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Master thesis

Hit or miss? - Do acquisitions create value for the acquiring company's shareholders?

A long-term event study on acquisitions performed by Swedish IT companies.

Abstract

In this paper, we investigate the long-term post-event stock return performance of companies operating in the IT sector and listed on NASDAQ Stockholm by using 78 mergers and acquisitions deals performed in the 2009 – 2013 period. We apply the event study methodology, focusing on the buy-and-hold abnormal returns approach. Stock return performance is analyzed in comparison to the Swedish general market index, as well as the Swedish technology index, and a set of control firms. The study finds different results depending on the method used; however, the only statistically significant result suggests that acquisitions destroy value for the acquiring company's shareholders, which is in line with the majority of previous research.

Keywords: mergers and acquisitions, long-term performance, event study, buy-and-hold abnormal returns.

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1. Introduction

The worldwide volume of mergers and acquisitions has been increasing lately. According to Bloomberg (2015), the total value of mergers and acquisitions deals increased by 47% between 2013 and 2014, from \$2.4 to \$3.5 trillion globally. This trend continued even during 2015, reaching a record year activity of \$4.3 trillion. 2016, in turn, was a turbulent year due to political upsets (e.g. Brexit vote, Trump's election), but global spending was still high, with the value of \$3.6 trillion (Bloomberg, 2016). This trend can be connected to globalization and the ongoing development of worldwide markets that have given companies access to new opportunities. At the same time, though, it has led to increased competition. In order to thrive and grow, many companies perform mergers and acquisitions, which affect shareholders, employees and customers daily all around the world. Thus, it is not surprising that mergers and acquisitions have been, and still are, studied extensively by both researchers and corporate management.

Much of the recent upward trend is driven by the technology industry, especially the IT sector. According to EY (2016), this sector experienced a whopping increase of 112% in its mergers and acquisitions activity in 2015 and the fourth quarter of the same year was the highest aggregate value quarter on record. The vast majority of the most relevant mergers and acquisitions, occurred globally in recent times, happened in the IT sector, such as Microsoft's acquisition of Skype, Facebook's acquisition of Instagram and WhatsApp and Hewlett-Packard's acquisition of Lenovo.

The increased activity of mergers deals is, nevertheless, somewhat surprising. According to long-term studies (e.g. Agrawal et al., 1992; Gregory, 1997; Loughran & Vijh, 1997; Rau & Vermaelen, 1998), acquisitions are, on average, value-destroying for the acquiring company's shareholders. This is controversial as, after all, companies are supposed to create value for their shareholders, which means that all strategic corporate decisions, such as mergers, should benefit them. Taking this into account, it is reasonable to ask oneself: is it possible that recent mergers and acquisitions have been, in fact, value-creating?

Research on how mergers and acquisitions affect long-term performance of acquiring companies has not focused on the upward-trending technology industry yet. An interesting aspect of the IT sector is that it is considered to be knowledge intensive. This means that the most important assets are often personal and professional know-how, opposed to more traditional companies, such as manufacturing companies, where key assets are mainly tangible

(Alvesson & Svenningsson, 2012). The current literature on mergers and acquisitions, performed in different countries and industries, shows that they are, on average, value-destroying; nevertheless, our hypothesis is that, in the technology sector, the immaterial nature of its key assets might contribute to value-creating mergers.

In this study, we investigate acquisitions performed by Swedish IT companies, by considering only deals where the acquiring firm ends up owning more than 50% of the target company. Our aim is to find out whether these strategic decisions create shareholder value. We focus on the Swedish market, since it has some interesting characteristics. According to Breman and Felländer (2014), the Swedish productivity growth has been particularly driven by the technology sector ever since 2006. For example, the IT sector stood for 42% of the growth between 2006 and 2013. In addition, the Swedish market has not been studied as much as, for example, the US market, where most of the long-term studies on post-merger performance come from. As these markets differ in various ways, for example in size and legislation, it is interesting to see whether there are differences also on post-merger performance. As we want to capture the latest trends, we focus on acquisitions performed after the latest financial crisis, during the 2009 – 2013 period. The results are then compared to the results of previous studies. The methodology adopted is a long-term event study, as suggested by previous research, focusing on the buy-and-hold abnormal returns approach, that captures investor experience.

Our goal is, thus, to contribute with new knowledge about mergers and acquisitions, by studying whether acquisitions performed by Swedish IT companies are value-creating or not. Our intention is, then, to suggest specific factors that could explain why certain mergers are successful while others fail.

The paper proceeds as follow. Section 2 discusses theory behind mergers and acquisitions. Section 3 presents event study methodology and previous research. Section 4 describes methodology and data selection. Section 5 discusses results and, finally, Section 6 draws conclusions.

2. Theory about Mergers and Acquisitions

There are two main types of mergers and acquisitions: mergers and consolidations. In a merger, two firms combine to form a single entity (Gaughan, 2007). The merged corporation goes out of existence and the acquiring company gets its assets and liabilities. A consolidation, instead,

is a legal consolidation of two or more companies into one new unit, where the original companies cease to exist and the original shareholders become shareholders in the new company (Gaughan, 2007; Kim et al., 2010).

In addition to these two definitions, the term takeover is also widely used. This is a vaguer term and it is mainly used for mergers where the acquiring firm purchases an entire company. Often takeover refers only to hostile transactions, while sometimes it is also used for describing friendly deals. Friendly takeovers are also known as acquisitions (Gaughan, 2007).

In practice, though, the difference between these distinctions is often blurred and the terms are used interchangeably (Gaughan, 2007; Arnold, 2008; Kim et al., 2010). One explanation to this is that it is often difficult to define the different characteristics of the deals that actually occur. According to Gaughan (2007), consolidation is often applied when the two companies are of similar size while merger is used when the companies differ in size. In addition, there might be differences between the actors' position of power, which makes the definition even more delicate. For example, even though in a consolidation the two parties are considered equal, there could be an acquiring party and an acquired party. In these kind of situations, the acquiring firm is often more dominant and ends up having more power in the new company (Arnold, 2008; Kim et al., 2010).

2.1. Motives behind Mergers and Acquisitions

Acquisitions are strategic decisions and, thus, motives behind these transactions are generally complex in nature and differ among deals (Trautwein, 1990). However, many researchers agree on that the main motive and rationale behind acquisitions are synergies (Damodaran, 2005; Weitzel & McCarthy, 2009; Kim et al., 2010). Damodaran (2005) defines synergy as the additional value created by combining two or several firms that is not available to the independently operating companies. According to Damodaran (2005), synergies can be categorized into two groups. Operating synergies include economies of scale, increasing pricing power, combination of different functional strengths and higher growth potential, which generally results in higher expected cash flows. Financial synergies, instead, include diversification, tax benefits, debt capacity and uses for excess cash, and show up either as higher cash flows or lower discount rates. Trautwein (1990) adds one more synergistic effect, named managerial synergies. It refers to a situation where the acquiring company's management is more competent, i.e. possesses superior planning and monitoring abilities than the acquired company's management. This creates an opportunity to increase the effectiveness

and growth potential of the target company. Berk and DeMarzo (2013) list motives behind mergers and acquisitions:

Economies of Scale and Scope – Economies of scale create a cost advantage that arises due to increased output. Economies of scope, in turn, create a cost advantage that is based on the production of complementary goods or services.

