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Master Thesis

Do Acquiring Firms Gain from Takeovers? Empirical Evidence from the Norwegian Stock Market

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Abstract

The objective of this thesis is to study the economic effect when acquiring firms announce takeovers in the Norwegian stock market. We find that bidders experience a positive abnormal announcement return of 2.16% on average. However, the abnormal return calculated in NOK is insignificantly negative. Large firms obtain insignificant abnormal returns of 0.22%, while small firms obtain significant returns of 4.10%. Thus, we find evidence of the size effect. The size effect is robust and holds when controlling for different measures of size, deal characteristics, and firm's characteristics. Acquisitions do create value for acquiring firms' shareholders only under certain conditions.

Key words:

Mergers and Acquisitions, Takeovers, Bidder gains, Size effect, Organizational form, Method of payment.

Acknowledgment

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"The real price of everything, what everything really costs to the man who wants to acquire it, is the toil and trouble of acquiring it"

- Adam Smith, Wealth of Nations, 1776

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1.0 Introduction

Of all interesting topics within corporate finance, we find mergers and acquisitions the most intriguing. Takeovers usually attract attention from investors, the financial press, and other stakeholders. The wealth of investors and employees are affected. Competitors, suppliers and customers may face a new environment. The greater society may benefit from increased efficiency or suffer from reduced social surplus due to monopoly profits.

Takeovers generate massive reallocation of resources. In 1995, the value of mergers and acquisition equaled 5 percent of the GDP and was equivalent to 48 percent of non-residential gross investment in the USA (Andrade et al. 2001). Consequently, measuring economic effects from takeovers is an important objective in finance.

The most fundamental question in the takeover literature is whether takeovers create value for shareholders, and ultimately the society, by a more efficient allocation of resources. Different theories and explanations for sources of value creation or value destruction have been formulated. Berkovitch and Narayanan (1993) summarize these theories into three major categories; (1) Efficiency and/or synergy gains, (2) Hubris (winner's curse) and (3) Agency problems.

The task of this thesis is to investigate the economic effect of takeovers—from the perspective of the acquiring firm. Although most former evidence indicates that bidding firms experience abnormal returns close to zero upon announcement, it also suggests that circumstances crucially affect the outcome (Betton et al. 2008). To make the thesis even more interesting we use data from the Oslo Stock Exchange. Applying Norwegian data adds a dimension to the research in at least two aspects. Firstly, the Norwegian economy is quite specialized due to a small population and ample natural resources. The distinctive features of the Norwegian economy are partially reflected in the companies listed at Oslo Stock Exchange (OSE). Evidently, different firm characteristics have proven to affect abnormal returns in takeovers. Secondly, and perhaps more importantly, the ownership at Oslo Stock Exchange differs from most other countries. For example, the

ownership concentration is higher in Norwegian listed firms than in Anglo Saxon countries. Moreover, OSE-listed firms have a relatively large degree of state ownership and relatively low degree of individual ownership, compared to most other countries (Bøhren and Ødegaard, 2006;Goergen 2012). Most former research applies data obtained from an environment quite different from the Norwegian corporate governance regime. It is reasonable to assume that corporate governance mechanisms affect firm behavior in takeover situations. Thus, investigation of the economic effects of takeovers in the Norwegian stock market becomes of interest. We formulate the following research question:

What effect do takeovers have on the shareholder wealth of acquiring firms' shareholders in the Norwegian stock market?

Earlier evidence suggests firm size of the bidder affects announcement returns. Moeller et al. (2004) provide evidence that abnormal returns are positive for acquiring firms on an equally weighted basis, while the dollar return is negative. Large firms tend to enter deals with negative abnormal returns, known as the size effect. We investigate whether the size effect is present in takeovers carried out by OSE-listed firms. Therefore, we formulate the following sub-research question:

Does the bidder's size matter for the economic outcome in takeovers in the Norwegian stock market?

Moreover, we explore how the method of payment and status of the target as a public, private, or subsidiary firm, are related to announcement returns. In all analyses, we divided the sample into sub-samples of large and small firms. Hence we can investigate how abnormal returns and the size effect change, conditional on different circumstances.

Finally, we run cross-sectional regressions with announcement abnormal returns as the dependent variable, where we include a wide range of variables representing different firm and deal characteristics. This allows us to test the robustness of our findings and investigate potential explanations. In other words, it helps us to distinguish between hypotheses that potentially can explain the size

effect (e.g. overvaluation hypothesis, signaling hypothesis and free cash flow hypothesis).

We have organized the residual thesis as follows. In section 2, we provide a review of background and relevant literature. In section 3, we formulate different hypotheses. In section 4, we describe our methodological approach, and section 5 describes our sample and how data is collected. In section 6, we present empirical findings and discuss the practical implications and limitations in light of existing theory and evidence. Finally, we conclude in section 7.

2.0 Background and Literature

Motives for Mergers and Acquisitions

Before we go deeper into empirical evidence, we briefly explain theories on sources of value creation or value destruction in takeovers. Throughout the literature review, we will solely focus on the perspective of the acquiring firm, according to our research question.

Synergy. Or value creating motive, may be the most important economic argument to support merger and acquisition activity. The synergy motive assumes managers of acquiring firms and targets maximize shareholder wealth. Hence, managers only engage in takeover activity if both sets of shareholders collect gains (Berkovitch and Narayanan 1993). Sources of synergy gains may be economy of scale, for example by improving financial and/or operating efficiency. Synergy is usually calculated by adding bidder and target's announcement returns. Mulherin and Boone (2000) report an average combined abnormal return of 3.56% in US transactions that took place from 1990 to 1999.

Hubris. Roll (1986) introduces the hubris hypothesis, which suggests that a wealth transfer from buyer to seller occurs due to irrationality. He argues that acquiring firms' managers simply are overconfident (self-pride, arrogance). The hypothesis suggests managers have exaggerated belief in their skills to extract synergy gains from investments and by managing the target firm's resources better than current management. Consequently, the acquiring firm overpays and faces the winner's curse phenomenon. If an acquisition is predominated by hubris, total gains are zero, but it causes a transfer of wealth from the shareholders of the acquirer to the shareholders of the target (Roll 1986). Hence, net effect for the diversified shareholder is zero. Malmendier and Tate (2008) find overconfident managers are 65% more likely to make value-destroying acquisitions, consistent with the hubris hypothesis.

Agency problems. Jensen and Meckling (1976) formulate the agency hypothesis. In this context agency problems occur when there is a conflict of interest between owners (principal) and management (agents). Asymmetrical information enables managers to expropriate the owners of the firm, for example by overpaying in

acquisitions and personally benefit from running a large firm (i.e. empire building). If acquisitions are dominated by agency, we expect positive gains to the target and negative gains to the acquirer. The net effect is ambiguous (Berkovitch and Narayanan 1993).

Literature Review

Abnormal announcement returns are found to be one of the most useful and accepted tools to assess the economic impact of takeovers (Asquith, 1983; Hietala et. al 2003). The abnormal return is simply the difference between a firm's actual return and the expected return. The methodology section elaborates on the calculations of abnormal returns.

In a sample of 281 US acquisitions from the period 1990–1999, Mulherin and Boone (2000) find that bidders experience an insignificant average announcement return of -0.37%, in a three days event window. Andrade et al. (2001) use a sample of 3 688 completed US acquisitions from three different decades (1973–1998) and find that bidders obtained insignificantly negative abnormal return in the range -0.7% to -3.8%. Using a four days event window, Bradley and Sundaram (2006) find an insignificant average announcement return of 1.4% in a sample of 12 476 completed US acquisitions from the period 1990–2000. It is reasonable to conclude that abnormal returns to the bidder are *not* systematically different from zero (Betton et al. 2008). This is consistent with evidence from broad research within the field, which indicates that the market expect bidders to earn their cost of capital (Copeland et al. 2005).

There is, however, much more to the story than unconditional averages. Earlier empirical literature suggests method of payment is an important explanatory factor of abnormal returns. Andrade et al. (2001), and most other papers, suggest that paying with stock reduces bidders gain in public acquisitions. Moreover, they found a significant positive difference in the returns of cash and equity portfolios, which indicates that the effect of payment method do *not* reverse over time. They argue that bidders tend to offer equity when their stock is overvalued, and offer cash when their stock is undervalued. This is consistent with the pecking order theory. Moreover, Myers and Majluf (1984) argue cash payments might serve as a

signal to the market that management of the acquiring firm expects an increase in firm value in the post-acquisitions period. Consequently, bidders obtain higher returns from all-cash offers, while all-equity offers have a negative impact on the abnormal returns at announcement day (Travlos 1987; Walker 2000; Heron and Lie 2004; Dong et al. 2006).

More recent evidence suggests that the bidder returns is not, as previously thought, dominated by the method of payment. Betton el at. (2008) conclude target status as a public or non-public firm and bidder's size are key drivers. In a large sample of US data from the period 1980–2005, the authors find that a combination of large bidder, payment in all-stock, and the target being a public company represent a worst-case scenario. In this case, the average bidder abnormal return was -2.21% in a three-day event window. Conversely, a combination of a small bidder, private target and all-stock payment represents a best-case scenario. The average abnormal return was 6.46% to the bidding firms' shareholders in this case. These findings are consistent with Bradley and Sundaram (2006), who found negative announcement return in public-target acquisitions, and positive announcement return in private target acquisitions. Additionally, the authors find positive abnormal returns in deals of non-public targets paid with equity, while deals where the target was public still experience negative abnormal returns.

Moeller et al. (2004) show that small acquirers outperform large acquirers, independent of payment method or organizational form of the target. Moeller et al. (2004) investigate the size effect, which is defined as difference in abnormal returns between small acquirers and large acquirers. The authors investigate a sample of 12 023 US transactions executed between 1980 and 2001 and find that acquiring firms experienced a significant equally weighted abnormal return of 1.1%. However, they find acquiring-firm shareholders lose on average $25.2 million upon announcement. This is only possible if there are systematical differences in abnormal announcement returns between large and small firms. Moeller et al. (2004) divide their sample into small and large acquirers and find small acquirers experiencing significant positive abnormal returns of 2.32% and a significant wealth creation to shareholders of $1.7 million, on average.

Contradictory, large acquirers experience insignificant abnormal returns of 0.08%, but a significant wealth destruction of $47.9 million, on average. The size effect is robust to firm and deal characteristics, and does *not* reverse over time. Jansen et al. (2012) prove that the size effect exist monotonically across firm size deciles, not just in comparison between large and small firms. Their sample consists of 18 872 acquisitions between 1980 and 2008. Earlier work by Eckbo and Thorburn (2000) on data from Toronto Stock Exchange finds a tendency of decreased return as the bidder size increases. The evidence of the size effect seems quite robust in existing literature.

