	0.187	0.432	-0.069%	0.006%
42	-0.00100	0.575	0.047	0.217	-0.510%	-0.388%
45	-0.00100	1.302	0.338	0.582	-2.515%	-0.070%
46	-0.00001	0.157	0.005	0.067	-1.014%	0.143%

48	0.00200	0.478	0.075	0.274	-1.601%	-0.500%
49	0.00000	0.196	0.005	0.072	-0.626%	-0.314%
50	0.00100	0.281	0.009	0.12	1.119%	0.442%
51	0.00100	1.1	0.068	0.26	-0.295%	-0.201%
52	-0.00200	0.756	0.092	0.303	-0.114%	-0.142%
53	0.00300	1.03	0.115	0.34	-0.106%	-0.204%
54	-0.00100	1.063	0.05	0.223	1.394%	-0.158%
55	0.00000	0.595	0.111	0.332	-0.316%	0.177%
56	0.00000	1.64	0.328	0.573	2.714%	0.508%
57	-0.00500	1.1	0.009	0.093	1.291%	0.584%
58	0.00100	0.658	0.207	0.455	-0.428%	-0.361%
59	-0.00100	0.887	0.06	0.244	-0.820%	1.201%
60	0.00000	0.377	0.103	0.32	-0.628%	0.384%
61	0.00200	2.012	0.5	0.707	0.494%	-0.008%
62	-0.00100	0.887	0.06	0.244	-0.223%	1.567%
63	-0.00100	1.091	0.247	0.497	0.853%	0.107%
64	0.00200	1.033	0.34	0.583	0.295%	0.316%
65	0.00400	0.982	0.255	0.505	-7.736%	-2.588%
66	-0.00100	0.051	0.001	0.023	-1.591%	-0.334%
67	0.00400	0.982	0.255	0.505	3.352%	0.858%
68	0.00000	0.281	0.023	0.152	2.165%	1.111%
69	0.00300	0.86	0.095	0.309	4.945%	1.945%
70	0.00100	0.722	0.107	0.326	-0.102%	0.702%
71	0.00400	0.982	0.255	0.505	3.391%	1.366%
73	0.00200	1.291	0.526	0.725	-3.151%	-0.764%
74	-0.00100	0.478	0.129	0.359	0.806%	0.693%
75	0.00002	0.403	0.056	0.236	0.954%	0.447%
76	-0.00300	1.34	0.267	0.517	-0.729%	0.332%
77	0.00002	0.403	0.056	0.236	1.015%	0.279%
78	0.00200	1.291	0.526	0.725	-2.246%	-0.728%
79	0.00400	0.982	0.255	0.505	1.953%	0.433%
80	0.00100	0.797	0.087	0.294	-0.795%	-1.681%
81	0.00000	0.807	0.247	0.497	-1.741%	-0.704%
82	0.00000	0.086	0.005	0.072	1.097%	0.560%
83	0.00000	1.373	0.249	0.499	-0.313%	-0.478%
84	0.00400	0.761	0.035	0.187	2.635%	0.470%
86	0.00200	1.53	0.076	0.276	6.465%	2.897%
87	0.00000	0.537	0.031	0.176	-0.247%	-0.151%
88	0.00100	0.35	0.003	0.057	-0.822%	-0.001%
89	0.00100	1.608	0.258	0.508	-1.434%	-1.097%
91	0.00200	1.53	0.076	0.276	5.287%	2.082%
92	0.00100	1.608	0.258	0.508	0.169%	0.027%
93	0.00400	0.761	0.035	0.187	2.407%	0.791%
94	0.00200	1.533	0.186	0.431	1.094%	-1.163%
95	0.00500	1.259	0.034	0.185	-2.188%	-2.311%
96	0.00200	0.454	0.015	0.124	-0.038%	0.741%
97	0.00000	0.405	0.039	0.198	7.292%	2.629%
98	-0.00100	1.636	0.17	0.412	1.698%	1.842%
99	0.00000	0.567	0.042	0.204	4.124%	1.234%
100	0.00300	1.054	0.137	0.371	-0.463%	0.420%
101	0.00300	1.054	0.137	0.371	-1.563%	0.583%