Vertical Integration – Companies can decrease risk by having control over the whole supply chain.

Expertise – Companies can get access to new expertise by acquiring entities that already possess the know-how that is missing.

Monopoly Gains – Gaining a bigger market share increases market power and, thus, weakens the competitors.

Efficiency Gains – Acquisitions usually create efficiency as the combined production uses less resources than the production of the independently operating companies. In other words, costs are reduced since it is possible to eliminate overlapping processes.

Operating Losses – Profitable firms can reduce their tax burdens by acquiring money-losing firms.

Diversification – Larger and more diversified companies are considered more stable. Thus, diversification decreases operational risk.

Earnings Growth – Companies can gain growth potential by acquiring high-growth firms.

According to Damodaran (2005), synergies are directly connected to the pricing of mergers and acquisitions as the acquiring firm values its target company based on synergistic effects. This explains why acquirers pay premiums to their target company.

2.2. Motives Connected to Management's Well-Being

While acquisitions are supposed to be beneficial for the acquiring company's shareholders, it is also important to highlight that mergers might lead to the so-called principal-agent problem, which describes the conflict between the company's management and shareholders (Jensen & Meckling, 1976). Managers are supposed to maximize shareholder value but, due to the separation of ownership and control, they might be tempted to maximize the value for themselves, which results in an agency cost. Therefore, the principal-agent problem is considered to be connected to mergers and acquisitions as they can be driven by management's

own well-being (Kim et al., 2010; Motis, 2007). Motis (2007) lifts up three motives behind acquisitions that are connected to management's well-being:

Empire building – The empire building hypothesis was first formulated by Mueller (1969). It refers to the managers' intention to increase the size of the organization they lead. The reason behind this might be that their salary is directly related to the size and complexity of the company they manage, and mergers and acquisitions are one of the fastest ways to increase the them. Harford and Li (2007) have studied empire building and found that the management's compensation increased after mergers and acquisitions, even though the transactions were not considered successful.

Hubris – Hubris as a merger rationale was first introduced by Roll (1986). Hubris refers to the management's overconfidence in their abilities. Managers of the acquiring firm might believe to be more competent than those of the acquired entity and end up overpaying for the target company. High premiums, in turn, result in loss for the acquiring company's shareholders (Motis, 2007). According to previous studies (Hayward & Hambrick, 1997; Craninckx & Huyghebaert, 2010), it is shown that hubris results in high premiums. According to Craninckx and Huyghebaert (2010), hubris might even increase management's aggressiveness.

Diversification – According to Motis (2007), managers are supposed to construct an optimal portfolio for the company. By diversifying this portfolio, the management can reduce risk and maximize expected returns. However, since managers have decisional power over the portfolio, they might, instead, choose to construct an optimal portfolio for themselves.

2.3. Unsuccessful Mergers and Acquisitions

According to several long-term studies (e.g. Agrawal et al., 1992; Gregory, 1997; Loughran & Vijh, 1997; Rau & Vermaelen, 1998), mergers and acquisitions are on average value-destroying for the acquiring company's shareholders. Definition of value-destroying or unsuccessful mergers varies. According to Sevenius (2011), an unsuccessful merger is a merger that does not live up to the goals set by the acquiring company prior to the acquisition. According to Bruner (2009), the benchmark for measuring post-merger performance is the return required by investors, i.e. return that the investors could have earned on other investment opportunities of similar risk. Thus, if the investment earns a rate that is equal to the required rate, the value is conserved and, similarly, if the rate is higher than the required rate, value is created and, if lower, the value is destroyed. In other words, mergers and acquisitions are successful if they do not destroy value. An unsuccessful deal has a negative effect on the

acquiring company. According to Bruner (2009), it can cause a decrease of market capitalization, financial instability, weakened position on the market, organizational vulnerability, impaired reputation and violation of moral norms.

3. Literature Review

3.1. Event Study Methodology

Analyzing behavior of stock returns following corporate events, such as acquisitions, has been a topic of many studies in financial economics. Event studies, introduced by Fama et al. (1969), produce useful evidence on how stock prices respond to information. In other words, event study methodology contributes to better understanding the effects of corporate behavior and decisions (Barber & Lyon, 1997; Campbell et al., 1997). This methodology is used extensively for measuring the impact of a specific event on asset prices both on short and long horizon. The point of interest is to test if post-event abnormal returns for sample firms are statistically different from zero. If they are confirmed to be non-zero, the market has either over-reacted or under-reacted to the event, as the security price differs from the underlying fundamentals. In other words, event studies are a way of testing market efficiency (Kothari & Warner, 2008). Therefore, post-acquisition stock returns performance is usually studied by applying this methodology.

An event study is considered to have a long horizon if it focuses on finding out how returns evolve over a long period, usually during one to five years, after a specific event. Short-term studies, in turn, are considered more reliable than long-term ones: as the time horizon grows, the company will most likely be affected by other factors than the acquisition. Therefore, it is more difficult to determine in what degree the evolution of a stock price is caused by the acquisition itself (Campbell et al., 1997; Kothari & Warner, 2008). Nevertheless, as mergers and acquisitions are often based on strategic decisions, it is logical to assume that there exist long-term gains. Thus, it is also important to analyze long-term effects of events on security price performance.

3.1.1. Models for Estimating Abnormal Returns

Assessing post-event performance, both on short and long term, is often based on measuring abnormal returns. There is considerable variation on how abnormal returns are measured and

statistically tested. One of the most commonly used model is the market model. Even though more sophisticated models have been developed, many researches still prefer to use it. Brown and Warner (1985) state that the market model yields similar results to those of more complex models. Campbell, Lo and MacKinlay (1997) also recommend the market model, arguing that the variance of abnormal returns is not reduced by using more sophisticated methods. According to Fama (1998), the market model is suitable for estimating the effect of company-specific events, such as mergers and acquisitions, because the estimation of abnormal returns does not constrain the cross-section of expected returns. This is due to the fact that expected returns estimated using the market model are conditional as they are given by the market return. The market model specifies the expected return of a specific firm in the following way:

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

where e_{it} is the residual return (abnormal return). When re-arranged, the abnormal return of a specific firm is given by:

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

Barber and Lyon (1997), in turn, recommend using the adjusted market model. Abnormal returns are calculated as a simple difference between the buy-and-hold return on a sample firm and the buy-and-hold return on a benchmark, such as reference portfolio (usually market index) or a control company. The adjusted market model is a simplified market model where alpha is equal to zero and beta is equal to one. Thus, the abnormal return of a specific firm is given by:

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

Another well-known model used for assessing long-term effects of mergers and acquisitions on stock returns is the Fama-French (1993) three-factor model. It is applied by regressing post-event monthly excess returns for a specific firm on a market factor, a size factor, and a book-to-market factor. This multifactor model can be expressed in the following way:

$$R_{(t)} - RF_{(t)} = \alpha + \beta_1 [RM_{(t)} - RF_{(t)}] + \beta_2 SMB_{(t)} + \beta_3 HML_{(t)} + e_{(t)}$$

where $R_{(t)} - RF_{(t)}$ is the portfolio's excess return, $RM_{(t)} - RF_{(t)}$ is the market's excess return, $SMB_{(t)}$ is the excess return of small minus big firms (given by market capitalization), $HML_{(t)}$ is the excess return of high book-to-market minus low book-to-market firms and $e_{(t)}$ is the error term. β_1 , β_2 and β_3 are estimated from the regression.