The M&A literature is rather inconclusive regarding explanations of the size effect. Anything that explain the size effect has to be more pertinent for large firms than for small firms. The negative bidder abnormal return has been a hot topic for discussion in recent decades and researchers have come up with several suggestions. Moeller et al. (2004) argue that the hubris hypothesis may explain the size effect due to more overconfident managers in large firms. Moreover, they document large firms paying higher premiums for targets and gaining lower synergies. Less wealth creation, or even wealth destruction, combined with higher premiums is consistent with the hubris hypothesis as an explanation for the size effect (Roll 1986; Jansen et al. 2012). Jansen et al. (2012) find hubris being present in all size quintiles of acquiring firms, but much more widespread in the largest firms. This makes sense as we expect managers in larger firms to have overcome greater obstacles to obtain their position. Nevertheless, the authors state that size effect is as much a function of small firms making superior synergy-driven acquisitions as a function of larger firms making acquisitions driven by agency and/or hubris motives.

Jensen (1986) argues that the acquiring firm creates takeover value when bidder has good governance (low agency costs) and pays with cash rather than stock, known as the free cash flow hypothesis. Servaes (1991) finds that bidder returns is higher when bidder performs well and pays with cash, which is consistent with the free cash flow hypothesis. Well performing bidders have lower agency costs and the ability to improve the target. McCardle and Viswanathan (1994) present evidence consistent with the argument that managers execute acquisitions when

they face reduced internal growth opportunities. Firms with limited growth opportunities are likely to have higher agency costs of free cash flow (Jensen 1986). Moeller et al. (2004) argue that this is more likely for larger bidders, but find no empirical support for the reasoning. If the growth opportunities signaling hypothesis explains the announcement return, it would have a negative impact on the return.

Dong et al. (2006) show how acquirer's misvaluation of the target leads to worse announcement returns. The authors argue that highly valued bidders are more likely to use stock and less likely to use cash and willing to pay more relative to the target. By definition, large firms have higher market capitalization than small, and thus more likely to be overvalued. This can contribute to explain the size effect. Yet, Moeller et.al (2004) finds no empirical support for the overvaluation hypothesis in their research of the size effect.

Summing up the literature review, the most important findings are that:

(1) Bidders' announcement abnormal returns are *not* systematically different from zero, implying that the market expects acquiring firms to earn their cost of capital.
(2) Earlier research suggested that method of payment is the most important determinant of announcement abnormal returns, while more recent evidence suggest that organizational form of the target and bidder size is more important.
(3) Bidders experience positive abnormal returns in private-target acquisitions and negative abnormal returns in public-target acquisitions.
(4) A combination of small bidder, all-stock payment, and the target being a private firm represents a best-case scenario.
(5) Small acquirers outperform large acquirers independent of method of payment or organizational form of the target (the size effect).
(6) The evidence of the size effect is quite strong in existing literature. Still, the literature is inconclusive regarding explanations of the size effect. There is some support for the hubris hypothesis. Large firms pay higher premiums and obtain lower synergy gains. However, small firms making superior synergy-

driven acquisitions are just as important in explaining the difference between large and small bidders.

(7) Other possible explanations for the size effect are Jensen's free cash flow hypothesis, the signaling hypothesis and the overvaluation hypothesis. Although there is some indication that these hypotheses are relevant, existing evidence is vague.

Finally, in the introduction we have pointed out that distinctive features of the Norwegian economy, and the ownership-structure at Oslo Stock Exchange, makes it interesting to investigate whether former conclusions remains significant under Norwegian conditions.

3.0 Hypotheses

The objective of the thesis is to investigate the economic effect on acquiring firms when takeovers take place in the Norwegian stock market. We measure abnormal announcement return to assess the economic impact. Thus, we formulate the following hypothesis:

H_0: Acquiring firms earns on average zero abnormal returns in takeovers
H_A: Acquiring firms earns average abnormal returns *different* from zero

Since earlier research show that abnormal returns differs among large and small bidders, equally weighted abnormal returns is an incomplete measure of the economic effect in takeovers. Hence, we calculate the NOK abnormal return to obtain a more extended analysis. We formulate the following hypothesis:

H_0: Acquiring firms earn on average zero abnormal NOK return in takeovers
H_A: Acquiring firms earn on average abnormal NOK return *different* from zero

To investigate whether size of the bidding firm affects abnormal returns we split the sample in sub-samples of large and small bidders, which leads to the following hypothesis:

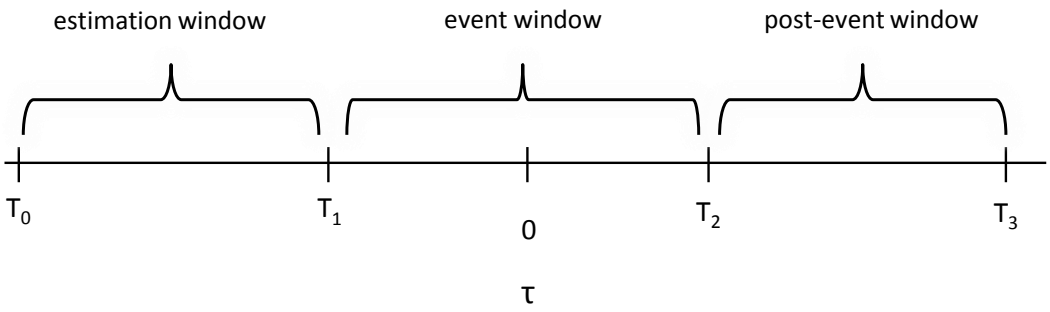
H_0: The abnormal return in takeovers is the same for small and large bidders
H_A: Small firms earn significantly *different* abnormal return than large firms

Former research has proven that a number of firm and deal characteristics influence abnormal returns in takeovers. Therefore, we investigate how a subset of control variables is related to abnormal returns. Particularly, we analyze the method of payment and the organizational form of the acquired asset in detail. *Appendix 1* summarizes different control variables and existing literature.

4.0 Methodology

To investigate the economic consequences of takeovers we apply an *event study.* An event study describes a technique of empirical financial research assessing the impact of a particular event on a firm's stock price. Thus, it is a useful tool for determining the impact of an event on the firms' claimholders, and for capital market research of market efficiency (Bodie, Kane and Marcus 2011). Professional thinking on event study methods has evolved over time, but there is relatively little controversy about statistical properties of such studies. Under which conditions event studies is adequate is well understood. The method is considered quite reliable under short time horizons, while it is more vulnerable on long time horizons (Kothari and Warner 2007). Figure 1 illustrates the timeline for the event study.

Figure 1



The time of the event is defined as the announcement date of the acquisition, which is assumed the time the deal first became publicly known. However, anticipation and leakage of information may affect stock prices prior to the event date (Bodie, Kane and Marcus 2011). Thus, it is important to examine an expanded event window to capture the complete economic effect. We apply expanded event windows to control; [-1, +1], [-2, +2], [-20, +1] and [-20, + 20]. Note that risk of capturing other sources of abnormal behavior increase by expanding the event window.

To estimate the abnormal returns we use the market model, which is the empirical counterpart to the Capital Asset Pricing Model (CAPM). The stock return for firm *i*, during a given period *t*, is expressed as:

$$(1) \quad R_{it} = \alpha_i + \beta_i R_{Mt} + e_{it}$$

where R_{Mt} is the market return during the period t and e_{it} is the zero mean disturbance term. The parameter β_i measures the sensitivity to the market return, and α_i is the average rate of return the stock would realize in a period with zero market return. The abnormal return for firm i at time τ ($AR_{i\tau}$) is then:

$$(2) \quad AR_{i\tau} = R_{i\tau} - \hat{\alpha}_i - \hat{\beta}_i R_{m\tau}$$

Hence, the abnormal return is the disturbance term of the market model calculated on an *out of sample basis*. The abnormal return is simply the difference between actual return and expected return. We use an estimation window and run regressions to estimate the alphas ($\hat{\alpha}$) and betas ($\hat{\beta}$) for each firm. It is important that the estimation window is sufficiently separated from the event to make sure that the estimate is not affected by the event itself (Kothari and Warner 2007). In our calculation we have applied a [-504, -20] pre estimation window a [+20, +504] post estimation window. There are two reasons to include a post estimation window. (1) Some firms have too short estimating period before the event and (2) by using a longer estimation period after the event results become more robust (MacKinlay 1997).

The market model improves the simpler constant mean return model. By removing the portion of variation explained by the market, variance of the abnormal return is reduced (MacKinlay 1997). Benefits from employing multifactor models, such as Fama French Three-Factor model, are limited as empirics prove that the marginal explanatory power of additional factors is small (MacKinlay 1997).

The null hypothesis can be tested in different ways, but most existing literature focus almost exclusively on the mean of the distribution of abnormal returns (Kothari and Warner 2007):

$$(3) \quad \overline{AR}_\tau = \frac{1}{N} \sum_{i=1}^{N} AR_{i\tau}$$

To assess abnormal returns in expanded event windows we calculate the *cumulative abnormal return*:

$$(4) \quad \overline{CAR}(\tau_1, \tau_2) = \sum_{\tau=\tau_1}^{\tau_2} \overline{AR}_\tau$$

This is the sum of each day's average abnormal performance. The CAR starting at time τ_1 through timeτ_2. The null hypothesis is that the mean (cumulative) abnormal return is equal to zero.

We will use the same approach as MacKinlay (1997) to test whether the cumulative abnormal returns, $\overline{\text{CAR}}$, is statistically significantly different from zero. The following test estimator is applied:

$$(5) \quad \Theta_1 = \frac{\overline{CAR}(\tau_1, \tau_2)}{var\left(\overline{CAR}(\tau_1, \tau_2)\right)^{1/2}} \sim N(0,1)$$

where

$$(6) \quad var\left(\overline{CAR}(\tau_1, \tau_2)\right) = \sum_{\tau=\tau_1}^{\tau_2} var(\overline{AR_\tau})$$

and

$$(7) \quad var\left(\overline{AR}_\tau\right) = \frac{1}{N^2} \sum_{i=1}^{N} \sigma_{\varepsilon_i}^2$$

Since $\sigma_{\varepsilon_i}^2$ is unknown in practice, an estimator must be used to calculate the variance of the abnormal return as in (7). The sample variance measure of $\hat{\sigma}_{\varepsilon_i}^2$ from the market model regression will be used as an estimator, as suggested by MacKinlay (1997).

Why is the abnormal return a relevant measure?