102	0.00300	1.212	0.196	0.443	0.825%	-0.181%
103	-0.00100	1.409	0.29	0.539	-2.178%	-0.814%
104	-0.00500	2.165	0.353	0.594	0.271%	-0.851%
105	0.00400	0.947	0.124	0.352	-0.371%	-0.671%
106	-0.00500	2.165	0.353	0.594	0.881%	-0.511%
107	-0.00500	2.165	0.353	0.594	1.210%	-1.039%
108	-0.00800	0.491	0.007	0.082	-2.576%	1.304%
109	-0.00100	0.261	0.008	0.091	2.014%	0.431%
110	-0.00100	1.409	0.29	0.539	0.112%	0.062%
111	0.00100	0.165	0.005	0.07	4.466%	1.877%
112	0.00000	0.765	0.218	0.467	0.024%	0.117%
113	0.00000	0.114	0.013	0.114	-0.521%	-0.026%
114	0.00001	0.968	0.207	0.455	-0.325%	0.146%
115	0.00200	0.545	0.091	0.301	0.213%	0.299%
116	0.00200	0.617	0.081	0.284	1.865%	0.928%
117	-0.00700	0.289	0.003	0.057	-0.300%	0.903%
118	0.00200	0.992	0.009	0.097	1.917%	1.689%
119	0.00001	0.968	0.207	0.455	0.720%	0.933%
120	-0.00006	0.555	0.324	0.0569	0.600%	0.464%
121	0.00200	0.617	0.081	0.284	1.025%	1.328%
122	0.00000	0.259	0.021	0.146	-1.653%	-0.282%
123	0.00100	0.815	0.099	0.315	0.502%	-0.610%
124	-0.00100	0.825	0.08	0.283	3.105%	0.242%
125	0.00200	0.617	0.081	0.284	1.723%	1.371%
126	0.00000	0.132	0.023	0.153	0.200%	0.217%
127	0.00000	1.056	0.496	0.704	-0.891%	0.397%
128	0.00200	2.319	0.321	0.567	-1.656%	0.598%
129	0.00100	0.217	0.026	0.162	-0.421%	-0.490%
130	0.00200	0.617	0.081	0.284	0.887%	0.438%
131	0.00200	0.547	0.061	0.246	0.585%	-0.617%
132	0.00300	1.103	0.061	0.247	-0.737%	-1.022%
133	0.00400	0.766	0.009	0.097	-2.858%	-0.141%
134	0.00000	1	0.179	0.424	-1.866%	0.013%
136	-0.00300	1.334	0.202	0.449	-3.235%	-1.745%
137	0.00200	0.557	0.087	0.295	0.711%	0.469%
138	-0.00100	1.117	0.035	0.187	0.527%	0.232%
139	0.00000	0.435	0.063	0.251	-0.325%	-0.614%
140	-0.00800	2.117	0.015	0.122	-0.423%	0.448%
141	-0.00100	1.032	0.205	0.453	1.465%	0.571%
142	0.00000	0.658	0.026	0.161	1.398%	-0.006%
143	0.00000	0.48	0.03	0.173	2.802%	0.935%
144	-0.00100	1.032	0.205	0.453	0.999%	-0.333%
145	-0.00100	0.919	0.059	0.243	0.641%	0.206%
146	-0.00100	0.633	0.015	0.122	1.570%	0.590%
147	-0.00200	1.014	0.059	0.243	-2.051%	0.082%
148	-0.00200	0.483	0.012	0.11	4.093%	0.996%
149	0.00000	0.995	0.088	0.296	1.588%	-0.472%
150	-0.00100	0.899	0.074	0.272	1.349%	0.131%
151	0.00008	0.74	0.001	0.035	0.378%	-0.162%
152	-0.00003	0.637	0.079	0.281	5.525%	1.879%
153	0.00100	0.725	0.248	0.498	-0.903%	0.152%

154	0.00100	0.357	0.03	0.173	1.633%	0.710%
155	-0.00100	0.899	0.074	0.272	1.951%	-0.160%
157	0.00200	0.459	0.024	0.156	0.325%	-0.831%
159	-0.00200	1.014	0.059	0.243	-3.470%	0.160%
160	0.00200	0.459	0.024	0.156	-0.027%	-0.406%
161	-0.00005	1.036	0.167	0.408	0.637%	-0.063%
162	0.00100	0.365	0.056	0.237	-0.590%	-0.339%
163	0.00000	0.468	0.022	0.149	0.911%	-0.383%
164	0.00500	0.635	0.008	0.087	-1.266%	0.125%
165	-0.00100	0.553	0.184	0.429	-0.430%	-0.110%
166	0.00200	0.883	0.04	0.201	3.610%	1.985%
167	-0.00100	0.553	0.184	0.429	-0.481%	-0.174%
170	-0.00100	0.553	0.184	0.429	-0.156%	-0.266%
171	0.00300	1.85	0.411	0.641	-0.028%	-0.598%
172	-0.00006	1.081	0.291	0.54	-0.518%	-0.284%
173	-0.00100	0.496	0.063	0.251	3.457%	1.137%
174	0.00100	0.237	0.007	0.082	1.658%	0.377%
175	0.00300	0.618	0.108	0.328	1.716%	-0.166%
176	-0.00100	0.496	0.063	0.251	3.550%	1.826%
177	-0.00100	1.341	0.171	0.414	3.752%	0.425%
178	0.00300	1.85	0.411	0.641	-3.345%	0.751%
179	-0.00100	1.075	0.361	0.601	-4.234%	-0.960%
180	0.00100	0.298	0.037	0.193	0.532%	-0.222%
182	0.00100	0.587	0.082	0.286	-0.169%	0.337%
183	-0.00100	0.496	0.063	0.251	3.128%	0.935%
184	0.00200	0.363	0.025	0.157	0.638%	-0.009%
185	0.00100	0.734	0.387	0.622	-0.047%	-0.098%
186	0.00100	0.866	0.244	0.494	-0.379%	0.272%
187	0.00100	0.017	0.001	0.028	-0.266%	-0.278%
188	0.00200	0.319	0.028	0.169	-0.757%	-0.493%
190	0.00300	0.834	0.11	0.331	4.497%	0.440%
191	0.00200	0.25	0.014	0.12	1.262%	-0.257%
192	-0.00100	1.184	0.769	0.877	-2.053%	-0.715%
193	0.00100	0.866	0.244	0.494	-0.175%	0.145%
195	0.00100	0.468	0.161	0.401	-0.437%	-0.462%
198	0.00100	0.33	0.081	0.284	1.202%	0.159%
199	0.00200	0.106	0.006	0.079	-0.200%	-0.564%
200	0.00400	0.615	0.121	0.347	2.090%	-0.501%
201	0.00300	0.03	0	0.01	0.788%	0.515%
202	0.00000	0.866	0.331	0.575	0.158%	0.007%
203	0.00300	0.484	0.059	0.244	0.090%	0.264%
204	-0.00300	1.014	0.211	0.406	1.536%	0.489%
206	0.00400	0.615	0.121	0.347	2.368%	-0.225%
207	0.00000	0.178	0.034	0.184	0.720%	0.018%
209	0.00000	0.559	0.112	0.335	-0.252%	0.371%
210	0.00200	0.134	0.005	0.071	-0.880%	-0.216%
211	0.00000	0.918	0.286	0.534	-0.828%	-0.499%
213	0.00400	0.457	0.036	0.19	-2.936%	-0.811%
214	-0.00100	1.366	0.469	0.685	1.455%	0.626%
215	0.00000	0.677	0.371	0.609	0.035%	0.200%
216	-0.00006	0.525	0.083	0.287	0.371%	-0.445%