3.1.2. Models for Testing Long-Term Abnormal Returns

Most studies on long-term performance of acquiring companies use either the cumulative abnormal return method (CAR) or the buy-and-hold abnormal return method (BHAR) for testing post-event abnormal returns. According to Fama (1998), monthly abnormal returns can be summed. Thus, the CAR method can be presented in the following way:

$$CAR_{it} = \sum_{t=1}^{\tau} (R_{it} - E[R_{it}]) = \sum_{t=1}^{\tau} (AR_{it})$$

where CAR_{it} is the cumulative abnormal return for t periods, R_{it} is the return of a sample firm at time t and $E[R_{it}]$ is the expected return of a sample firm at time t .

The return for a buy-and-hold investment of a sample firm can be expressed in the following way:

$$BHAR_{it} = \prod_{t=1}^T (1 + AR_{it}) - 1$$

where $BHAR_{it}$ is the buy-and-hold abnormal return of a sample company over time period T .

To test the null hypothesis that the average cumulative or buy-and-hold abnormal return is equal to zero for the sample of n firms, a t-test is conducted, with the following test statistics that follow the Student's t-distribution:

$$t_{CAR} = \frac{\overline{CAR}_{it}}{\sigma_{CAR_{it}}/\sqrt{n}}$$

or

$$t_{BHAR} = \frac{\overline{BHAR}_{it}}{\sigma_{BHAR_{it}}/\sqrt{n}}$$

where \overline{CAR}_{it} and \overline{BHAR}_{it} are the sample averages and $\sigma_{CAR_{it}}$ and $\sigma_{BHAR_{it}}$ are the cross-sectional sample standard deviations of the abnormal returns for the sample of n firms (Barber & Lyon, 1997).

BHAR method has been strongly suggested and employed by several researchers (Barber & Lyon, 1997; Barber et al., 1999; Mitchell & Stafford, 2000; Kothari & Warner, 2008; Dutta & Jog, 2009). One explanation is that it is considered to cause less distortion than CAR method (Barber & Lyon, 1997; Kothari & Warner, 2008). Barber, Lyon and Tsai (1999) also add that

cumulative abnormal returns are biased predictors of buy-and-hold abnormal returns as they answer slightly different questions. Buy-and-hold-abnormal returns answer the question of whether sample firms yield abnormal stock returns over a particular time-horizon, while cumulative abnormal returns describe whether sample firms consistently earn abnormal returns.

According to Fama (1998), both CAR and BHAR methods can cause bad-model problem in long-term event studies. He argues for CAR method as the bad-model problem is more acute with BHAR method. Therefore, he states that formal inference should be based on averages or sums of short-term abnormal returns (AAR or CAR) rather than on buy-and-hold abnormal returns. The bad-model problem is caused by models for expected returns with incomplete descriptions. Different models for expected returns produce different estimates of long-term abnormal returns. The bad-model problem is more serious if long-term returns are used, as the errors in expected returns grow faster with the return horizon than their volatility.

According to Rosen (2006), the choice between CAR and BHAR methods is a trade-off between type 1 and type 2 errors. BHAR method gives power to the hypothesis testing but may lead to the rejection of too many null hypotheses (type 1 errors). CAR method, on the other hand, fails to measure all relevant information when individual events are aggregated. This weakens the power of hypothesis testing, leading to type 2 errors.

Kothari (2001), in turn, finds three different kinds of problems with long-term event studies: risk estimation, data problems and lack of a market theory of market inefficiency. Long-term studies require an appropriate adjustment for risk, whereas short-term ones do not since the effect is minimal. Adjustments for risk are tricky in long-term event studies and errors in risk adjustment (even small ones) can substantially influence the results. Data problems include survivor and data snooping biases, cross-correlation and skewness. Lack of a market theory of market inefficiency, in turn, refers to the lack of a well-developed theory that could explain market inefficiency detected by many researchers.

3.1.3. Benchmarks for Long-Term Stock Returns

An important part of measuring post-merger performance is benchmarking long-run stock returns as the choice of benchmark influence the results of the tests (Fama, 1998; Dutta & Jog, 2009). Despite the problems related to the choice of benchmark, they are still needed in order to isolate the effect of events on security price performance (Kothari & Warner, 1997). According to Barber and Lyon (1997), there are three different approaches for evaluating long-

term returns of sample firms: (i) return on a reference portfolio, such as an equally weighted market portfolio, used as benchmark, (ii) control firms that are matched to sample firms according to firm-specific characteristics (generally size and book-to-market ratio), and (iii) three-factor model by Fama and French (1993).

The reference portfolio approach uses a portfolio, such as the market portfolio (index), as a benchmark. A problem with using an index as benchmark is that it can lead to misspecified test statistics (empirical rejection rates exceed theoretical rejection rates). This, in turn, results in three observed biases: new listing bias, rebalancing bias and skewness bias (Barber & Lyon, 1997). First, new listing bias arises in event studies of long-term abnormal returns because sample firms usually have a long pre-event return record while the benchmark portfolio includes firms that have only recently begun trading and are known to underperform market averages (Barber & Lyon, 1997; Brav, 2000). Second, rebalancing bias arises because the compounded return on the benchmark portfolio typically assumes periodic rebalancing of the portfolio weights, while sample firms' returns are compounded without rebalancing (Barber & Lyon, 1997; Brav, 2000). Last, skewness bias arises because long-term abnormal returns are positively skewed, i.e. they have a right-skewed distribution (Barber & Lyon, 1997; Brav, 2000). Therefore, the Student's t-distribution is asymmetric with a mean smaller than the zero null (Brav, 2000).

Another widely used approach to assess long-term performance of acquiring companies is the control firm approach. According to Fama (1998), average stock returns are related to firm size and book-to-market ratio. Thus, cross-firm variation can be controlled for by estimating abnormal returns using the control firm approach. Matching on size produces different abnormal returns than matching on, for example, size and book-to-market ratio. Thus, the control firm approach does not solve the bad-model problem but it yields well-specified test statistics as it controls for new listing, rebalancing and skewness biases (Barber and Lyon, 1997). New listing bias is eliminated as both sample firms and control firms are listed during the event. Rebalancing bias disappears since the returns of both sample and control firms are calculated without rebalancing. Lastly, skewness bias is eliminated since both sample and control firms are equally likely to have large positive returns.

A third approach used by researchers to estimate post-merger stock performance is the Fama-French three-factor model. According to Barber and Lyon (1997), the advantage of this model is that it does not require size or book-to-market data for sample firms. However, it is only applicable when abnormal returns are calculated using CAR. In addition, it assumes that the

firm's market, size and book-to-market characteristics are stable over time and it requires at least five post-event observations.