The abnormal return is per definition the additional return to what is expected from the asset-pricing model. Single firms will usually differ from their expected return most of the time; hence earn "abnormal return." However, in larger samples we expect the average abnormal return to be zero—some firms obtain positive and some firms obtain negative abnormal return, but we do *not* expect this to be systematically different from zero. Thus, the abnormal return under a specified event is a suitable proxy for the event's economic impact. However, the abnormal return is not a perfect way to evaluate the economic effect of corporate actions. For example, the average abnormal return in a sample does not count for different firm sizes. To make analyses that are more sophisticated, we calculate the abnormal return in NOK as well. The abnormal NOK return is the difference between actual market capitalization change and prediction from the market model. This provides a value weighted measure, as an alternative to the equal weighted abnormal return in equation (3).

Determinants of abnormal performance

We run cross sectional regressions to test whether the size effect is a proxy for other firm and deal characteristics, which we know from existing literature affect abnormal returns. Thus, we can test whether size effect remains after controlling for these variables. The regression is formulated like this:

$$(8)\quad CAR_t = \alpha + \beta_1 Small + \beta_2 Relative\ size + \beta_3 Cash + \beta_4 Equity + \beta_5 Conglomerate + \beta_6 Private + \beta_7 Public + \beta_8 Crossborder + \beta_9 Toehold + \beta_{10} Tobin's\ Q + \beta_{11} \frac{Debt}{asset} + \beta_{12} \frac{\beta_{10} OFC}{assets} + \beta_{13} ROA + \varepsilon_t$$

where small is a size dummy which take the value of 1 in case of a small firm, and zero otherwise. Cash and equity are dummy variables, which take the value of 1 if the deal is financed with 100% cash and 100% equity, respectively. Conglomerate, private, public, and cross border are also dummy variables. See *appendix 1* for more details. Regression (8) provides information about determinants for value creation or value destruction in takeovers.

To test the robustness of the size effect we run a separate regression similar to (8), except replacing the small dummy with other measures of size. We apply the natural logarithm of market capitalization and the natural logarithm of book value of total assets for this purpose. Furthermore, we run regression (8) in subsamples of large and small firms, which allow distinguishing between different hypotheses explaining the size effect.

Econometric issues in event studies

In event studies, the assumption of market efficiency is important. That is, assuming stock prices instantaneously reflect new information. To what extent markets are efficient is somewhat ambiguous, but most authorities indicate that the assumption of market efficiency is satisfied under short time horizons (Bodie, Kane and Marcus 2011). The problem is less serious the shorter the time horizon, since expected returns on a daily basis is close to zero, regardless of asset pricing model. Extended event windows creates problems since event studies are joint tests of whether abnormal returns are significant different from zero, and whether the assumed model of expected returns (e.g. CAPM or Fama-French three factor model) is correct. Moreover, risk of capturing concurrent events not related to the takeover itself, increase when extending the event window.

Variance is often underestimated due to increased volatility under event-time clustering. Hence, test statistics are biased upwards and the null hypothesis is rejected too often. To adjust for this we use the test estimator suggested by MacKinlay (1997).

In econometrics, assumptions regarding normality of the data are crucial. Even though we find deviation from normality in our dataset, our sample is sufficiently large to rely on the central limit theorem (Kothari and Warner 2007).

Finally, one should carefully interpret cross-sectional regressions regressed on different firm characteristics. Heteroscedasticity in abnormal returns is a concern. We solve this by using White's adjustment. A more serious concern is that acquisitions are endogenous events, reflecting a firm's self-selection to choose the event, which in turn reflects insiders' information (Kothari and Warner, 2007).

5.0 Data

The sample of acquisitions comes from the Zephyr database, which was used for a preliminary sorting of transactions. When preparing the data, we early decided to avoid going further back than 2000, to make sure that data-quality was reliable.

Only transactions where the acquiring firm was listed at the time the transaction took place are included in the sample. Targets are public, private, or subsidiaries. The following criteria are applied when collecting the data:

(1) To avoid unnecessary noise in our data, only transactions larger than 1 million Euro is included. The Euro denomination is simply used because Zephyr reports data in Euros. The transaction value in each deal is converted to NOK by using the exchange rate at the announcement date, reported by Norges Bank.
(2) Only acquisitions in which the acquiring firm has the intention to take control over the target is included. This implies that only bidders with initial stake less than 50% and bidders that obtain 100% of the target is included.
(3) Finally, only completed deals are considered.

Each transaction is investigated carefully to make sure that announcement dates and deal characteristics are correct. Information is added when necessary. The Oslo Stock Exchange newsfeed, Newsweb, is used for this purpose. During this process we found that the Zephyr database had wrong announcement dates for some transactions, and insufficient information in transactions we could easily find in Newsweb. Nevertheless, the database was correct most of the time, and a good starting point.

Transactions that fulfilled the criteria to be included in the sample, but where relevant information was not available in Newsweb, or by searching the web, is excluded from the sample. Moreover, we executed random tests of the quality of the Zephyr database with respect to missed transactions. We searched for transactions in Newsweb not being covered in the Zephyr database, and we did *not* find any such transactions. Hence, we conclude that Zephyr in general covers the market for mergers and acquisitions fairly well.

After the comprehensive work of cleaning and double-checking the sample, we are quite confident about data quality. Going through all transactions first hand was a time consuming, but necessary, process to make sure data was reliable. However, we cannot guarantee not being guilty in missing single transactions. This is in any case due to chance, rather than cherry picking.

We also removed some transactions. First, we excluded transactions where we could *not* obtain sufficient information for cross-sectional regression analysis. Second, we excluded transactions where the firm had two events at the same day, since it is impossible to distinguish the economic effect. Third, we excluded transactions where Statoil was the acquiring firm. The reason for the latter is that Statoil is a very large firm compared to other companies listed at Oslo Stock Exchange, hence its transactions influence the total NOK return too much. For the record, Statoil experienced on average negative return in their transactions, by any measure.

Data on stock prices, returns, trading volume and market capitalization are from Oslo Stock Exchange. Returns are adjusted for stock splits, rights issues, dividends, and other corporate actions. Accounting numbers used in cross sectional regressions has been obtained from Thomson Reuters Datastream. Fiscal numbers from year-end *the year before* the event took place has been used.

Our requirements and data cleaning yield a sample of 224 successful transactions. After collecting and organizing the data we have split the sample in two sub-samples; acquisition made by large and small firms, respectively. The definition is straightforward; the 50% largest firms ranked by market capitalization 20 days prior to the event date are defined as large, while the remaining 50% is defined as small. This definition is obviously somewhat subjective and at least two objections are reasonable. Firstly, market capitalization fluctuates with market cycles, so comparing market capitalization between two different firms, in which one is from 2007 and the other from 2009, is not necessarily consistent. Secondly, it is not given that firms should be divided between small and large by 50^{th} percentile. However, there are two reasons that we still stick to our definition of size:

1) We control the size effect by running cross-sectional regressions and test for robustness by running separate regression using different kind of size measures, such as natural logarithm of the market capitalization and the natural logarithm of the book value of total assets. If the results are consistent, there is evidence indicating that size effect exists regardless of size definition.
2) A one and only "true" definition of small and large firms does not exist. Any definition will be a trade-off between different considerations.

The number of acquisitions varies relatively much from year to year, typically pro-cyclical with the state of the economy. Table 1 summarizes the distribution of deals by announcement year and acquirer firm size.

Table 1

The sample contains all completed mergers and acquisitions between 2000–2011 by firms listed at Oslo Stock Exchange where the publicly traded acquiring firm gained control of a public, private or subsidiary target. Transactions that do not fulfill the criterions described in the data chapter is removed. Firms are ranked by market capitalization 20 days prior to the event. Large (small) acquirers are the 50% largest (smallest).

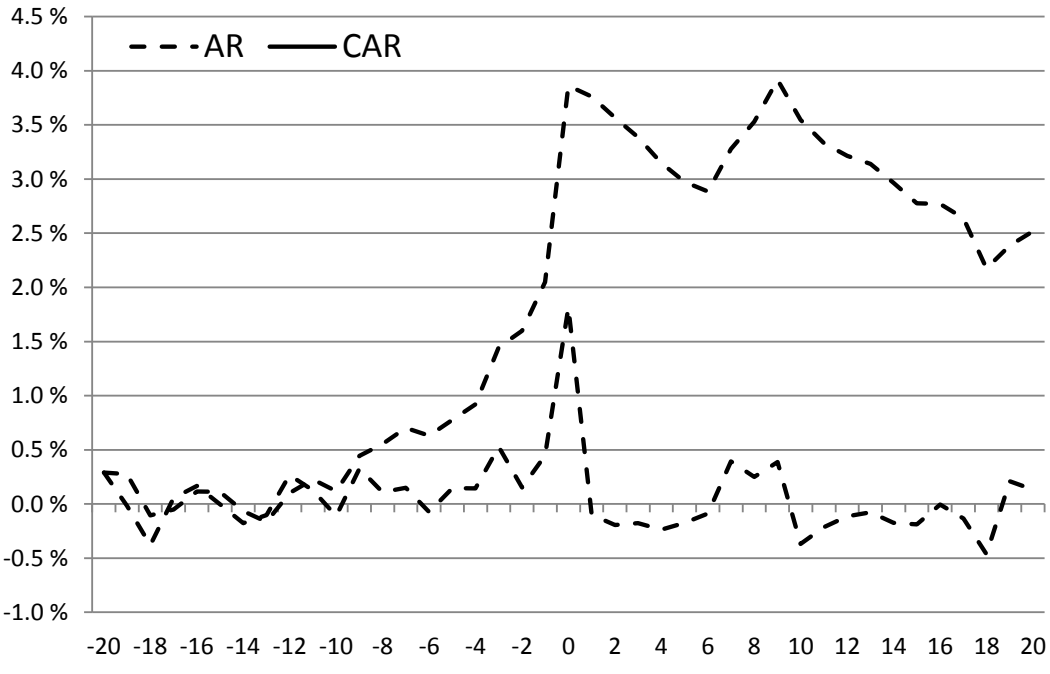
Announcement	Acquirer size		
year	Large	Small	All
2000	11	7	18
2001	8	8	16
2002	4	2	6
2003	4	8	12
2004	13	8	21
2005	12	20	32
2006	14	20	34
2007	19	15	34
2008	6	6	12
2009	1	4	5
2010	9	7	16
2011	11	7	18
All	112	112	224

6.0 Empirical Results

Following the methodological event study approach we have calculated abnormal returns for the sample.Abnormal returns are calculated for each day in a [-20, +20] day event window, using the market model. The dashed line in Figure 2 illustrates the development of abnormal returns (AR) day by day, while the solid line illustrates cumulative abnormal returns (CAR). The AR-graph shows a pattern similar to random walk on days sufficiently away from the event date. There is, however, a clear increase in AR at time 0. Moreover, the CAR graph starts rising a few days prior to the event, indicating that the market learns about the event gradually. The CAR graph also indicates that the market adjust somewhat downwards the first few days after the event date. The visual inspection gives a strong indication that acquiring firms obtain positive average abnormal returns when they announce takeovers.