217	0.00100	0.571	0.1	0.316	-0.304%	-0.479%
218	0.00100	0.937	0.098	0.314	1.940%	-0.148%
219	0.00200	0.962	0.107	0.327	1.592%	0.868%
220	0.00000	0.045	0.002	0.046	-0.083%	0.250%
221	-0.00100	0.403	0.106	0.326	0.974%	-0.002%
224	-0.00200	0.217	0.019	0.139	0.772%	0.834%
225	-0.00300	0.503	0.136	0.369	2.645%	0.217%
227	-0.00500	1.047	0.164	0.406	2.228%	1.229%
228	0.00000	0.689	0.33	0.574	-0.660%	-0.730%
232	0.00000	0.845	0.319	0.565	-0.718%	-4.080%
234	0.00100	1.546	0.644	0.803	-6.222%	-1.745%
235	0.00100	1.215	0.526	0.725	1.473%	0.689%
236	-0.00100	0.245	0.027	0.163	0.896%	1.228%
237	-0.00400	0.495	0.079	0.281	-7.709%	-4.127%
239	0.00200	0.831	0.124	0.352	-0.861%	-0.210%
240	0.00400	0.506	0.142	0.377	1.213%	-0.089%
241	0.00300	0.12	0.006	0.076	1.173%	0.176%
242	-0.00100	0.245	0.027	0.163	0.720%	1.521%
244	0.00100	0.296	0.044	0.211	1.137%	-0.213%
245	0.00100	0.047	0.003	0.057	-0.106%	-0.307%
247	0.00400	0.506	0.142	0.377	-1.920%	-0.187%
248	0.00400	0.506	0.142	0.377	-1.497%	0.185%
249	0.00100	0.422	0.045	0.213	0.817%	-0.430%
250	0.00200	0.606	0.205	0.453	0.298%	0.292%
251	0.00000	0.588	0.15	0.387	1.846%	0.714%
252	-0.00100	0.653	0.128	0.357	2.097%	1.035%
253	0.00200	0.504	0.169	0.411	-0.949%	0.354%
254	0.00000	0.277	0.017	0.132	-1.553%	0.320%
255	0.00400	0.506	0.142	0.377	-1.528%	-0.311%
256	0.00000	0.588	0.15	0.387	0.599%	0.224%
257	0.00400	0.982	0.255	0.505	2.606%	0.564%
258	-0.00100	0.742	0.136	0.368	0.109%	-0.088%
259	0.00200	0.112	0.001	0.023	-0.185%	0.524%
260	-0.00100	0.832	0.18	0.424	-1.787%	-0.325%
261	-0.00300	0.874	0.026	0.16	1.753%	0.508%
262	0.00000	0.726	0.191	0.437	1.894%	0.281%
265	-0.00100	0.327	0.09	0.3	0.141%	0.076%
267	0.00200	0.141	0.007	0.082	-1.617%	-0.320%
268	-0.00009	0.801	0.405	0.636	0.295%	-0.044%
269	0.00200	0.433	0.052	0.228	0.087%	0.246%
270	0.00100	0.045	0	0.013	3.057%	2.230%
271	0.00100	0.374	0.09	0.3	-0.865%	-0.263%
272	0.00000	0.019	0	0.018	0.130%	0.407%
297	0.00000	0.019	0	0.018	0.145%	0.407%
273	0.00100	0.528	0.07	0.264	0.389%	0.886%
274	0.00000	0.468	0.022	0.149	-0.064%	-0.619%
275	-0.00200	1.545	0.079	0.282	2.020%	0.592%
276	0.00000	0.75	0.035	0.188	-13.896%	4.546%
277	0.00000	0.313	0.023	0.151	2.295%	2.253%
278	0.00000	0.157	0.006	0.078	2.019%	-0.774%
279	0.00100	0.449	0.054	0.232	0.522%	1.076%

280	0.00100	0.301	0.095	0.307	0.825%	-0.282%
281	-0.00300	0.386	0.129	0.359	-0.882%	-1.464%
282	0.00000	0.276	0.065	0.254	-0.327%	0.025%
283	0.00100	0.089	0.009	0.094	1.117%	0.423%
284	0.00100	0.423	0.115	0.339	1.263%	0.035%
286	0.00000	0.202	0.039	0.197	0.006%	0.352%
287	-0.00100	0.566	0.226	0.475	0.728%	0.679%
288	0.00400	0.982	0.255	0.505	1.984%	0.602%
291	0.00400	0.982	0.255	0.505	1.015%	-0.389%
292	0.00200	1.53	0.076	0.276	4.271%	2.729%
293	0.00200	1.53	0.076	0.276	7.143%	3.406%
294	0.00400	0.761	0.035	0.187	2.388%	0.639%
295	0.00400	0.761	0.035	0.187	2.219%	0.181%
299	-0.00300	0.386	0.129	0.359	0.053%	-2.613%
300	-0.00100	0.245	0.027	0.163	0.567%	1.295%
301	0.00000	0.588	0.15	0.387	3.091%	1.145%
302	0.00200	1.033	0.34	0.583	0.393%	0.016%
303	-0.00100	0.64	0.112	0.334	0.672%	-0.124%
304	0.00100	0.978	0.462	0.68	-0.224%	-0.208%
305	0.00000	1.174	0.003	0.183	0.550%	-0.628%
306	0.00100	0.422	0.045	0.213	0.970%	-0.828%
307	-0.00100	0.211	0.007	0.081	0.099%	-0.402%

Appendix 11 – OLS market model SPSS output

This appendix displays the output from that OLS regression performed in SPSS. The coefficients matrix in the end is the relevant matrix for the analysis conducted.