Barber, Lyon and Tsai (1999) further discuss methods for testing long-term abnormal stock returns. They evaluate two general approaches to control for new listing, rebalancing and skewness biases. The first one is based on traditional event study framework and buy-and-hold abnormal returns while the second approach is based on calendar-time portfolios discussed by Fama (1998). A recent study by Jegadeesh and Karceski (2009) states that methods suggested by Barber, Lyon and Tsai (1999) are now commonly used in long-term event studies.

The first approach consists of two steps. The first step is to construct reference portfolios so that they are free from new listing and rebalancing biases. As a consequence, these portfolios have a mean abnormal return equal to zero and, therefore, the misspecification of test statistics is reduced. The second step consists of controlling for skewness, which is done by applying standard statistical methods recommended when the underlying distribution is positively skewed. Skewness can be controlled for by either using bootstrapped skewness-adjusted t-statistics or calculating empirical p-values from the simulated distribution of average long-run stock returns estimated from pseudo-portfolios (Barber et al., 1999).

Barber, Lyon and Tsai's (1999) second approach is based on calendar-time portfolios. There are two ways of calculating calendar-time abnormal returns for sample firms. The first model for calendar-time returns of a portfolio is based on the Fama-French three-factor model. The estimated intercept (α) denotes a test for the null hypothesis that the mean monthly excess return for that portfolio is zero. The second model, in turn, estimates mean monthly calendar-time abnormal returns. First, event-period abnormal returns for a portfolio are calculated. Then, mean abnormal returns (MAR_t) are calculated for each calendar month t , as given by the following formula:

$$MAR_t = \sum_{i=1}^{n_t} x_{it} AR_{it}$$

where n_t is the number of firms in the portfolio in month t and x_{it} describes the weight when abnormal returns are equally or value-weighted. The grand mean monthly abnormal returns $MMAR$ is then given by:

$$MMAR = \frac{1}{T} \sum_{t=1}^T MAR_t$$

where T is the total number of calendar months.

According to Barber, Lyon and Tsai (1999), the first approach based on a traditional event study framework and the calculation of BHAR suffers from two biases: cross-sectional dependence and bad-model of asset pricing. Cross-sectional dependence is caused by calendar clustering and overlapping return calculations. Calendar clustering results from sample firms sharing the same event date. Overlapping return calculations, in turn, are caused by firms that perform several acquisitions during the observation period (Barber et al., 1999; Antoniou et al., 2006). Failure to account for cross-correlation of sample firms affects inference; however, full solution to this problem is not available. Mitchell and Stafford (2000) suggest a correction procedure for cross-sectional dependence in buy-and-hold abnormal return test statistics. This is done by calculating “corrected” t-statistics with sample standard deviation that accounts for cross-dependence.

Calendar-time portfolios are suggested as possible remedies for misspecification. According to several researchers (Fama, 1998; Mitchell & Stafford, 2000; Dutta & Jog, 2009), there are a few advantages of the calendar-time portfolio approach over BHAR based approaches. Since portfolios are constructed with monthly calendar-time returns, all cross-correlations of event firms are automatically taken into account. In addition, monthly returns are less susceptible to the bad model problem and the distribution of calendar-time monthly returns is a better approximation for the normal distribution. Thus, the calendar-time approach is assumed to be more reliable than BHAR and have more power to identify evidence of abnormal performance (Mitchell & Stafford, 2000).

However, despite these advantages of the calendar-time portfolio approach, there are several researchers that still prefer BHAR methodology. Loughran and Ritter (2000), for example, argue that the calendar-time portfolio approach might fail to detect abnormal returns if they happen in months of high merger activity. In other words, abnormal performance averages over month of low and high event activity and, therefore, this approach might fail to detect abnormal returns. Barber, Lyon and Tsai (1999), instead, argue for BHAR methodology as it precisely represents investor experience. Mitchell and Stafford (2000), in turn, add that the calendar-time approach is robust to the most serious statistical problems and that the inferences from this approach are, actually, quite similar to those of the BHAR approach when it is modified for the positive cross-sectional dependence of event-firm abnormal returns.

3.1.4. Inefficiencies of Long-Term Event Studies

According to Barber, Lyon and Tsai (1999), a necessary condition for long-run abnormal returns is that the applied method yields well-specified test statistics in random samples, which, in turn, depends on the method used for calculating abnormal returns. Choosing the right model for estimating abnormal returns is, therefore, a step of fundamental importance as a wrong model causes errors (Fama, 1998; Kothari, 2001; Kothari & Warner, 2008). According to Fama (1998), the bad-model problem can be limited by using asset pricing models with firm-specific characteristics (e.g. market model). Thus, firm-specific expected return, i.e. stock's expected return, is estimated without constraining the cross-section of expected returns. Nevertheless, the bad-model problem can be limited, but not fully avoided (Fama, 1998).

Many recent studies on long-term post-event performance suggest market inefficiency, i.e. statistically significant abnormal returns opposed to zero abnormal returns suggested by market efficiency. Fama (1998) states that this is a result of long-term returns being sensitive to the way the tests are done. Thus, Fama (1998) lifts up another factor that needs to be taken into account when inference is made about market efficiency, named joint-hypothesis problem. As market efficiency per se is not testable, it must be jointly tested with a model for expected returns. Since all models show problems in describing average returns, precise inference about market efficiency is likely to remain impossible. In other words, tests of efficiency are always contaminated by bad-model problem.

Conventional t-statistics can be problematic in long-term event studies due to the assumption of normality, stationarity and independence of observations, while, in practice, stock returns are positively cross-correlated as all major corporate events, such as mergers and acquisitions, are not random. Instead, they are known as being cyclical and clustered in nature (Mitchell & Stafford, 2000; Jegadeesh & Karceski, 2009). Thus, conventional t-statistics can lead to misspecified t-test statistics. One suggested remedy is bootstrapping, as discussed by Fama (1998), Barber and Lyon (1999), Kothari and Warner (2008). However, bootstrapping has its disadvantages as it assumes that post-event sample firms' returns are independent and this results in misspecification (Mitchell & Stafford, 2000; Antoniou et al., 2006; Jegadeesh & Karceski, 2009).

To summarize, each approach has its advantages and disadvantages. The advantage of approaches based on a traditional event study framework and BHAR is that they yield an abnormal return measure that accurately represents investor experience; however, they are

more sensitive to the problem of cross-sectional dependence among sample firms and a poorly specified asset pricing model. The calendar-time portfolio approach, in turn, controls well for cross-dependence among sample firms and is less sensitive to a poorly specified asset pricing model; however, it does not measure precisely the return of an investor holding the security for a long post-event period (Barber et al., 1999).

3.2. Previous Research on Long-Term Post-Merger Performance

Most of the studies performed over the last 20 years on long-term post-acquisition performance (Gregory, 1997; Loughran & Vijh, 1997; Rau & Vermaelen, 1998; André et al., 2004) show negative abnormal returns for the acquiring company's shareholders.

Gregory (1997) studies 452 UK mergers over the 1984–1992 period. The main focus of his study is abnormal returns in the event-time approach, i.e. BHAR, but the calendar-time approach, i.e. Fama-French three-factor model, is also applied. The study addresses the issue of choosing the appropriate benchmark by using six different abnormal returns models: the first five models assume some form of CAPM while the sixth one assumes that returns are driven only by firm size. The results show that acquisitions are, on average, wealth reducing for acquiring companies while firm size and book-to-market values do not explain the negative post-event returns.