Figure 2

The horizontal axis represents the timeline around the event date, where the event date is at time 0. The vertical axis represents abnormal returns. The dashed line show each day's average abnormal return (AR), calculated as the difference between expected return predicted by the market model and actual return. The solid line shows how the abnormal return cumulate throughout the period (CAR).



The intuition from Figure 2 is confirmed by calculations presented in Table 2. The equally weighted CAR in a [-1, +1] event window is 2.16% and is significant at the 1% level. The median is 0.97% and highly significant as well, which suggests that results are not sensitive to skewness of the distribution. This is consistent with Moeller et al. (2004), but inconsistent with papers restricting the sample to acquisitions of public targets. For example, Andrade et al. (2001) find insignificant negative abnormal return for acquiring companies in a sample of 4 256 transaction from 1973 to 1998.

Table 2

$CAR_{[-1, +1]}$ denotes the three-day cumulative abnormal return in percent, measured using the market model. $ANPV_{(NOK\ 2011)}$ denotes inflation adjusted (base 2011 NOK) abnormal return in million NOK, calculated as the gross change in the value of the acquirer's equity minus the expected return from the market model. $VWCAR_{[-1, +1]}$ is the value weighted return, calculated as total NOK return for all acquirer divided by the aggregate market capitalization of acquirers. The calculations and tests for significance of CAR is calculated in accordance to the methodology section. Tests for equality in means are based on t-tests and tests for equality in medians is based a Wilcoxon-test. Median values in brackets.

	All (1)	Large (2)	Small (3)	Difference (2) – (3)
$CAR_{[-1, +1]}$	2.16[a]	0.22	4.10[a]	-3.87[a]
	[0.97][a]	[-0.09]	[2.13][a]	[-2.22][a]
$ANPV_{(NOK\ 2011)}$	-60.3	-151.1[c]	30.4[b]	-181.5[b]
	[7.5]	[-8.1]	[10.4][a]	[-17.7]
SUM MNOK	*-13 508*	*-16 918*	*3 410*	
$VWCAR_{[-1, +1]}$	-0.41	-0.53	4.51	
n	224	112	112	

a, b and c represents significance level of 1%, 5% and 10%, respectively

By calculating abnormal returns on an equally weighted basis a NOK 100 million firm counts as much as a NOK 100 billion firm. Obviously, a 100 billion firm has the most economic significance. Therefore, we have calculated abnormal NOK returns achieved by the acquiring firms. The abnormal NOK return is defined as the difference between actual development of market capitalization and development expected by the market model. Results are reported in the second row of Table 2. On average, shareholders of acquiring firms lose MNOK 60.3 when takeovers are announced. This result, however, cannot be distinguished

from zero at any reliable level. Shareholders of large firms lose on average MNOK 151.1 at announcement date, while shareholders of small firms gain MNOK 30.4 at announcement date. These results are statistically significant at a 10% and 5% level, respectively.

Equally weighted abnormal returns and NOK returns have different signs. This situation can only occur if there is a size effect. Column (2) and (3) in Table 2 shows the result for sub-samples of large and small firms. There is a significant difference in abnormal returns for small and large firms. Small firms obtain an abnormal return of 4.10%, which is highly statistically significant. Large firms experience an abnormal return of 0.22%, which is not distinguishable from zero. Finally, small firms experience positive value weighted return of 4.51%, while large firms experience value weighted return of -0.53%.

The aggregate NOK loss for all firms in the sample was MNOK 13 508 and the aggregate loss for large firms was MNOK 16 918. The NOK returns are inflation adjusted to 2011 values by using Statistics Norway's consumer price index.

Even if we can conclude that bidders experience positive abnormal returns, it does not seem like takeovers create value for the shareholders since the NOK return is negative and indistinguishable from zero. However, it seems reasonable to conclude that small firms tend to enter deals which create positive value for their shareholders, while large firm tend to enter deals which creates negative value. Although not reported here, we have tested that our results are robust with respect to different length of the event window.

The findings of the size effect are mostly consistent with results reported by Moeller et al. (2004), but in contrast to the Moeller paper, we cannot conclude that abnormal NOK returns for all firms are negative at any significant level. Thus it seems like the sub-sample of large firms destroy value in takeovers, but the value destruction is offset by small firms creating value. However, the difference in statistical significance might also be due to the large difference in sample sizes.

Table 3 shows how abnormal returns and NOK returns are related to organizational form of the asset. Note that for some sub-groups the number of observations is small, so we carefully draw conclusions, as we cannot rely on the central limit theorem. We see that private deals are most profitable in all cases, hence an important driver of announcement returns. In the full sample, private deals earn 5.18% higher abnormal return than public deals, which is a highly significant result. The size effect seems, however, to remain regardless of the organizational form of the target. Small firms earn on average 5.71% abnormal announcement return in private deals that capitalizes to MNOK 39.2. Large firms earn insignificant positive abnormal returns only in private deals, but even in private deals, large firms obtain negative NOK returns of 91 million. This indicates that organizational form of the acquired asset cannot explain the size effect.

Table 3

$CAR_{[-1,+1]}$ and $ANPV_{(NOK\ 2011)}$ sorted by size of the acquiring firm and the organizational form of acquired assets. The first two rows in each category is the $CAR_{[-1,+1]}$ in percentage, while the next to rows are the $ANPV_{(NOK\ 2011)}$ in million. The number of observations in each group are denoted n. The calculations and test for significance of CAR is in accordance to the methodology section. Test for equality in means are based on t-tests and tests for equality in medians is based on a Wilcoxon-test. Median values are in brackets.

	Private	Public	Subsidiary	Difference test		
	(1)	(2)	(3)	(1) – (2)	(1) – (3)	(2) – (3)
Panel A: Full Sample						
All	3.38[a]	-1.80	0.55	5.18[a]	2.82[a]	-2.36[b]
	[1.87][a]	[-0.75][b]	[0.13]			
	-22.4	-305.7	-83.9	283.3	61.6	-221.8
	[11.4][a]	[-14.1]	[4.3]			
	n=140	*n=15*	*n=69*			
Small	5.71[a]	-1.21	1.36	6.93[a]	4.36[a]	-2.57[c]
	[3.10][a]	[-0.75]	[1.66][b]			
	39.2[b]	36.3	9.2	2.9	30.0	27.1
	[10.1][a]	[11.4]	[7.3][b]			
	n=74	*n=6*	*n=32*			
Large	0.76	-2.20	-0.14	2.95[b]	0.90	-2.06
	[0.75][c]	[-0.75][c]	[-0.54]			
	-91.3[c]	-533.7	-164.5	442.4	73.2	-369.2
	[29.1]	[-463.6][c]	[-47.7]			
	n=66	*n=9*	*n=37*			

a, b and c represents significance level of 1%, 5% and 10%, respectively

Panel A in Table 4 show how the method of payment relates to announcement returns. In the full sample, there is positive return no matter how the deal is financed. Moreover, equity deals earn significantly more than cash deals. This is the case in sub-samples of large and small firms as well. Small firms outperform large firms regardless of method of payment. Large firms only destroy firm value in pure cash deals, where their shareholders lost an average of MNOK 238.6. This is an indication that the free cash flow hypothesis might be relevant, as management seems to invest inefficient when paying with (excess) cash.
Panel B show how abnormal returns relate to method of payment conditional on the firm being private. Here we find the best-case scenario: A small firm acquiring a private target paying with equity. In this scenario, the abnormal return is 9.57%, capitalizing to NOK return of MNOK 32.8. This is statistical significant at a 1% level and 5% level, respectively. Moreover, paying with equity is most profitable in all cases. Earlier literature usually report that paying with equity reduce the return for the bidder. However, Betton et al. (2008) conclude that paying with equity increase returns when the target is private. Most targets in our sample are private. Private firms usually have fewer, but larger owners. Hence, owners of private firms usually have stronger incentives to find the true value of the payment. Thus, the problem with asymmetrical information is reduced.

Public and subsidiary deals are left out of Table 4 due to a small number of observations.

Table 4

$CAR_{[-1,+1]}$ and $ANPV_{(NOK\ 2011)}$ sorted by size of the acquiring firm and method of payment of the acquired assets. The first two rows in each category is the $CAR_{[-1,+1]}$ in percentage, while the next to rows are the $ANPV_{(NOK\ 2011)}$ in million. The number of observations in each group are denoted n. The calculations and test for significance of CAR is in accordance to the methodology section. Test for equality in means are based on t-tests and tests for equality in medians is based on a Wilcoxon-test. Median values are in brackets.

	Cash	Equity	Mix	Difference test		
	(1)	(2)	(3)	(1) – (2)	(1) – (3)	(2) – (3)
Panel A: Full Sample						
All	0.99[c]	6.83[a]	2.02[a]	-5.84[b]	-1.03	4.81[c]
	[0.13]	[2.99][a]	[1.65][a]			
	-143.4[c]	48.0[a]	27.7	-191.4[b]	-171.1[c]	20.3
	[4.9]	[11.4][a]	[9.9][c]			
	n=119	*n=32*	*n=73*			
Small	3.36[a]	7.32[a]	2.91[a]	-3.97	0.44	4.41
	[1.96][b]	[3.33][a]	[1.65][a]			
	44.7	35.5[b]	15.2[b]	9.1	29.5	20.3
	[8.5][b]	[10.2][a]	[9.7][c]			
	n=40	*n=26*	*n=46*			
Large	-0.21	4.68[c]	0.49	-4.89	-0.70	4.19
	[-0.36]	[2.37]	[1.45]			
	-238.6[b]	101.9	48.9	-340.5[c]	-287.5[c]	53.1
	[-20.3]	[71.8]	[27.9]			
	n=79	*n=6*	*n=27*			
Panel B: Private						
All	1.42[b]	9.11[a]	3.13[a]	-7.69[b]	-1.71	5.98[c]
	[0.58]	[4.28][a]	[2.72][a]			
	-112.1	47.3[a]	55.9	-159.4	-168.0	-8.6
	[6.3]	[13.8][a]	[12.7][a]			
	n=64	*n=24*	*n=52*			
Small	4.97[a]	9.57[a]	3.74[a]	-4.61	1.22	5.83
	[2.51]	[4.51][a]	[2.25][b]			
	84.9	32.8[b]	17.5[b]	52.1	67.5	15.4
	[7.1]	[11.2][a]	[10.1][b]			
	n=19	*n=21*	*n=34*			
Large	-0.07	5.91	1.97	-5.98	-2.04[b]	3.94
	[0.20]	[2.63]	[2.72][b]			
	-195.3	148.8	128.4	-344.1[c]	-323.7	20.4
	[0.1]	[95.1]	[111.3]			
	n=45	*n=3*	*n=18*			

a, b and c represents significance level of 1%, 5% and 10%, respectively

Is the size effect explained by firm and deal characteristics?