Variables Entered/Removed[b]

Model	Variables Entered	Variables Removed	Method
1	1 BXLT[a]	.	Enter

a. All requested variables entered.

b. Dependent Variable: 1 Stock

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.654[a]	.428	.425	.015236434

a. Predictors: (Constant), 1 BXLT

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.034	1	.034	144.414	.000[a]
	Residual	.045	193	.000		
	Total	.078	194			

a. Predictors: (Constant), 1 BXLT

b. Dependent Variable: 1 Stock

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.001[1]	.001		-.550	.583
	1 BXLT	1.057[2]	.088	.654	12.017	.000

a. Dependent Variable: 1 Stock

1. This is the intercept between the regresion line and the y-axis, the alpha (α)
2. This is the slope of the regression line, the beta (β)

Appendix 12 – Extreme values

Deal 15
The deal between Focus Bank (acquirer) and Oppdal hotels (target) is a sort of bankruptcy settlement, where Focus Bank acquired the target for a symbolic price – though only temporarily. Unfortunately, we have been unable to retrieve any more information on this deal.

Deal 17
The deal between Den Norske Banken ASA (acquirer) and Realkreditt (target) was a product of the bank crisis in the late 80s. At the same time the Norwegian Government became a major shareholder. Hence the stock prices around the merger announcement are affected by other variables as well.

Deal 86
The deal between Itera ASA (acquirer) and Objectware A/S (target) occurred on the same time as Itera made other profitable investments (other smaller acquisitions, not 100 percent of the stock). Hence it is difficult to determine how much of the stock fluctuations around the merger date can be contributed to this specific merger announcement.

Deal 232
The deal between Odim ASA (acquirer) and Sunnmøre Elektro AS (target) happened at the same time that Odim made several expansions into new foreign markets. Hence it is difficult to determine how much of the stock fluctuations around the merger date can be contributed to this specific merger announcement.

Deal 237
The deal between Codfarmers ASA (acquirer) and NAP Marine AS (target) was announced on the same date as a rights issue announcement, where the target stockholders contributed to the acquirer's equity. Hence it is difficult to determine how much of the stock fluctuations around the merger date can be contributed to this specific merger announcement.

Deal 276
The deal between Strømme AS (acquirer) and Tesma Holding AS (target) is somewhat difficult to obtain exact information on, but is seems that there has been several announcements around the same time as the merger announcement. Due to this, we have decided to treat the deal as an extreme value.

Deal 292 and 293
The deal between Itera ASA (acquirer) and Zema AS (target) and Compandia AS (target) were both announced on the same dates as Itera announced the acquisition of foreign companies. Itera is one of the serial acquirers in the sample, and since many of their acquisitions are of foreign companies, they are not included in the sample

Appendix 13 - Descriptive statistics reports & graphs

The descriptive statistics reports and graphs are produced in SPSS, with and without extreme values.

Descriptive statistics with extreme values

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ACAR (-1, 1)	268	-.23208	.62960	.0148454	.07351988	2.693	.149	21.558	.297
ACAR (-5, 5)	268	-.45402	1.13333	.0212681	.13092904	2.835	.149	23.387	.297
Public (-1, 1)	24	-.12701	.10370	-.0179515	.05539405	.338	.472	-.131	.918
Public (-5, 5)	24	-.18490	.13514	-.0201665	.07814982	.286	.472	.269	.918
Private (-1, 1)	163	-.23208	.62960	.0256605	.08177676	2.960	.190	21.333	.378
Private (-5, 5)	163	-.45402	1.13333	.0343137	.15381590	2.666	.190	18.959	.378
Subsidiary (-1, 1)	81	-.18667	.21876	.0027992	.05392191	.350	.267	3.973	.529
Subsidiary (-5, 5)	81	-.19194	.28922	.0072929	.08054338	.530	.267	1.779	.529
Stock (-1, 1)	70	-.23208	.41688	.0238212	.09085551	.912	.287	5.596	.566
Stock (-5, 5)	70	-.45402	.50009	.0384558	.14283042	.082	.287	2.910	.566
Cash (-1, 1)	69	-.18667	.13492	.0097927	.05127667	-.673	.289	2.391	.570
Cash (-5, 5)	69	-.28747	.20084	-.0045117	.08043974	-.391	.289	1.879	.570
Mixed (-1, 1)	65	-.12701	.15862	.0170060	.05637737	.129	.297	.362	.586
Mixed (-5, 5)	65	-.19191	.73169	.0315359	.12340274	2.918	.297	15.464	.586
Unknown (-1, 1)	64	-.10035	.62960	.0082810	.08737191	5.841	.299	41.649	.590
Unknown (-5, 5)	64	-.44877	1.13333	.0198347	.16336066	4.822	.299	35.812	.590
Large (-1, 1)	119	-.23208	.21876	.0036960	.05734291	-.017	.222	4.987	.440
Large (-5,5)	119	-.28473	.37461	.0103339	.08055347	.647	.222	5.236	.440
Small (-1, 1)	149	-.23127	.62960	.0237499	.08336527	3.186	.199	21.324	.395
Small (-5,5)	149	-.45402	1.13333	.0300008	.15993556	2.633	.199	17.716	.395
Valid N (listwise)	0								