Loughran and Vijh (1997) study 947 US acquisitions during the 1970–1989 period. They measure five-year abnormal returns using matching stocks chosen to control for firm size and book-to-market effects. They find that post-event abnormal returns are related both to the mode of acquisition offer (negotiated deal or tender offer) and the form of payment (stock or cash). Results show that acquirers that make merger bids earn on average 15.9% less than matching firms while acquirers that make tender offers earn 43% more than matching firms. Stock acquirers, in turn, earn 24.2% less than matching firms, while cash acquirers earn 18.5% more than matching firms.

Rau and Vermaelen (1998) conduct a study on long-term post-merger performance of US deals. Their sample includes 3169 mergers and 348 tender offers from 1980 to 1991. They control for firm size and book-to-market. When adjusting for size and book-to-market ratios, merger bidders underperform their equally weighted control portfolios, while tender offers show a statistically significant abnormal return of +8.6%. When comparing value acquirers (high book-to-market companies) and glamour acquirers (low book-to-market companies), the results show that value acquirers earn significantly higher abnormal returns than glamour acquirers.

André, Kooli and L'Her (2004) take a look at long-term post-acquisition performance of 267 Canadian companies in the 1980–2000 period. In order to deal with cross-sectional dependence, they apply calendar-time portfolio approach. The benchmark is set to be reference portfolios formed based on firm size and book-to-market ratios. The authors find that Canadian acquirers underperform on average over the post-acquisition period.

Other few studies (Mitchell & Stafford, 2000; Dutta & Jog, 2009), instead, show no significant abnormal return for acquirers.

Mitchell and Stafford (2000) perform a long-term event study on mergers, seasoned equity offerings and share repurchases in the 1958–1993 period on the US market. In addition, they discuss the recent developments in the long-term event study methodology, focusing especially on the buy-and-hold abnormal return (BHAR) approach, as it is the most used method, when studying corporate events. They also introduce 'corrected' t-statistics that control for statistical problems present in the BHAR methodology. Abnormal returns are measured using both BHAR and calendar-time portfolio approach. When cross-sectional dependence is accounted for, they find very little evidence of long-term abnormal returns, contrary to many other studies.

Dutta and Jog (2009) investigate the post-acquisition stock return performance of Canadian firms over a three-year period. Data consist of 1300 deals in the 1993–2002 period and do not include acquiring firms operating in the financial sector. They apply both event-time and calendar-time approaches. The event-time approach follows the BHAR methodology; the expected returns of the acquiring firms is calculated by using a reference portfolio returns, such as market index return, and control firm returns, such as a matching firm based on firm size and book-to-market ratio. In the calendar-time approach, the authors calculate the monthly abnormal return by using the Fama-French three-factor model to estimate the intercept. Despite the stylized facts coming from US studies, the authors find that acquisition announcements result in a positive reaction of the Canadian market, followed by a counteraction within a short period of time. Therefore, it seems that acquisitions do not destroy value in Canada. The authors suggest that the different result between the American and Canadian market may be due to different mergers and acquisitions antitrust regulations: more precisely, the Canadian regulatory regime is less strict and developed than the American one.

A summary of the most relevant studies is presented in Table 1.

Table 1

Key studies on long-term post-merger performance (since 1997).

Study	Data	Investigation Period	Methodology	Results
Gregory (1997)	452 UK firms over 1984-1992	2 years	BHAR and calendar-time approaches (six models in total)	-11.8% to -18% statistically significant abnormal return depending on method used
Loughran & Vijh (1997)	947 US firms over 1970-1989	5 years	BHAR with size and book-to-market adjustments	-15.9% significant abnormal return
Rau & Vermaelen (1998)	3517 US deals over 1980-1991	3 years	CAR with size and book-to-market adjusted control portfolio	-4% significant abnormal return
André, Kooli & L'Her (2004)	267 Canadian firms over 1980-2000	3 years	calendar-time portfolio approach with Fama-French regression	significant underperformance on average
Mitchell & Stafford (2000)	2767 US firms over 1958-1993	3 years	BHAR and calendar-time portfolio approach	no significant abnormal return
Dutta & Jog (2009)	1300 Canadian deals over 1993-2002	3 years	BHAR and calendar-time portfolio approach	no significant abnormal return

4. Methodology and Data

4.1. Methodology

As discussed above, there are several suggested methods for long-term event studies. All of them have their advantages and disadvantages. As we are interested in finding out whether acquisitions are value-destroying for the acquiring company's shareholders over the long-run, we find that the buy-and-hold abnormal return method is the most appropriate method to apply, as it accounts for investor experience. This method has been used regularly by several researchers, such as Loughran and Vijh (1997), Mitchell and Stafford (2000) and Dutta and Jog (2009).

The adjusted market model is a widely-used model for the calculation of abnormal returns, as suggested by Barber and Lyon (1997). The market model, in turn, takes the cross-sectional

dimension into account and, thus, can result in a less severe bad-model problem. Due to these factors, we choose to apply both models for the estimation of abnormal returns.

As for the benchmark, our choice is based on previous studies performed using BHAR method. We choose to benchmark the acquiring companies' returns by using (i) reference portfolio returns, and (ii) control firm returns, as e.g. Dutta and Jog (2009).

Most of the previous studies have used an equally weighted portfolio, usually the market index, as a benchmark. Based on this, we apply this approach, so that we can compare our results with those of previous studies. In our case, the equally weighted portfolio is the NASDAQ OMX Stockholm 30 Index (OMXS30). Moreover, as our study focuses on the IT sector, we also choose to benchmark the performance of our sample companies to the NASDAQ Stockholm Technology Index, SX9000GI. Thus, we can analyze how the acquiring companies perform overall and, also, in comparison to the Swedish technology sector.

We also choose to apply the control firm approach as it controls for the three biases connected to the traditional reference portfolio approach, as discussed in the event study methodology section. Following previous studies (e.g. Mitchell & Stafford, 2000; Dutta & Jog, 2009), benchmark companies are chosen by size and book-to-market ratio. We first identify Swedish firms that have done acquisitions in the 2009 – 2013 period and exclude them, as well as firms operating in the financial sector. Then we proceed by measuring firm size and book-to-market ratio as suggested by Barber and Lyon (1997). Firm size is measured as the market capitalization, which corresponds to the market value of common equity, given by the number of shares outstanding multiplied by the closing price at the end of the year prior to acquisition. Book-to-market ratio is measured using the book value of common equity divided by the market value of common equity at the end of the year prior to acquisition. The matching is performed by first finding control firms with size ranging from 70% to 130% of the sample company's size. In case there are no control firms inside this interval, the three control firms with the closest size are chosen. Next, out of this interval group, the control firm with the closest book-to-market ratio is chosen as the matching firm for the sample company. This way, we do not only take the size of the acquiring firm into account but also whether the company is assumed to be a growth firm (low book-to-market) or a value firm (high book-to-market).

In sum, we test the following three models: (i) adjusted market model benchmarked to OMXS30 and SX9000GI, (ii) market model benchmarked to OMXS30, and (iii) control firm approach.