Whether deal or firm characteristics can explain the size effect is a legitimate concern. Table 5 shows the descriptive statistics of relevant firm and deal characteristics for all transactions, and for sub-sample of large and small acquirers.

Small firms enter much smaller deals than large firms in absolute value, as expected. However, it is noteworthy that small firms enter deals that have significantly higher ratio between deal value and market capitalization. Asquith et al. (1983) report that bidders return increase as the relative size between deal value and market capitalization of the acquiring firm increase. Therefore, it is important to control that size effect is the *not* the same as *relative* size effect.

Apart from size, the status of the target is one of the most important determinants of abnormal returns. We saw from Table 3 that abnormal returns were significantly higher in acquisitions of private targets than acquisitions of public or subsidiary targets. However, sub-samples of large and small firms do not differ much with respect to the organizational form of the target, suggesting that this would not explain the size effect.

In our sample, large firms tend to enter pure cash deals significantly more frequently than small firms do, while small firms enter pure equity deals significantly more frequently than large firms do. Table 4 illustrated how acquisitions paid with equity gain significantly more than acquisitions paid with cash or a mix of cash and equity. However, as described in the literature review, recent evidence proves that this variable is not the major driver for negative bidder return, as previously though. Thus, it is interesting to investigate whether this result remain significant when we include other control variables.

Table 5

The Sample (n) contains of 224 completed acquisitions in Norway between 2000 and 2011 where the listed acquiring firms gain controll of a public, private, or subsidiary target. Tests for equality in means are based on t-tests. Median values in brackets. All variables are defined in appendix 1.

	All	Large	Small
Panel A: Deal Characteristics			
Deal value (MNOK)	1 153.7 [124.7]	2 117.0 [319.2]	190.4[a] [59.5]
DV/total assets	0.47 [0.1]	0.17 [0.05]	0.78[a] [0.15]
Relative size	0.29 [0.09]	0.19 [0.04]	0.39[b] [0.15]
Pure cash payment deals	0.53	0.71	0.36[a]
Pure equity payment deals	0.14	0.05	0.23[a]
Mix payment deals	0.33	0.24	0.41[a]
Conglomerate deals	0.16	0.14	0.18
Private targets	0.63	0.59	0.66
Public targets	0.07	0.08	0.05
Subsidiary targets	0.31	0.33	0.29
Cross border deals	0.55	0.61	0.49[c]
Panel B: Acquirer charateristics			
Market capitalization (MNOK)	12 315.2 [1 719.2]	24 051.5 [4 824.0]	578.99[a] [496.5]
Total assets (MNOK)	27 284.0 [1 690.3]	52 086.3 [5 084.8]	2481.76[a] [338.1]
Tobin's Q	1.95 [1.41]	1.67 [1.34]	2.24[b] [1.53]
Debt/total assets (book)	0.23 [0.21]	0.27 [0.27]	0.19[a] [0.15]
OCF/assets (market)	0.05 [0.06]	0.07 [0.07]	0.03[a] [0.03]
ROA	0.03 [0.07]	0.09 [0.09]	-0.03[a] [0.06]
n	224	112	112

a , *b* and *c* represents statistical significance in mean between large and small firms at the level of 1%, 5% and 10%, respectively.

Table 6
The table show the pearson correlation among the variables. All variables are defined in appendix 1.

	Car[-1,+1]	Small	ln marketcap	ln assets	Relative size	Cash	Equity	Conglomerate	Private	Public	Crossborder	Toehold	Tobin's Q	Debt/assets	Ocf/assets	ROA
Car[-1,+1]	1.000															
Small	0.239[a]	1.000														
ln marketcap	-0.244[a]	-0.796[a]	1.000													
ln assets	-0.259[a]	-0.700[a]	0.874[a]	1.000												
Relative size	0.322[a]	0.164[b]	-0.213[a]	-0.136[b]	1.000											
Cash	-0.154[b]	-0.349[a]	0.364[a]	0.358[a]	-0.192[a]	1.000										
Equity	0.236[a]	0.255[a]	-0.315[a]	-0.345[a]	0.167[b]	-0.435[a]	1.000									
Conglomerate	-0.086	0.049	-0.089	-0.118	-0.063	0.070	-0.040	1.000								
Private	0.194[a]	0.074	-0.168[b]	-0.201[a]	0.025	-0.192[a]	0.105	0.038	1.000							
Public	-0.131[b]	-0.054	0.181[a]	0.211[a]	0.050	0.073	-0.058	0.029	-0.346[a]	1.000						
Crossborder	-.072	-0.117	0.215[a]	0.079	-0.107	0.048	-0.092	-0.068	-0.053	-0.044	1.000					
Toehold	-0.075	-0.191[a]	0.134[b]	0.168	0.025	0.023	-0.054	0.052	-0.011	0.086	-0.048	1.000				
Tobin's Q	0.129	0.146[b]	-0.139[b]	-0.452[a]	-0.019	-0.212[a]	0.219[a]	0.035	0.166[b]	-0.106	0.141[b]	-0.039	1.000			
Debt/assets	-0.074	-0.204[a]	0.074	0.303	0.031	0.101	-0.131[b]	-0.020	-0.077	-0.053	-0.126	0.099	-0.298[a]	1.000		
Ocf/assets	-0.167[b]	-0.239[a]	0.361[a]	0.400[a]	-0.124	0.306[a]	-0.185[a]	-0.013	-0.145[b]	0.044	0.015	0.115	-0.251[a]	0.069	1.000	
ROA	-0.039	-0.259[a]	0.320[a]	0.327[a]	-0.044	0.216[a]	-0.269[a]	-0.090	-0.154[b]	0.169[b]	-0.015	-0.067	-0.402[a]	0.038	0.487[a]	1.000

a and b represents significance level of 1% and 5%, respectively

Panel B in Table 5 show different firm characteristics. More leveraged firms obtain higher announcement returns in acquisition, according to Maloney et al. (1993). Two things are noteworthy in our sample. (1) Firms, in general, are less leveraged than found in previous research, typically from Anglo Saxon countries. (2) Small firms have lower leverage than large firms, which also is in contradiction to former research. It is hard to assess the exact reason for this, but some potential explanations make sense. Firstly, the Norwegian economy is quite specialized due to a small population and access to ample natural resources. This is reflected in our sample where most firms are either in industries related to natural resources, shipping or technology, rather than traditional industry and consumer goods. Indeed, by browsing through our sample we find that technology firms with low leverage are overrepresented in our sub-sample of small firms. Frank and Goyal. (2004) argue that higher market-to-book values imply higher growth opportunities, hence higher costs of financial distress. Consequently, the optimal debt level decrease. Remarkably, small firms in our sample have larger Tobin's Q than large firms, which can contribute to explain the leverage puzzle. Furthermore, Servaes (1991) show that firms with a high Q experience higher announcement returns in acquisitions of public firms. Thus, we have to find out whether this can explain the size effect in our data.

The free cash flow hypothesis predicts which takeovers being more likely to destroy rather than create shareholder value. Firms facing high cash flow and low investment opportunities are more likely to undertake poor acquisitions (Jensen, 1986). Note that large firms in our sample have significantly higher operating cash flow-to-asset ratio. It is therefore interesting to investigate whether the free cash flow theory can contribute to explain the size effect.

Table 6 sum up the correlation between CAR and the different explanatory variables. As expected, size is negatively correlated with abnormal returns, while relative size is positive correlated with abnormal returns. Moreover, private deals and paying with equity is positively correlated with abnormal returns, while public deals and paying with cash is negatively correlated with abnormal returns. Note that all the explanatory variables have *lower* correlation than 0.5 among each

other. Hence, we can conclude that the problem of multicollinearity is rather limited.

To formally test whether the size effect proxy for deal or firm characteristics, we run cross sectional regressions, where relevant control variables from the descriptive statistics are included. Table 7 display the output of different cross sectional regressions run with $CAR_{[-1, +1]}$ as the dependent variable. The standard errors in the regression are White-adjusted due to evidence of heteroscedasticitiy. The first three columns in Table 7 are output of regressions that include all firms in the sample, but with three different measures of size. Model (1) measure the size effect by including a dummy variable, which takes the value of 1 in case of a small firm, and zero otherwise. The model suggests that small firms earn, on average, 2.75 percentage points higher abnormal returns compared to large firms, other things being equal. This result is significant at a 1% level, and supports the size effect hypothesis.

The variables private and public take the value of 1 for private and public deals, respectively, and zero otherwise. In our sample bidders earns 2.23 percentage points higher abnormal return when the target is private, compared to when the target is a subsidiary. The result is statistically significant at a 5% level. This is not surprising in light of Table 3. Moreover, public deals experience 3.21 percentage points lower abnormal return, compared to subsidiary deals. Hence, the status of the target as a private, public or a subsidiary is an important determinant for bidders' abnormal returns. This result is consistent with most recent evidence in the literature (Betton et al. 2008).

The variables cash and equity are dummies, which take the value of 1 in case of a pure cash and pure equity payment, respectively, and zero otherwise. None of these variables is statistically significant. There is, however, a weak tendency that pure equity deals gain more. This suggests that the findings in Table 4 are less relevant when controlling for other characteristics, which are consistent with recent evidence suggesting that method of payment is less important, particularly in private deals (Betton et al. 2008).

Operating cash flow-to-asset ratio affects abnormal returns negatively and implies that bidding firms create more value for their shareholders when the management of the firm has reduced access to free cash. This result is statistically significant at a 10% level in model (1). Jensen (1986) argues that the foundation of agency costs is incentives for self-serving managers and free cash flow. Referring back to Table 4, we see large firms obtaining negative abnormal returns only when they pay with cash. Combined, these findings give support to Jensen's free cash flow hypothesis, which is an intriguing result. Nevertheless, the size effect remains when controlling for the variable representing free cash flow in the firm.

In model (1), the return on assets (ROA) is positively related to abnormal returns and the variable is significant at a 10% level. This is reasonable from an economic point of view. Firstly, firms with higher profitability are most likely better run by the management, which indicates that agency costs are lower than in less profitable firms. Secondly, well-managed firms will probably have a larger ability to improve the target. Thus, bidders with higher ROA have a better foundation to make acquisitions with superior synergy and efficiency gains.

Conglomerate, cross border and toehold are all dummy variables that are included to avoid omitted variable bias. The coefficient of the conglomerate variable is negative and statistical significant in some of the regressions, suggesting a wealth loss in diversified acquisition activity. Neither the cross border nor the toehold variable is close to significant. Tobin's Q is positively related to abnormal return in all five models, but not close to statistical significant.