Table 15: Descriptive statistics with extreme values

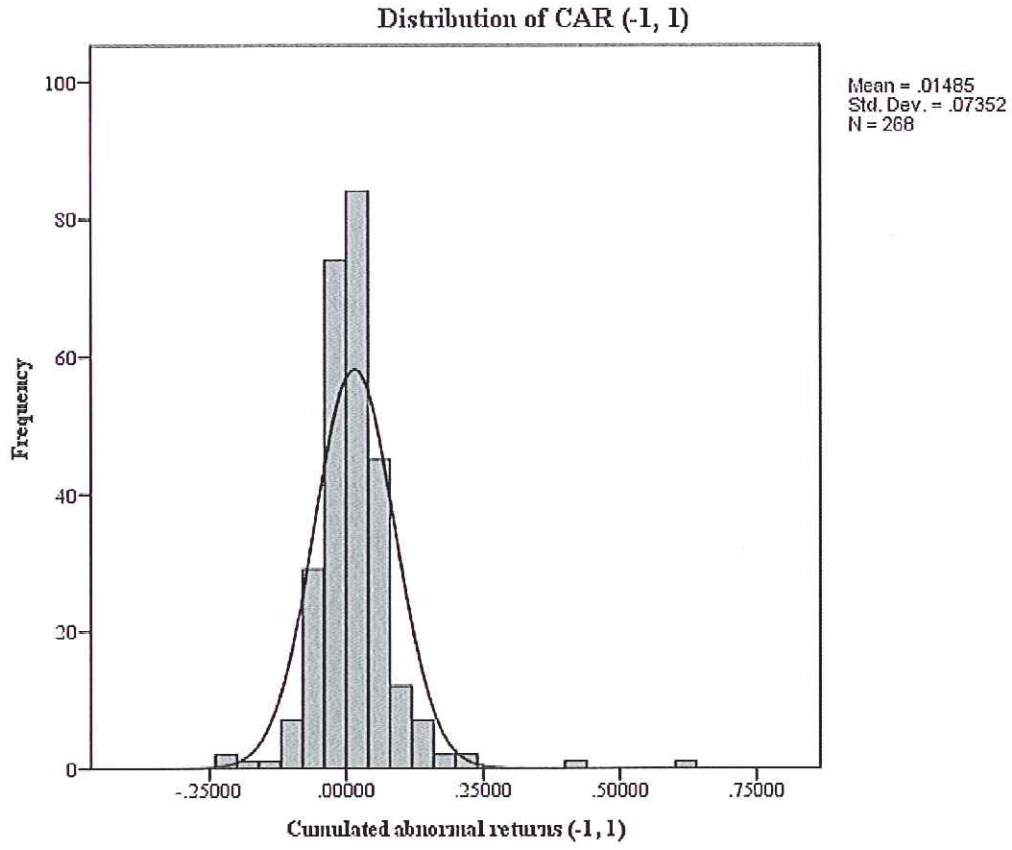


Figure 4: Distribution of CAR (-1, 1), with extreme values

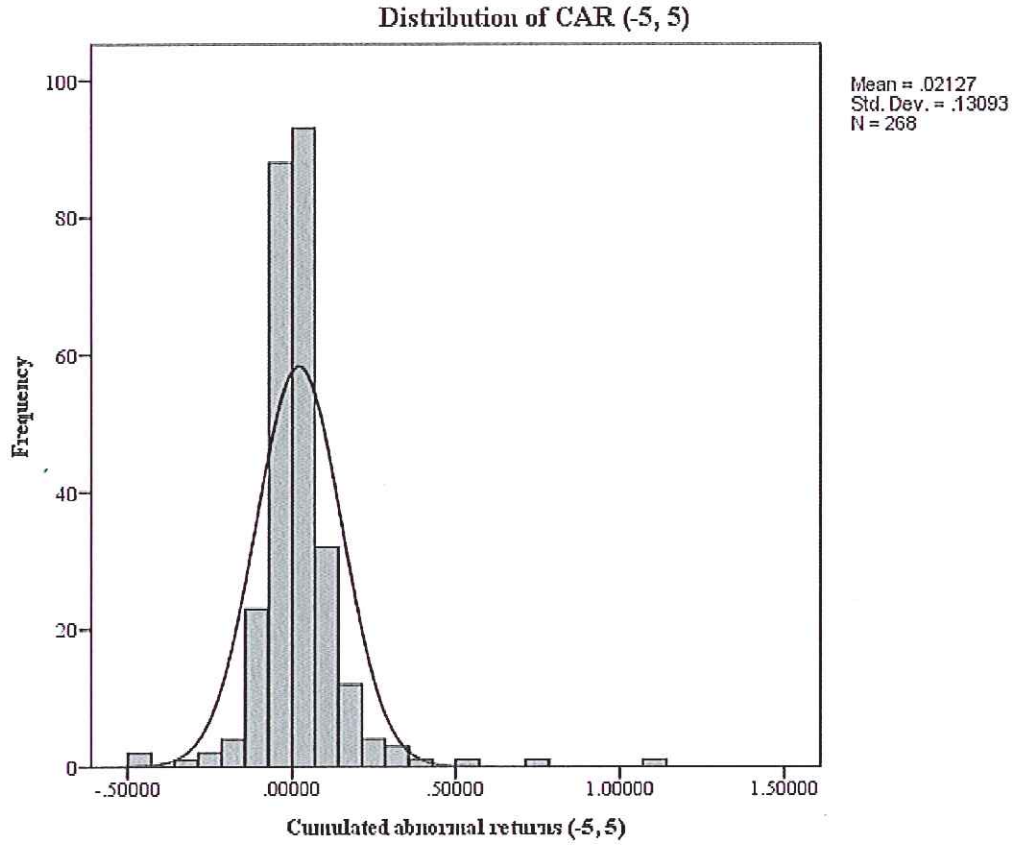


Figure 5: Distribution of CAR (-5, 5), with extreme values

Descriptive statistics without extreme values

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
ACAR (-1, 1)	260	-.23208	.21876	.0099680	.05377988	-.076	.151	2.635	.301
ACAR (-5, 5)	260	-.28747	.28922	.0124772	.08447803	.069	.151	1.656	.301
Public (-1, 1)	24	-.12701	.10370	-.0179515	.05539405	.338	.472	-.131	.918
Public (-5, 5)	24	-.18490	.13514	-.0201665	.07814982	.286	.472	.269	.918
Private (-1, 1)	155	-.23208	.16576	.0180373	.05178342	-.337	.195	3.433	.387
Private (-5, 5)	155	-.28747	.24784	.0202410	.08648323	-.183	.195	2.092	.387
Subsidiary (-1, 1)	81	-.18667	.21876	.0027992	.05392191	.350	.267	3.973	.529
Subsidiary (-5, 5)	81	-.19194	.28922	.0072929	.08054338	.530	.267	1.779	.529