4.2. Data

Researchers have used different factors for determining which sample companies are included in their study. Based on previous studies and the focus of our study, we set certain restrictions on our sample population that are presented below:

- the acquiring company is registered on NASDAQ Stockholm;
- the acquiring company operates in the sector defined by Zephyr Database as Computer, IT and Internet services;
- the deal is defined as merger or acquisition on Zephyr Database;
- the acquisition is assumed completed on Zephyr Database;
- deals of any size are considered;
- the deal value is published on Zephyr Database;
- the acquirer's stake after the acquisition is at least 50% of the target company;
- sufficient stock return data must be available for the estimation of the applied models;
- sufficient accounting information must be available for the gathering of market capitalization and book-to-market values.

We choose to consider deals of any size, as e.g. Dutta and Jog (2009), in order to get a broad and realistic picture of the effect that acquisitions have on acquiring companies' post-event performance. Nevertheless, according to Gregory (1997), bigger acquisitions are of greater economic significance and worthy more attention. Therefore, in order to be able to evaluate the deal size, the deal value is to be known. Moreover, a minimum stake of 50% of the target company is considered so that the acquirer has control over the target company.

In addition to the criteria presented above, we also set restrictions on the time dimension. The choice of investigation period is an important part in long-term event studies as, when the time horizon grows, it becomes more difficult to connect the evolution of post-event stock prices to the acquisition. Thus, most long-term event studies on acquisitions span either over three years or five years, of which, the three-year period is more commonly used. Therefore, we choose to investigate stock return performance over the three-year post-event period starting from the effective date of completed deal, similar to several previous studies (e.g. Mitchell & Stafford, 2000; Dutta & Jog, 2009). An additional reason for this is that, by using three-year post-event observations, we can focus on more recent tendencies, as we can extend the sample period up to 2013. Since we are interested in the latest trends, acquisitions performed between January 1st 2009 and December 31st 2013 are used. As for the estimation period, that is used for

estimating the expected/normal returns in the market model, the most commonly used window spans from 12 to 6 months before the effective date of completed deal. This is assumed in order to exclude possible stock price distortions caused by insider information and other additional factors.

Information about our sample deals is obtained from Zephyr Database and stock market prices are collected from NASDAQ Stockholm and Thomson Reuters Database. Data used for the calculation of size and book-to-market ratios is collected from Thomson Reuters Database.

After taking the above criteria into account, our sample population consists of 78 acquisitions performed by Swedish IT companies listed on NASDAQ Stockholm over the period of 2009 – 2013. Table 2 shows the number of acquisitions by year, as well as the overall amount traded and the average deal. As for the deal value, only five transactions are worth less than 500.000 euros. If a firm makes acquisitions within three years of the effective date of the previous acquisition, the cases are considered overlapping. Otherwise, acquisitions are considered non-overlapping. Our data has 65 overlapping cases. A list of our sample deals is presented in Appendix A, whereas Appendix B presents size, book-to-market ratio and control firm's name of our sample companies.

Table 2

Description of our sample data.

YEAR	NUMBER OF DEALS	AMOUNT TRADED (IN €)	AVERAGE DEAL
2009	11	789,263,190	71,751,199
2010	21	439,092,870	20,909,184
2011	20	411,751,920	20,587,596
2012	15	2,911,796,030	194,119,735
2013	11	109,942,720	9,994,793
TOTAL	78	4,661,846,730	59,767,266

5. Results and Discussions

The results for long-term post-acquisition stock return performance obtained by applying the adjusted market model, market model and control firm approach are presented in Table 3.

Table 3

Buy-and-hold abnormal return and t-statistics.

Model	Average BHAR	Standard Deviation	t-statistics	p-value
Adjusted market model (OMXS30)	0.06	0.67	0.7493	0.4560
Adjusted market model (SX9000GI)	0.02	0.65	0.2369	0.8134
Market model	0.42	1.99	1.8706	0.0652
Control firm approach	-0.29	0.59	-4.3177	0.0000

The buy-and-hold abnormal return is calculated as the average of the compounded difference between the sample company's stock return and the benchmark's return over a three-year period starting after the effective month of acquisition, as e.g. Dutta and Jog (2009). BHAR values are expressed in decimals. T-statistics, standard deviation and p-values, calculated to investigate statistical significance at 10%, 5% and 1% levels, are also reported in the table.

The adjusted market model produces positive abnormal returns with both the general index and the technology index as benchmark. When benchmarked against the general index, OMXS30, the estimated abnormal return is 6%, while the technology index, SX9000GI, produces an abnormal return estimate of 2%. This difference can be explained by the different characteristics of the benchmarks employed: while the general index captures general tendencies in the stock market, the technology index, in turn, captures characteristics connected to the technology sector. On average, acquisitions seem to lead to positive abnormal returns for Swedish companies operating in the technology sector. Nevertheless, it is important to take into account that these abnormal returns are not statistically significant at either 10%, 5% or 1% significance levels. Compared to previous studies, these results are similar to those of Mitchell and Stafford (2000) and Dutta and Jog (2009).

The adjusted market model has been criticized for not taking the cross-sectional dimension into account, as discussed earlier. A suggested solution for this problem is the market model. In our case, the market model produces statistically insignificant positive abnormal returns at 1% and 5% significance level. However, the abnormal return estimate of 42% over the three-year period is significant at 10% significance level. It is important to note that this is an extremely high positive BHAR compared to the results given by the adjusted market model. One possible

explanation is that the estimation window used for estimating betas of our sample companies is close to the 2008 financial crisis, therefore the estimates might be different from the true long-run beta values. As a consequence, the resulting BHARs might be biased. In addition, it is worth mentioning that the market model is assumed to reduce the variance of abnormal returns and, thus, yield better results. In our case, though, the model actually increases the variance. It is possible that these results signal the bad-model problem, which, thus, should be taken into account when inference is made.

Both the adjusted market model and the market model yield positive buy-and-hold abnormal returns, which is consistent with our hypothesis. These results seem to suggest that acquisitions performed by Swedish companies operating in the IT sector are value-creating deals for the acquiring company's shareholders. This could be explained, for example, by synergistic effects, that were discussed in the theory section above. However, it is worth mentioning again that these results are statistically insignificant and, thus, are not statistically reliable. In addition, these two models can suffer from new listing, rebalancing and skewness biases, which impact the inference made from these results.

The third model, the control firm approach, is applied in order to control for the three biases connected to the portfolio approach and, thus, to improve the inference. This model produces an average abnormal return estimate equal to -29%, that is also statistically significant at all of the significance levels. Nevertheless, it is worth mentioning that the t-statistics seem to differ significantly from the values of the other models. The t-statistics are calculated by applying the general formula $t_{BHAR} = \frac{\overline{BHAR}_{it}}{\sigma_{BHAR_{it}}/\sqrt{n}}$, as mentioned earlier. Therefore, its negative value, equal to -4.3177, comes from the negative estimate of average BHAR, since the denominator (the standard deviation divided by the square root of the number of sample firms) is positive. The negative estimate of BHAR is similar to several previous studies (e.g. Gregory, 1997; Loughran & Vijh, 1997; Rau & Vermaelen, 1998; André et al., 2004). This result might, thus, indicate that either acquisitions do not create synergies or acquiring companies fail to gain from synergies. The acquiring companies might even pay too high a price for the synergistic effects and, thus, the acquisition ends up being value-destroying, rather than creating value for the acquiring company's shareholders. Another explanation could be that the motives behind these acquisitions are connected to management's well-being. However, as the data consists of overlapping cases, it is important to take into account that our sample might be affected by cross-sectional dependence. In addition, previous research has shown that the choice of

matching principles may also influence the results. In both our study and the majority of existing literature, matching is based on size and book-to-market ratios, which means that sector and industry characteristics are ignored. This approach is also more sensitive to company-specific characteristics than the portfolio approach, which can distort the results. For example, if the control firm experiences some problems in the distribution chain or quality, this affects the company negatively and results in declining stock price. This can, in turn, result in positive abnormal returns of the matched company that are, however, not connected to the acquisition. These are, therefore, factors that need to be taken into account when making inference based on the control firm approach.