Model (2) and (3) offer different measures of size to test for robustness of the size effect with respect to the definition of size. In model (2) the natural logarithm of market capitalization 20 days prior to the event proxy for acquirers' firm size. The variable is significantly negative at a 5% level. Our interpretation is that abnormal return *decreases* as firm size *increase*. This is an important result, as it confirms that the size effect is *not* sensitive to our classification of large and small firms. Hence, it provides an additional support for the hypothesis that small firms earn significantly higher announcement returns than large firms.

Table 7

Cross sectional regression with $CAR_{[-1, +1]}$ as the dependet variable. Model (1) include a dummy variable for size, which take the value of 1 in case of a small firm, and zero otherwise. Model (2) and (3) uses logarithm of market capitalization and total assets as a proxy for size. Model (4) and (5) is subsamples of large and small companies. The standard errors is White-adjusted due to evidence of heteroskedasticity. P-values is reported in brackets below each coefficient.

	Sample				
	All	All	All	Large	Small
	(1)	(2)	(3)	(4)	(5)
Intercept	-0.0278	0.0662[c]	0.0579	-0.0175	-0.0050
	[0.241]	*[0.091]*	*[0.100]*	*[0.376]*	*[0.861]*
Small	0.0275[a]				
	[0.006]				
ln marketcap		-0.0052[b]			
		[0.044]			
ln assets			-0.0045[c]		
			[0.054]		
Relative size	0.0359	0.0361	0.0367	-0.0043	0.0424
	[0.173]	*[0.177]*	*[0.170]*	*[0.673]*	*[0.241]*
Cash	0.0146	0.0114	0.0104	-0.0025	0.0341
	[0.280]	*[0.376]*	*[0.424]*	*[0.824]*	*[0.163]*
Equity	0.0146	0.0359	0.0352	0.0436	0.0329
	[0.118]	*[0.126]*	*[0.140]*	*[0.107]*	*[0.286]*
Conglomerate	-0.0155	-0.0159	-0.0168[c]	-0.0011	-0.0291[c]
	[0.100]	*[0.101]*	*[0.089]*	*[0.911]*	*[0.083]*
Private	0.0223[b]	0.0210[b]	0.0212[b]	0.0080	0.0320[c]
	[0.013]	*[0.018]*	*[0.017]*	*[0.364]*	*[0.053]*
Public	-0.0321[b]	-0.0278[c]	-0.0264	-0.0137	-0.0785[b]
	[0.049]	*[0.096]*	*[0.118]*	*[0.339]*	*[0.026]*
Crossborder	-0.0040	-0.0036	-0.0049	0.0032	-0.0018
	[0.706]	*[0.727]*	*[0.640]*	*[0.698]*	*[0.933]*
Toehold	0.0001	-0.0047	-0.0048	-0.0047	0.0284
	[0.991]	*[0.714]*	*[0.698]*	*[0.620]*	*[0.484]*
Tobin's Q	0.0043	0.0042	0.0026	0.0044	0.0043
	[0.288]	*[0.296]*	*[0.508]*	*[0.243]*	*[0.436]*
Debt/assets	-0.0009	-0.0109	-0.0036	0.0355	-0.0354
	[0.969]	*[0.647]*	*[0.880]*	*[0.127]*	*[0.398]*
Ocf/assets	-0.1027[c]	-0.0888	-0.0835	-0.0355	-0.1236[c]
	[0.084]	*[0.159]*	*[0.193]*	*[0.691]*	*[0.084]*
ROA	0.0621[c]	0.0564	0.0503	0.0100	0.0815[c]
	[0.075]	*[0.102]*	*[0.139]*	*[0.848]*	*[0.058]*
n	224	224	224	112	112
R^2	0.227	0.215	0.214	0.176	0.233
Adjusted-R^2	0.179	0.167	0.166	0.076	0.140

a, b and c represents significance level of 1%, 5% and 10%, respectively

A stock price increase leads necessarily to an increase in the market capitalization of the firm. Therefore, large firms are more likely to be overvalued. Hence, the size effect might be due to overvaluation of large firms. We run a separate regression and include the logarithm of book value of total assets as an alternative measure of size. Book value is less likely to be overvalued since stock price increases usually *not* increase values of accounting items. If the size effect is a consequence of overvaluation of large firms, the size effect should disappear when we use book value assets as a measure of size. From model (3), we see that this is not the case. Indeed, the p-value is somewhat higher, but it is still 0.054. Besides that, the explanatory power of model (2) and model (3) are essentially the same.

As pointed out in the methodology chapter one should carefully interpret cross-sectional regressions run on different firm characteristics. Nevertheless, results in Table 7 are mainly consistent with earlier evidence and it seems reasonable to conclude that the model is well specified. Hence, two important conclusions can be drawn from the analysis. (1) The size effect remains regardless of definition of size: Small firms obtain significantly higher abnormal return than larger firms. (2) The size effect is not explained by different firm and deal characteristics between large and small firms.

What can explain the size effect?

In the literature review, we discussed different kind of hypotheses that might explain the size effect: Overvaluation hypothesis, signaling hypothesis and agency hypothesis. Any explanation of the size effect has to affect small and large firms differently.

The overvaluation hypothesis suggest large firms tend to be overvalued as a stock price increase would lead to higher market capitalization, and hence a larger firm. This hypothesis is *not* consistent with our data. Firstly, if the size effect is caused by larger firms being more likely to be overvalued, then the size effect should disappear when using book values as a measure of size. From (3) in Table 7, we see that this is not the case. The size effect remains even though we use book value of assets as a measure of size. Dong et al. (2006) believe high Tobin's Q proxy for overvaluation and report that firms with higher valuation have worse announcement returns in takeovers. If firms with higher Q are overvalued, we expect the Q to be negatively related to announcement return. In our sample, small firms have higher Q than large firms. Moreover, the Q has positive coefficients in all regression, although insignificant.

Another way to test whether the overvaluation hypothesis and the signaling hypothesis are relevant for large firms, and not for small firms, is to check whether regression (1) have a size effect because it is misspecified. That is, the variables, which influence bidder return, do so differently for large and small firms. This can be tested by running separate regressions for sub-samples of large and small firms. From (4) and (5) in Table 7 we see that none of the variables have significantly different impact on small and large firms. Although the subsamples are limited and have less explanatory power, there is no indication that neither the overvaluation hypothesis nor the signaling hypothesis can explain the size effect.

We find weak evidence supporting the free cash flow hypothesis. Small firms have significantly lower operating-to-asset cash flow. This variable is negatively related to CAR, supporting Jensen's cash flow hypothesis, namely that firms with higher cash flow and lower growth opportunities are more likely to undertake

inefficient takeovers. This finding supports Table 4, namely that acquisition paid with cash by large firms is a "worst case scenario." Nevertheless, the free cash flow hypothesis cannot explain the size effect. The size effect remains strong in all regressions, also when controlling for the cash flow variable. Moreover, Jensen predicts that unused debt capacity can lead to worse takeovers, which is consistent with evidence of Maloney et al. (1993) who found that firms with less leverage experienced significantly lower abnormal return in takeovers. This is not consistent with our data, which reinforce the puzzle of the size effect.

Moeller et al. (2004) find evidence supporting hubris hypothesis. Firstly, they find that larger firms pay higher premium in acquisitions of public firms. Secondly, they find that total synergy gains are lower in acquisitions carried out by large firms. Unfortunately, we do not have sufficient data to test Roll's hubris hypothesis.

7.0 Conclusion and Critique

In this master thesis, we have investigated the economic effect of takeovers for acquiring firms in the Norwegian stock market. We find that firms listed at Oslo Stock Exchange (OSE) gain on average a significant cumulative abnormal announcement return of 2.16%, in a three-day event window.

However, when we calculate the NOK abnormal return we find that acquiring firms lost -60.3 MNOK on average per transaction. The sign of abnormal returns and NOK abnormal returns can only differ in a case a size effect exists, which implies that small firms experience higher abnormal announcement returns than large firms. When we calculate the abnormal return on a NOK basis, we find that small firms earn on average a significant abnormal gain of MNOK 30.4 per transaction. In contrast, large firms suffer a significant abnormal loss of MNOK 151.1. At the overall level, we can draw three important conclusions: (1) Small firms create significantly value for their shareholders through takeover activity. (2) Large firms destroy significantly value for their shareholders through takeover activity and (3) the net effect cannot be distinguished from zero at any reliable level.

From the cross-sectional regressions, we find that the size effect does *not* proxy for different firm or deal characteristics. It remains significant when including a wide range of control variables. Small firms gain on average 2.75 percentage points higher abnormal returns compared to large firms, other things equal. Moreover, the size effect is *not* sensitive to different definitions of size.

Small firms outperform large firms regardless of organizational form of the target or method of payment. However, method of payment becomes *insignificant* in explaining abnormal returns when we control for other deal and firm characteristics (in the regressions). In takeovers where the target is private, the bidder earns on average 2.23 percentage points higher abnormal returns, compared to takeovers with a subsidiary target. In takeovers where the target is public, the bidder earns on average -3.21 percentage points lower abnormal returns, compared to takeovers with a subsidiary target. The results in significant and suggest that bidder size and organizational form of the target remain the most

important determinant of abnormal performance. Most other variables become less relevant when we run regressions.

We do *not* find support for the overvaluation hypothesis. Noteworthy, small firms at Oslo Stock Exchange have significantly higher Tobin's Q than large firms, which support that Tobin's Q is a proxy for a well performing firm rather than an overvalued firm. We find some evidence supporting the free cash flow hypothesis. Firms with larger cash flow-to-asset-ratio earn significantly lower returns and firms with low growth opportunities (measured by Tobin's Q) tend to obtain lower abnormal returns in takeovers as well. However, the free cash flow theory cannot explain the size effect, since the size effect remains in the cross-sectional regressions where we also include the control variable (controlling free cash flow). Lastly, we do not find any evidence supporting the signaling hypothesis.

In the introduction, we explained two key characteristics of OSE-listed firms. (1) OSE-listed firms have a relatively small variation in sectors, with a high concentration of firms related to natural resources, shipping and technology. (2) OSE-listed firms have high ownership concentration, high degree of state ownership and low degree of individual ownership compared to most other countries. Throughout the thesis, we have provided evidence consistent with existing literature. This implies that the economic effect of takeovers remains under the Norwegian corporate governance regime, which is quite different from most other corporate governance regimes. This finding is important in at least two aspects. Firstly, it should influence how Norwegian authorities should approach corporate governance regulations. Secondly, it should provide premise for future research within the field. For example, future research should probably focus more on CEO's incentives, rather than ownership structure (e.g. ownership concentration, types of owners) when investigating explanations of the size effect.