Stock (-1, 1)	65	-.23208	.21876	.0145462	.06474902	-.223	.297	3.667	.586
Stock (-5, 5)	65	-.28473	.28922	.0254213	.10314910	-.207	.297	1.379	.586
Cash (-1, 1)	69	-.18667	.13492	.0097927	.05127667	-.673	.289	2.391	.570
Cash (-5, 5)	69	-.28747	.20084	-.0045117	.08043974	-.391	.289	1.879	.570
Mixed (-1, 1)	64	-.12701	.15862	.0163839	.05659776	.158	.299	.368	.590
Mixed (-5, 5)	64	-.19191	.24784	.0205961	.08699012	.316	.299	.322	.590
Unknown (-1, 1)	62	-.10035	.09314	-.0012594	.03806133	.162	.304	.909	.599
Unknown (-5, 5)	62	-.11243	.24532	.0094332	.05937999	.974	.304	2.735	.599
Large (-1, 1)	118	-.23208	.21876	.0019114	.05416723	-.431	.223	5.021	.442
Large (-5,5)	118	-.28473	.28922	.0072468	.07348822	-.071	.223	3.576	.442
Small (-1, 1)	142	-.12701	.16576	.0166629	.05271272	.260	.203	.403	.404
Small (-5,5)	142	-.28747	.24784	.0168237	.09265936	.073	.203	.794	.404
Valid N (listwise)	0								