All in all, we find that the three models applied produce results that differ from each other quite significantly. This is in line with previous research discussed earlier that indicates that the choice of benchmark can influence the results. These results, therefore, seem to emphasize the importance of choosing both the right model and benchmark. Nevertheless, it is important to keep in mind that neither the bad-model problem, joint-hypothesis problem nor cross-sectional dependence can be fully avoided. Even though more advanced models have been developed, the majority of studies is still performed using the adjusted market model with an equally weighted market portfolio as benchmark. The control firm approach, which is rather simple to execute and is considered to result in better inference, is only applied in a fraction of previous studies.

6. Conclusions

In this study, we examine, whether acquiring companies operating in the Swedish IT sector create long-term value for their shareholders. The sample consists of 78 acquisitions over the 2009 – 2013 period, that is characterized by high activity on the mergers and acquisitions market. The long-term performance of our sample companies is measured using event study methodology and, as the study focuses on shareholder value, buy-and-hold abnormal return approach is applied.

The results show that, as in many previous studies, abnormal returns are affected by both the applied model and benchmark. The adjusted market model and market model produce positive buy-and-hold abnormal returns, that are, nevertheless, statistically insignificant. The control firm approach, in turn, yields statistically significant negative returns for the acquiring

company's shareholders, which is in line with the majority of previous studies. This is interesting as Sweden is a smaller market than, for example, USA or UK, and this might cause more variation in stock returns, as the Swedish trading activity does not reach as high numbers as the American and British markets do. Nevertheless, it seems that trends are similar in Sweden, despite the differences between the markets. Therefore, it would be interesting to expand the research over other sectors and markets, and see whether this kind of a trend also exists on larger scale.

All in all, our hypothesis, that the recent high numbers of mergers and acquisitions performed on the Swedish IT sector could be explained by value-creating deals, is not supported by the data. On the contrary, it seems that the acquiring companies included in the sample are destroying shareholder value. Thus, the latest upward mergers and acquisitions trend on the Swedish IT sector cannot be explained by value-creation. This is somewhat controversial, as a firm's fundamental objective is to create value for its shareholders. A possible explanation to this controversy could be that it takes time before acquisitions start creating value for the acquiring company. Perhaps, they become profitable later on and the three-year investigation period, used in both this study and the majority of previous research, does not capture the value-creation. Thus, it would be interesting to perform this kind of a study using a longer investigation period. Other explanations to value-destruction could be, simply, that the acquiring companies fail to profit from acquisitions or they pay too high a price for the synergistic effects. Therefore, it would also be of interest to investigate why acquisitions end up destroying value.

In addition, long-term event study methodology can suffer from several problems (e.g. bad-model problem, joint-hypothesis problem, cross-sectional dependence) that lead to unreliable inference. Lately, several improved methods have been suggested to control for these problems. Thus, one recommendation for possible future studies is to apply the latest improved approaches to see if they yield similar results in comparison to the most commonly used standard methods. As our sample is probably affected by cross-sectional dependence caused by overlapping cases, it would be highly interesting to see how the corrected t-statistics related to the control firm approach suggested by Mitchell and Stafford (2000) would affect the results.

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Databases

NASDAQ Stockholm

Thomson Reuters Datastream

Zephyr Database

Appendix A

Our sample data of 78 mergers and acquisitions performed by Swedish IT companies.

Acquiring company	Target company	Date of Completed Deal	Deal value (€)
ACANDO AB	ABEO AS	14/09/2009	8,447,270
ADDNODE AB	DECERNO AB	30/11/2010	15,875,230
ADDNODE AB	STRAND INTERCONNECT AB	30/01/2009	3,590,270
ADDNODE AB	CADI OY	02/07/2010	2,009,450
ADDNODE AB	RAVALIK OY	15/08/2010	2,000,000
ADDNODE AB	JOINT COLLABORATION AS	30/08/2013	23,551,520
ALLTELE ALLMANNA SVENSKA TELEFON AB	TIMEPIECE SERVICOS DE CONSULTORIA LDA'S	27/03/2013	29,945,130
ALLTELE ALLMANNA SVENSKA TELEFON AB	VENTELO SVERIGE AB	30/08/2011	8,154,310
ALLTELE ALLMANNA SVENSKA TELEFON AB	BLIXTVIK AB	01/02/2013	2,778,110
ALLTELE ALLMANNA SVENSKA TELEFON AB	SPINBOX AB	29/04/2012	1,685,380
ALLTELE ALLMANNA SVENSKA TELEFON AB	PERFECT COMMUNICATION AB'S EPHONE BRAND	25/01/2011	1,203,690
ALLTELE ALLMANNA SVENSKA TELEFON AB	KRAMNET I KRAMFORS AB	06/10/2011	983,380
ALLTELE ALLMANNA SVENSKA TELEFON AB	LANDNCALL AB	21/06/2010	314,260
ANOTO GROUP AB	DEVELOPIQ LTD	02/05/2013	2,126,390
ANOTO GROUP AB	DESTINY WIRELESS LTD	31/08/2011	1,690,590
ANOTO GROUP AB	UBIQUITOUS SYSTEMS LTD	11/01/2012	1,454,700
BEIJER ELECTRONICS AB	QSI CORPORATION	22/10/2010	25,134,980
BEIJER ELECTRONICS AB	WESTERMO DATA COMMUNICATIONS AB	04/01/2010	21,011,350
BETSSON AB	NORDIC GAMING GROUP LTD	20/06/2012	85,000,000
BETSSON AB	TRANSVECTIO LTD	19/04/2012	65,000,000
BETSSON AB	ARTIC INVEST AS	15/06/2011	61,600,000