Although we feel confident that our research fulfills satisfactorily standards for scientific research within the field of financial economics, there are a few concerns. First, our sample consists of only completed offers. Second, the inference of cross sectional regressions is vulnerable due to firms' self-selection of the event (endogeneity). Third, we were not able to obtain information of the

mood in the transactions (hostile/friendly) and number of bidders. Therefore, the regressions might face omitted variable bias. Fourth, we cannot guarantee that we not have missed single transactions, or that the databases provide wrong information in single cases. We believe that the latter problem is minor, due to our comprehensive work with the data.

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9.0 Appendix

Appendix 1

Definition of the different variables their expected signs in cross sectional regressions. Deal level data is obtained from the Zephyr database and the Oslo Stock Exchange's newsfeed, Newsweb. Firm level: Professor Øyvind Norli has provided data on market capitalization. Book values are obtained from Thomson Reuters Datastream.

Variable	Definition	Sign	Authors
Panel A: Firm Size			
Small	Dummy variable that take the value of 1 if the firm is defined as a small company.	+	Moeller et al. (2004)
ln marketcap	Natural logarithm of equity market capitalization. Market capitalization is defined as the number of outstanding shares times the closing share price twenty days prior to the announcement date.	-	Moeller et al. (2004)
ln assets	Natural logarithm of book value of total assets in the prior year of the acquisition announcement.	-	Moeller et al. (2004)
Panel B: Deal level			
Relative Size	Deal value divided by the equity market capitalilization twenty days prior to the announcment date.	+/-	Asquith et al. (1983) / Travlos (1987)
Cash	Dummy variable that takes the value of 1 if the acquisition is only financed by cash.	+	Walker (2000); Heron and Lie (2004)
Equity	Dummy variable that takes the value of 1 if the acquisition is only financed by equity.	-	Travlos (1987)
Conglomerate	Dummy variable that takes the value of 1 if it is a conglomerate deal. Conglomerate deals are closely assessed by using the two-digit US SIC code and business descriptions.	-	Morck et al. (1990)
Private	Dummy variable that takes the value of 1 in case the target is private. This is done by screening through all the targets using the zephyr database and/or acquisitions details on newsweb.	+	Bradley and Sundaram (2006)
Public	Dummy variable that takes the value of 1 in case the target is public. This is done by screening through all the targets using the zephyr database and/or acquisitions details on newsweb.	-	Bradley and Sundaram (2006)
Crossborder	Dummy variable that takes the value of 1 if the target headquarters/business is in another country.	-	Moeller and Schlingemann (2005)
Toehold	Dummy variable that takes the value of 1 if the acquirer initial stake on the target is at least 5%.	+	Betton el al. (2008)
Panel C: Firm level			
Tobin's Q	The ratio is defined as the market value of total asset divided by the book value of total assets in the fiscal year prior to the acquisition announcement.	+	Servaes (1991)
Debt/Assets	The ratio is defined as the total debt divided on book value of total assets.	+	Maloney et al. (1993)
Ocf/assets	The ratio is defined as the operating cash flow divided on the market value of total assets.	-	Jensen (1986)
ROA	The return on assest is defined as earnings before interest and taxes divided on book value of total assets.	+	Morck et al. (1990)

The rationale of the variables is described through our master thesis.

Robert Nystad
Tommy Grinden

Preliminary Thesis Report

Takeover gains:
Empirical Evidence from the Norwegian Stock Market

15th of January 2013

BI Norwegian Business School

Campus: BI Oslo

Supervisor: Øyvind Norli

Master of Science in Business and Economics, Finance

Examination code and name:
GRA 19002 – Preliminary thesis

Table of Contents

Abstract

The preliminary thesis is the starting point of our Master Thesis in Finance. We study returns on takeovers in the Norwegian stock market. The preliminary thesis will address relevant literature, hypotheses, methodology, data collection, and progression plan.

1.0 Introduction

Of all interesting topics within corporate finance, we find takeovers the most intriguing. Merger-deals usually attract a lot of attention from investors, the financial press, and other stakeholders. The stakes are high. Investors are affected through change in the security prices, employees are affected through the new combined firm, and jobs could be lost or created. Competitors, suppliers and customers might face a new competitive environment. The greater society may benefit from increased efficiency or suffer from reduced social surplus due to monopoly profits.

Mergers and acquisitions (M&A) are one of the most important areas in corporate finance. The economics of mergers are significant in proportion to the total economy in countries with developed capital markets (Andrade et al. 2001). Although numerous papers have been worked out on this topic, studies on Norwegian data are almost nonexistent. The significance of takeovers in the economy, and the absence of empirical studies on Norwegian data, makes this topic pertinent for a master thesis.

Our research question is: *"Would Norwegian takeovers lead to abnormal return for the target, acquiring and the combined firm around the announcement date, and will the method of payment in the acquisition and the firm size affect the results?"*

In other words, our master thesis investigates the economic effects of takeovers in the Norwegian stock market. We will study synergies (combines returns), winners and losers (acquirer and target returns). Moreover, we will check different determinants that possibly can explain value creation or value destruction. Finally, long term performance of the acquiring firms will be analyzed to check whether the economic effects are sustainable or whether it reverses and disappears over time.

The residual preliminary thesis contains review of relevant literature, research hypotheses, data, methodology, and a temporary progress plan.

2.0 Background and Literature

Takeovers generate massive reallocation of resources within an economy. In 1995, the value of mergers and acquisitions equaled 5 percent of the GDP and was equivalent to 48 percent of nonresidential gross investments in the USA (Andrade et al. 2001). From the firm's perspective, mergers represent quite extraordinary events. Consequently, measuring economic effects of takeovers are an important objective in finance.

There have been three major waves of takeovers in modern financial history, that of the 1960s, the 1980s and the 1990s (Andrade et al. 2001). Industries that make up each wave vary tremendously. If mergers come in waves, and each wave differs in terms of industry composition, then a significant proportion of merger activity might be due to industry-level shocks. Technological innovation and deregulations are examples of industry shocks that can affect merger activity. Mitchell and Mulherin (1996) and Steven Kaplan (2000) find evidence supporting that deregulation, oil price shocks and technological innovation can explain a significant proportion of takeover activity in the 1980s.

The most fundamental question in the takeover literature is whether takeovers create value for shareholders, and ultimately the society by more efficient allocation of resources. Many theories and explanations for takeovers have been formulated, but they can be summarized into three major categories (Berkovitch and Narayanan, 1993):

Table 2.1

		(1)	(2)	(3)
	Motive	**Total Gains**	**Gains to Target**	**Gains to Acquirer**
I	Efficiency and/or synergy	+	+	+
II	Hubris (winner's curse, overpay)	0	+	-
III	Agency problems or mistakes	-	+	-

The table illustrates sources for gains and losses in takeovers. Efficiency gains must exceed agency costs to create value in takeovers. The hubris hypothesis suggests that the acquiring firms overpay, but that total gains are zero (Roll 1986). It is simply a transfer of wealth from shareholders of the bidder, to shareholders of

the target. This is typically due to overconfidence (self-pride, arrogance) and the winner's curse phenomenon. Efficiency improvements normally occur when the target is inefficiently managed and the bidder are able to improve it. Synergies can be reached through economy of scale, for example by sharing overhead costs or by financial synergies. Jensen and Meckling (1976) formulated the agency hypothesis. In this context agency problems occur when there is a conflict of interest between the owners (principal) and the management (agents). Asymmetrical information makes it possible for managers to expropriate the owners of the firm, for example by paying too much in takeovers and personally benefit from running a large firm (i.e. empire building). This is particularly problematic when the firm has weak owners (i.e. dispersed ownership concentration).

Betton et al. (2008) show that target experience significantly positive abnormal return. Moreover, the paper shows, on average, that bidders experience zero abnormal returns. This is consistent with evidence from broad research in the field (Copeland, Weston and Shastri 2005). This insinuates that the market expect bidders to earn their cost of capital.

Different explanations for lopsided gains have been presented. Firstly, if many bidders try to acquire the same target, the market for takeovers should be competitive. There is, however, no empirical support for this. In fact Andrade et al (2001) find an average of 1.1 bidders per deal in a sample of 4,256 deals. Secondly, Jensen (1986) argues that takeovers reduce agency costs in the target, while it occurs when agency costs are high in the bidder. Thirdly, Roll (1986) has formulated the hubris hypothesis, which suggests a wealth transfer from buyer to seller due to irrationality. Finally, mispricing could occur simply because of inefficient markets.

There is, however, much more to the story than unconditional averages. For example, it is evident that method of payment is an important explanatory factor of abnormal returns. Andrade et al. (2001) and most other studies suggest that paying with stock reduces bidder, target and total gain. They argue that bidders tend to offer equity when their stock is overvalued, and offer cash when their

stock is undervalued. This is consistent with the pecking order theory (Myers and Majluf 1984). Hirshleifer (1995) states that method of payment reflects bidders' private information of a stand-alone value or the value of the target's resources under the bidders' control. From targets perspective it is evident that they are likely to obtain higher premium from all-cash offers than from all-equity or mixed offers (Huang and Walking 1987; Eckbo and Langohr 1989). Copeland, Weston and Shastri (2005) conclude that target firms gain on average 15–20% in stock-for-stock mergers, while the abnormal return is 25–30% when the method of payment is cash. Likewise, the bidders obtain higher returns from all-cash offers (Travlos 1987; Heron and Lie 2004). Eckbo, Gimmarino and Heinkel (1990) found evidence that bidders in Canada obtain highest return when offering a mix of cash and equity.

Moeller et al. (2004) states that if the different hypotheses (e.g. hubris hypothesis, the method of payment hypothesis, overvaluation hypothesis, and the arbitrageur hypothesis) can explain the size-effect it has to be more relevant for large firms than for small firms. Eckbo and Thorburn (2000) found, on data from Toronto Stock Exchange, a tendency of decreased return as the bidder size increases. This is consistent with results from the U.S market where small firms experienced greater abnormal returns associated with acquisitions announcements than large firms (Moeller et al. 2004).

The long-term performance of acquiring firms is also given much attention in the literature. Recent studies suggest that takeovers generate either insignificant or negative abnormal returns in the long run (Loughran and Vijh 1997; Andrade et al. 2001; Moeller et al. 2004). Moeller et al. (2004) concluded that effects of firm size is not reversed over time and found that large firms offer larger acquisitions premium than small firms and therefore enter acquisitions with negative synergy gains. Loughran and Vijh (1997) found that all-equity mergers underperform and all-cash mergers overperform. The latter result is consistent with the findings to Andrè et al (2004). Interestingly, Andre et al. (2004) also found evidence that difference in the returns of cash and equity portfolios was positive and significant, which suggests that the effect of payment method is not reversed over time.