Table 16: Descriptive statistics without extreme values

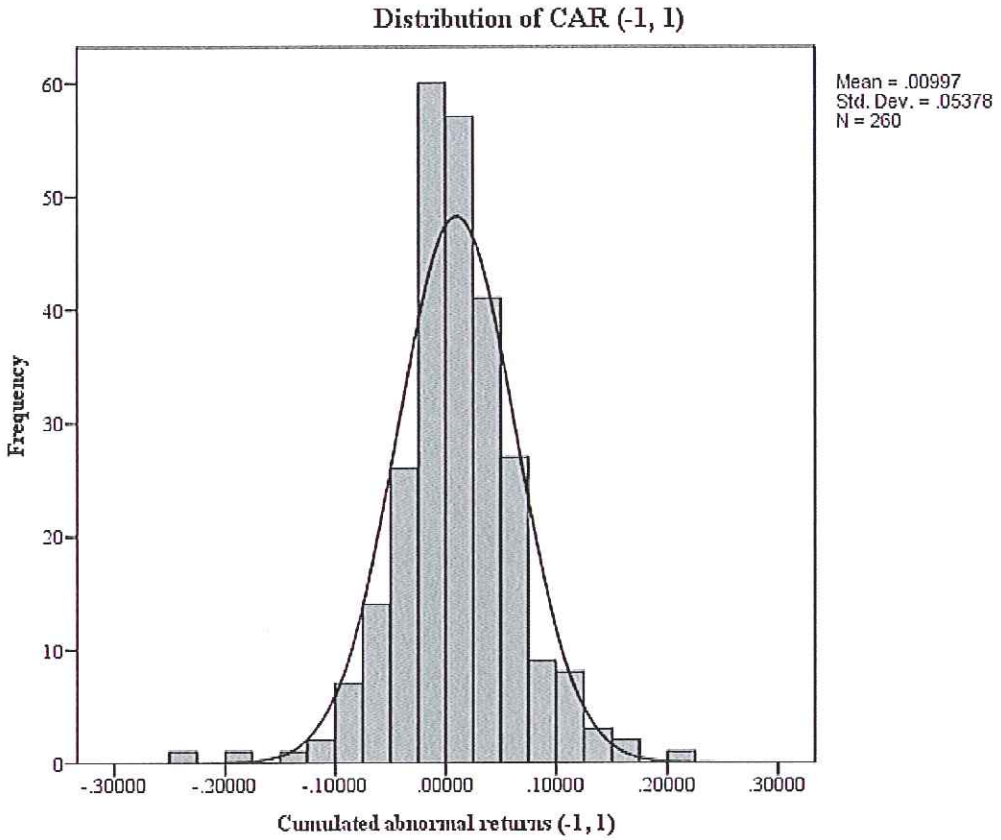


Figure 6: Distribution of CAR (-1, 1), without extreme values

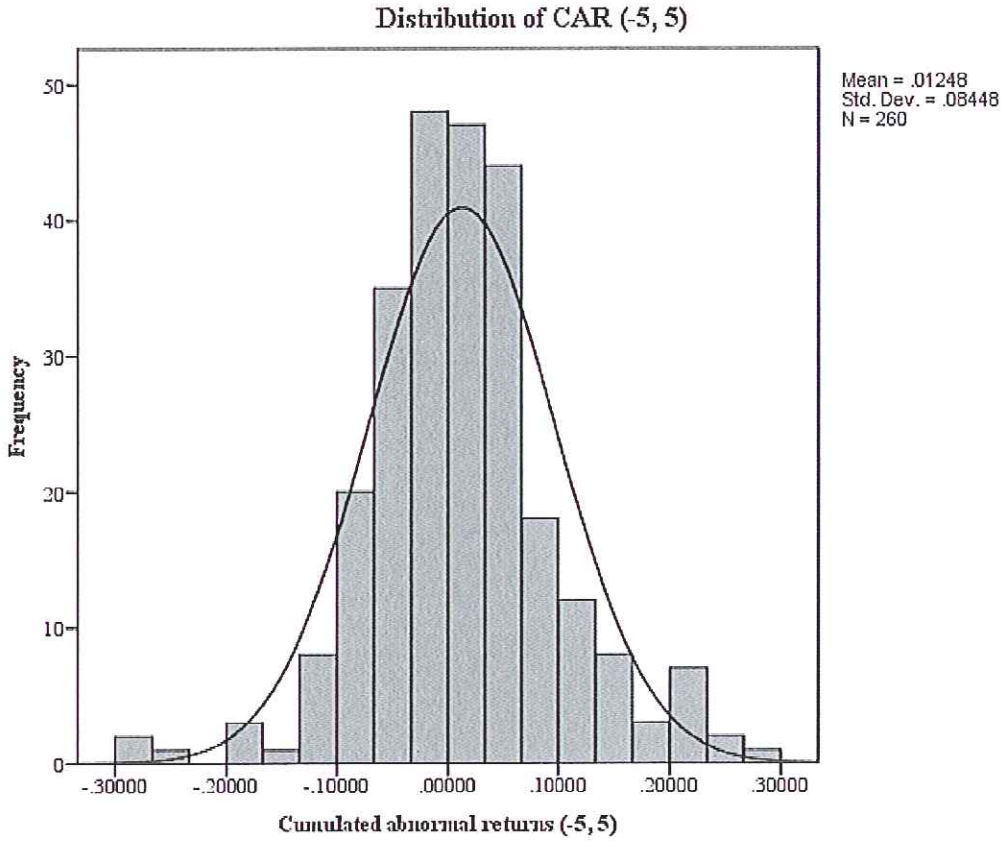


Figure 7: Distribution of CAR (-5, 5), without extreme values

Statistical properties of the sample

The location parameter mean (or average) is the crucial parameter in the further analyses. However, before performing statistical analysis on this parameter, there are other characterizations that need addressing.

Skewness is a measure of the asymmetry of the distribution. If a data set is perfectly normally distributed the skewness is zero. A negative skewness indicates that the tail on the left side is longer than the tail on the right side (Weinberg and Abramowitz 2008). For the CAR (-1, 1) the skewness is 2.693 with extreme values, while only -0.076 without extreme values. For the CAR (-5, 5) the skewness is 2.835 with extreme values, but drops to 0.069 without extreme values. To measure the severity of the distribution skew one can calculate the skewness ratio by dividing the skewness on the standard error of the skew. If this ratio exceeds 2.00 (or -2.00) the distribution is severely skewed (Weinberg and Abramowitz 2008). For CAR (-1, 1) the skewness ratio is 18.07 with extreme values and -0.5 without extreme values. For CAR (-5, 5) the skewness ratios is 19.03 with extreme values and 0.46 without extreme values. The conclusion is that with the extreme values the distribution of the sample is severely skewed, while it is not severely skewed when the extreme values are excluded from the sample.

Kurtosis is a measure of how fat the tails in the distribution are, and of how peaked the distribution curve is. A normally distributed data set has a kurtosis of zero. A kurtosis > zero implies a higher peak than the normal distribution curve and has many scores in the tails (fat tails), while a kurtosis < zero implies a flatter distribution than the normal distribution curve, with few scores in the tails (thin tails) (Field 2009). The CAR (-1, 1) has a kurtosis of 21.558 with extreme values and 2.635 without extreme values. The CAR (-5, 5) has a kurtosis of 23.387 with extreme values and 1.656 without extreme values. As with skewness, the kurtosis ratio can be measured. The kurtosis ratio of CAR (-1, 1) is 72.6 with extreme values and 8.75 without extreme values. The kurtosis ratio of CAR (-5, 5) is 78.74 with extreme values and 5.5 without extreme values. The distribution of the sample is clearly peaked, with fat tails. This can also clearly be viewed in figure 4 – 7, which displays the distributions of the four samples with a normally distributed curve drawn for comparison.

If the limits for extreme values are lowered, the distribution will eventually become approximately normal. After careful consideration this will not be done, as those values are as relevant and real as those closer to zero.

Appendix 14 – SPSS output from one-sample t-test

This output is from the t-test, testing the main hypothesis, without extreme values. The mean in the one-sample statistics is the mean reported in the thesis, and the *Sig. (2-tailed)* in the one-sample test is the two-tailed significance value reported in the thesis.

One-Sample Statistics

	N	Mean	Std. Deviation	Std. Error Mean
ACAR (-1, 1)	260	.0099680	.05377988	.00333529
ACAR (-5, 5)	260	.0124772	.08447803	.00523910

One-Sample Test

	Test Value = 0					
					95% Confidence Interval of the Difference	
	t	df	Sig. (2-tailed)	Mean Difference	Lower	Upper
ACAR (-1, 1)	2.989	259	.003	.00996802	.0034003	.0165357
ACAR (-5, 5)	2.382	259	.018	.01247724	.0021606	.0227939

Appendix 15 – SPSS output from the independent samples t-test

From the independent samples t-test the two-tailed significance can be found in the independent samples test table. The relevant significance value is the one where equal variances are not assumed. Only the significance value is reported from this test, as it tests the difference in mean between two variables.

Group Statistics

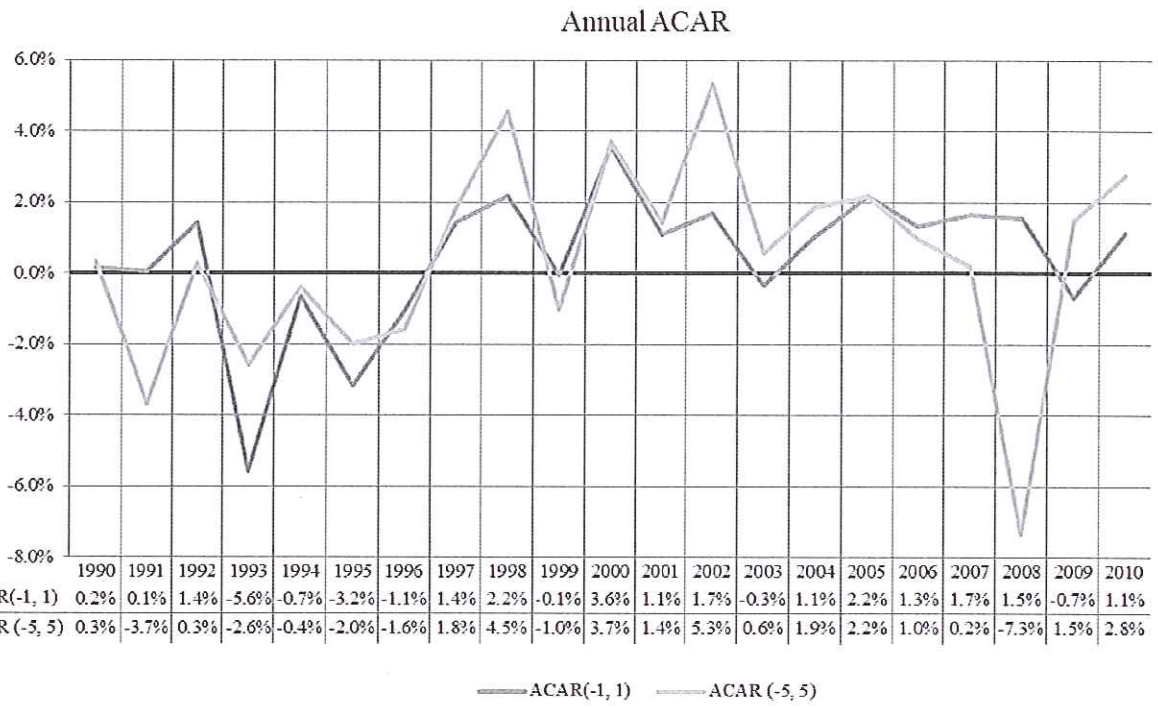
	Method of Payment	N	Mean	Std. Deviation	Std. Error Mean
ACAR (-1, 1)	2	32	.0178111	.05299342	.00936800
	3	29	.0235221	.05748564	.01067482
ACAR (-5, 5)	2	32	-.0037515	.08769942	.01550321
	3	29	.0144447	.09142623	.01697743

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
ACAR (-1, 1)	Equal variances assumed	.023	.879	-.404	59	.688	-.00571098	.01414495	-.03401495	.02259300
	Equal variances not assumed			-.402	57.130	.689	-.00571098	.01420250	-.03414960	.02272765
ACAR (-5, 5)	Equal variances assumed	.096	.757	-.793	59	.431	-.01819613	.02294315	-.06410526	.02771300
	Equal variances not assumed			-.791	57.840	.432	-.01819613	.02299092	-.06422018	.02782791

Appendix 16 – Annual ACARs

The graph below shows the three-day and eleven-day ACARs each year. As viewed there are some variations across time, but nearly none of the numbers are significantly different from the sample mean, or zero. The data set this graph is based upon is without the extreme values.



	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
ACAR(-1, 1)	0.2%	0.1%	1.4%	-5.6%	-0.7%	-3.2%	-1.1%	1.4%	2.2%	-0.1%	3.6%	1.1%	1.7%	-0.3%	1.1%	2.2%	1.3%	1.7%	1.5%	-0.7%	1.1%
ACAR (-5, 5)	0.3%	-3.7%	0.3%	-2.6%	-0.4%	-2.0%	-1.6%	1.8%	4.5%	-1.0%	3.7%	1.4%	5.3%	0.6%	1.9%	2.2%	1.0%	0.2%	-7.3%	1.5%	2.8%