3.0 Research question and hypothesis

The main objective of the thesis is to assess short-term effects of takeovers in the Norwegian stock market between 2000 and 2012. By short-term effects we mean the abnormal return around the announcement date. Earlier studies find that the combined abnormal returns are significantly positive, thus takeovers create value (Andrade et al. 2001). Additionally, targets and bidders are analyzed separately. In other words, we will investigate whether synergies exist and whose benefit from those synergy gains. The following hypotheses are formulated:

H_0: $Abnormal\ return_t = 0$ ($abnormal\ return\ for\ target$)
H_0: $Abnormal\ return_a = 0$ ($abnormal\ return\ for\ aquirer$)
H_0: $Abnormal\ return_c = 0$ ($abnormal\ return\ for\ combined$)

The formulation of hypotheses implies that the null hypothesis is rejected in the case of significantly abnormal returns. We will use different lengths of the event window. Moreover, we will examine whether abnormal returns are affected by method of payment (cash, equity, mix) and firm size (large and small). It is crucial to analyze different sources of financing as paying with stocks is in fact both a merger and a stock issue at the same time. Finance theory and empirical evidence suggests that—due to information asymmetry—stock issuing signals that the firm is overvalued, hence the share price usually fall during such events (Eckbo et al. 1990). Consequently, we expect takeovers financed with equity—ceteris paribus—to have lower return for the acquirer.

Furthermore, we will examine potential determinants of abnormal returns to better understand the sources of value creation or value destruction. Table 3 on the next page show the main characteristics, source of value change, and which variables to measure. Size and method to payment should still be included to avoid omitted variable bias.

Table 3.1: Hypothesis: Determinants of abnormal return in takeovers[a]

Characteristics	Source	Variables
Deal level	Method of payment	Cash
		Equity
		Mix
	Deal value	Log deal value
	Cross border	Cross border
	Type of acquisition	Conglomerate
		Vertical
		Horizontal
	Mood of acquisition	Friendly
		Hostile
	Toehold	Toehold
Firm level	Firm size	Large
		Small
	Tobin's q	High
		Low
Industry level	Industry	Industry

[a]Preliminary table to illustrate the hypotheses to be tested and the variables that might be used. The final table and ex ante expectations will be presented in the final thesis.

We will also examine whether abnormal returns around the announcements date are sustainable (i.e. whether the market interprets the new information efficiently) or whether it is reversed and disappears over time. We measure the long-term performance of the acquisitions and compare it to the short-term results. This will be carried out by forming portfolios and using the Jensen-alpha approach.

Access to data are crucial for the thesis to succeed, therefore changes to the research question might occur in the final thesis.

4.0 Data

The sample of takeovers on the Norwegian stock market is based on Lauvvang and Gundersen's (2010) database. To answer the research question we must supplement the database. We will also extend the time period to 2000–2012. If necessary, we increase the sample even more by collecting data further back.

We will apply the following criteria when organizing the data:

1. Acquisitions in which acquiring company has the intention to take control over the company.
2. Deals are completed.
3. Cases where the acquiring firm own more than 90% of the target would not be considered. Likewise, if the acquiring firm offers for a minority stake, it will be excluded from the sample.
4. The target or the acquiring company must be listed on the Oslo Stock Exchange.
5. Financial and market data must be available.

Newsweb (Oslo Børs) and Zephyr is used for extension and complementary data collection. Stock prices and benchmarks will be provided by Professor Øyvind Norli. The choice of benchmark will either be a world index or Oslo Stock Exchange Benchmark Index (OSEBX).

In addition to gather information about method of payment and firm size, table 3.1 gives an indication of which data we have to collect. Potential problems related to data collection and the risk of sample selection bias will be addressed in the final thesis.

5.0 Methodology

To investigate the economic consequences of takeovers we test the formulated hypotheses against empirical data. We apply an *event study* with cross-sectional data. An event study describes a technique of empirical financial research that assesses the impact of a particular event on a firm's stock price (Bodie, Kane and Marcus 2011). Event studies are important for determining impact on the firms' claimholders, and for capital market research of market efficiency. Professional thinking on event study methods has evolved over time, but there is relatively little controversy about statistical properties of such studies (Kothari and Warner 2007). Under which conditions event studies is adequate is well understood. The method is considered quite reliable under short time horizons, while it is more vulnerable on long time horizons.

This thesis examines return behavior for a sample of firms involved in a common type of event, namely a merger or acquisition. The first step is to collect and organize the necessary data as described in the data-chapter.

In the empirical part, we need to define the time of the event; the announcement date. Anticipation and leakage of information may affect stock prices prior to the event date (Bodie, Kane and Marcus 2011). Thus it is important to examine an expanded event window to capture the whole economic effect of takeovers. Therefore we define expanded event windows; [-1, +1], [-20, +1] and [-60, + 1]. Notice that by expanding the event window the risk of capturing other sources of abnormal behavior increases.

To estimate abnormal returns we apply the market model. The stock return for firm *i*, during a given period *t*, is expressed as:

$$(1) \quad R_{it} = \alpha_i + \beta_i R_{Mt} + e_{it}$$

where R_{Mt} is the market return during the period *t* and e_{it} is the part of security *i*'s return resulting from firm-specific events. The parameter β_i measures the sensitivity to the market return, and α_i is the average rate of return the stock would realize in a period with zero market return (Bodie, Kane and Marcus 2011).

Equation (1) can be reformulated to:

$$(2) \quad e_{it} = R_{it} - (\alpha_i + \beta_i R_{Mt})$$

The abnormal return for firm *i*, at time *t*, is now given by e_{it}. We use an estimation window and run regressions to estimate the alphas (α_i) and betas (β_i) for each firm. It is important that the estimation window is sufficiently separated from the event to make sure that the estimate is not affected by the event itself (Kothari and Warner 2007). It is straight forward to calculate the abnormal return in the event window when alphas and betas are computed. We know each firm's return and the market return in the event window. The abnormal return is simply the difference between actual return and expected return. This is calculated for the full sample, including acquirers, targets and combined returns.

The null hypothesis can be tested in different ways, but most existing literature focus almost exclusively on the mean of the distribution of abnormal returns (Kothari and Warner 2007):

$$(3) \quad AR_t = \frac{1}{N} \sum_{i=1}^{N} e_{it}$$

To assess abnormal returns in expanded event windows we calculate the *cumulative abnormal return*:

$$(4) \quad CAR(t_1, t_2) = \sum_{t=t1}^{t2} AR_t$$

This is the sum of each day's average abnormal performance. The CAR starting at time t_1 through time t_2 (i.e., horizon length $L = t_2 - t_2 + 1$). The null hypothesis is whether the mean (cumulative) abnormal return is equal to zero.

Statistical significance of the abnormal returns will be tested using tests statistics. We will use the same approach as MacKinlay (1997). To determine whether the average cumulative abnormal return, $\overline{\text{CAR}}$, is significantly different from zero we use the following test estimator:

$$(5) \quad \Theta_1 = \frac{\overline{CAR}(t_1, t_2)}{var\left(\overline{CAR}(t_1, t_2)\right)^{1/2}} \sim N(0,1)$$

where

$$(6) \quad var\left(\overline{CAR}(t_1, t_2)\right) = \sum_{t=t_1}^{t_2} var(\overline{AR_t})$$

and

$$(7) \quad var\left(\overline{AR_t}\right) = \frac{1}{N^2} \sum_{i=1}^{N} \sigma_{\varepsilon_i}^2$$

3.2 Determinants of abnormal performance

To assess the determinant of value creation or destruction we apply multiple regression analysis based on table 3.1 in the research question chapter. Formula (8) illustrates how it will look like:

$$(8) \quad CAAR_t = \alpha + \beta_1 Dcash + \beta_2 Dequity + \beta_3 DSize + \ldots + \beta_n Control + \varepsilon_t$$

where Dcash, Dequity and Dsize are dummy variables. Control is potential determinants that will be included in the multiple regressions. This will be addressed in the final thesis.

3.3 Long-horizon event studies

To examine post-event performance for acquiring firms we will use the calendar-time approach recommended by Fama (1998). This would be carried out by forming portfolios of acquiring firms. Both an equally-weighted and value-

weighted approach will be used. Then we estimate the abnormal returns for a two years post-acquisitions period. The time series of the portfolios would be regressed on the Fama-French (1993) three factor model:

$$(9) \quad R_{pt} - R_f = \alpha + \beta_1(R_{Mt} - R_f) + \beta_2(SMB_t) + \beta_3(HML_t) + e_{pt}$$

Where R_{pt} is the returns of the portfolio of acquisitions and R_f is the risk free rate. The risk factors in the model are the market returns, size and the book-to-market ratio. β_1, β_2 and β_3 are the loadings on each risk factor. A momentum factor suggested by Carhart (1997) and a turnover factor suggest by Eckbo and Norli (2005) will also be considered applied. Jensen's alpha, α, indicates whether there are average abnormal returns in our acquisition portfolio. Additionally to analyze the whole sample, we must divide it into size (large vs. small) and method of payment (cash vs. equity vs. mixed).

A model of expected return such as the Fama-French three factor model has to be specified to compute abnormal return. This is a potential source of error as there is no evidence for one true asset pricing model. The Fama-French model is criticized for lacking theoretical foundation. In general, however, it has proved to work quite well to explain historical returns. What the factors in the model might proxy for is not really relevant here; if the model is a fair description of reality, it will work well to calculate abnormal returns.

3.4 Econometric issues in event studies

There are several concerns regarding event study econometrics. An important assumption in event studies is market efficiency, that is, assuming stock prices instantaneously reflects new information. To what extent markets are efficient is somewhat ambiguous (Bodie, Kane and Marcus 2011). Moreover, estimation of alphas and betas depend on the estimation window, and it is important to avoid that the estimates are affected by the event itself.

Increased event window creates problems. Firstly, concurrent events that are not related to the takeover could affect the abnormal return. Secondly, event studies are joint tests of whether abnormal returns are significant different from zero, and

whether the assumed model of expected returns (e.g. CAPM or Fama-French three factor model) is correct. Nevertheless, the latter problem is less serious the shorter the time horizon, since expected returns on daily basis is close to zero regardless of asset pricing model.

The variance is often underestimated due to increased volatility under event-time clustering (MacKinlay 1997). Hence, the test statistics will be biased upwards and the null hypotheses are rejected too often. Other issues are assumptions of normal distribution, independent time series and cross-section data. The latter is particularly vulnerable in small samples—because we cannot rely on asymptotic results or the central limit theorem (Kothari and Warner 2007).

6.0 Progression Plan

This preliminary thesis will be the starting point of our master thesis. The research question and hypotheses may be adjusted somewhat when we have a more complete overview. If so, the literature review and methodology part may be adjusted as well. Our temporary progression plans is as follows:

1. Prepare the presentation of our preliminary thesis.
2. All data should be gathered and organized before 20th march.
3. All empirical analyses should be finished before 10th May.
4. First draft of the final thesis should be handed to the supervisor by the start of June.
5. Finished edition: 5th July.

7.0 References

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