CAPERIO HOLDING AB	CRUX HOLDING AB	29/12/2010	4,461,470
CAPERIO HOLDING AB	PLATTFORM IT AB	01/04/2009	1,403,790
CAPERIO HOLDING AB	SANVALUE AB	01/07/2011	872,250
DGC ONE AB	BRADATA MCP AB	18/02/2013	4,499,460
DGC ONE AB	TELENOVA AB	13/05/2009	470,190
DGC ONE AB	NAB SOLUTIONS AB'S BUSINESS SOFTWARE DIVISION	20/12/2010	188,470
DORO AB	ISIDOR SAS	03/07/2013	2,000,000
DORO AB	BIRDY TECHNOLOGY SAS	13/08/2011	1,890,000
DORO AB	PRYLOS SAS	11/07/2011	1,350,000
FORMPIPE SOFTWARE AB	TRAEN HOLDING A/S	31/07/2012	35,889,390
FORMPIPE SOFTWARE AB	EFS TECHNOLOGY A/S	02/08/2009	5,689,500
HEXAGON AB	INTERGRAPH CORPORATION	08/07/2012	1,729,218,750
HIQ INTERNATIONAL AB	TSG-TEST SOLUTIONS OY	26/06/2010	5,750,000
HIQ INTERNATIONAL AB	FRENDS TECHNOLOGY OY	05/11/2010	3,500,000
HIQ INTERNATIONAL AB	MOBILEYES AB	10/07/2009	2,727,310
HIQ INTERNATIONAL AB	ACE SIMULATION AB	15/02/2010	2,223,760
HMS NETWORKS AB	IXXAT AUTOMATION GMBH	30/01/2013	32,000,000
IMAGE SYSTEMS AB	REMACONTROL SWEDEN AB	11/01/2012	6,235,430
KNOWIT AB	NET RESULT INTERNATIONAL AB	15/09/2010	19,046,870
KNOWIT AB	ENDERO OY	07/12/2011	9,418,880
KNOWIT AB	REAKTOR AS	29/05/2010	5,714,480
KNOWIT AB	HELIKOPTER SYSTEMUTVECKLING AB	02/07/2010	3,539,960
LOOMIS AB	EFFECTIVOX SA	14/03/2012	20,300,000
LOOMIS AB	OREGON ARMORED SERVICE INC.	28/12/2013	4,147,290
LOOMIS AB	AGENCY of SECURITY FENIX CIT AS	01/10/2010	1,849,670

ONIVA ONLINE GROUP EUROPE AB	SERVAGE AB	30/06/2013	3,567,600
PEAB AB	SAAB AUTOMOBILE PROPERTY AB	07/07/2011	28,021,820
PREVAS AB	ZETIQ DEVELOPMENT AB	04/04/2012	3,014,950
PREVAS AB	AUTSYDE AB	01/09/2012	2,401,650
PREVAS AB	EMFILA SOFTWARE AB	13/10/2010	1,295,450
PREVAS AB	OPTILUTION AB	13/06/2009	928,770
PROACT IT GROUP AB	DATABASEMENT BV	11/01/2011	14,000,000
PROACT IT GROUP AB	B2NET LTD	08/04/2011	13,693,880
PROACT IT GROUP AB	STORYFLEX AS	20/10/2012	1,400,290
REJLERKONCERNEN AB	RÅBE INDUSTRIKONSULT AB	01/10/2010	7,890,460
SAAB AB	SENSIS CORPORATION	15/08/2011	136,624,760
SAAB AB	HITT NV	27/08/2012	17,415,000
SEAMLESS DISTRIBUTION AB	LETTELE SIA	27/10/2011	1,102,660
SECTRA AB	BURNBANK SYSTEMS LTD	06/06/2012	9,881,090
SOFTRONIC AB	MODUL 1 DATA AB	09/03/2011	8,756,300
SOFTRONIC AB	YARROW CONSULTING AB	18/12/2009	2,391,740
SOFTRONIC AB	ENTER SYSTEM AB	04/01/2010	469,090
SOFTRONIC AB	M ENTERPRISE SOLUTIONS AND HOSTING AB	23/02/2009	133,400
TELEFONAKTIEBOLAGET LM ERICSSON AB	TELCORDIA TECHNOLOGIES INC.	12/01/2012	904,899,400
TELEFONAKTIEBOLAGET LM ERICSSON AB	NORTEL NETWORKS LIMITED'S CDMA BUSINESS AND LTE ACCESS ASSETS	13/11/2009	761,179,320
TELEFONAKTIEBOLAGET LM ERICSSON AB	LG NORTEL CO., LTD	30/06/2010	197,213,060
TELEFONAKTIEBOLAGET LM ERICSSON AB	NORTEL NETWORKS CORPORATION'S NORTH AMERICAN GSM/GSM-R BUSINESS	31/03/2010	76,415,190
TELEFONAKTIEBOLAGET LM ERICSSON AB	NORTEL NETWORKS CORPORATION'S GLOBAL MULTI SERVICE SWITCH BUSINESS	11/03/2011	47,094,910
TELEFONAKTIEBOLAGET LM ERICSSON AB	GUANGDONG NORTEL TELECOMMUNICATIONS	12/05/2011	35,184,270

EQUIPMENT CO., LTD'S CERTAIN
ASSETS

TELEFONAKTIEBOLAGET LM ERICSSON AB	TECHNICOLOR SA'S BROADCASTING SERVICES DIVISION IN THE NETHERLANDS	03/07/2012	28,000,000
TRELLEBORG AB	MACDERMID OFFSET PRINTING BLANKETS	02/04/2010	43,189,670
TRELLEBORG AB	WATTS TYRES LTD	04/02/2011	26,060,000
TRELLEBORG AB	UNNAMED SPECIALTY TYRE OPERATION IN XINGTAI	17/02/2011	11,483,300
WISE GROUP AB	TALENTUM HR AB	22/12/2013	3,108,240
WISE GROUP AB	NETSURVEY BOLINDER AB	15/06/2011	2,566,920
WISE GROUP AB	K2 SEARCH AB	06/07/2009	2,301,630
VITEC SOFTWARE GROUP AB	IT-MAKERIET AS	05/07/2013	2,218,980

Appendix B

Size, book-to-market ratio and control firm name of our sample companies.

Acquiring company	Size (th €) on Dec 31st 2008	Book-to-market ratio on Dec 31st 2008	Control firm
ACANDO AB	775,470	1.0511	GHP SPECIALTY CARE
ADDNODE AB	472,450	0.8030	AROS QUALITY GROUP
ALLTELE ALLMANNA SVENSKA TELEFON AB	98,880	1.4013	ARCAM 'B'
ANOTO GROUP AB	232,740	0.4765	KABE HUSVAGNAR 'B'
BEIJER ELECTRONICS AB	460,350	1.5578	BTS GROUP
BETSSON AB	2,338,160	3.2484	KAPPAHL AB
CAPERIO HOLDING AB	6,780	0.1311	MSC GROUP AB
DGC ONE AB	199,640	2.1052	ODD MOLLY INTL.
DORO AB	78,340	2.6113	C-RAD 'B'
FORMPIPE SOFTWARE AB	102,100	0.9541	ARCAM 'B'
HEXAGON AB	9,615,500	0.8042	HOLMEN 'B'
HIQ INTERNATIONAL AB	1,083,710	1.8816	BIOINVENT INTL.
HMS NETWORKS AB	607,870	2.7496	BIOGAIA 'B'
IMAGE SYSTEMS AB*	21,200	-0.5287	G5 ENTERTAINMENT
KNOWIT AB	245,470	0.5489	KABE HUSVAGNAR 'B'
LOOMIS AB	3,409,580	1.1457	REZIDOR HOTEL GROUP
ONIVA ONLINE GROUP EUROPE AB	128,270	0.6353	TETHYS OIL
PEAB AB	5,411,810	0.8496	SAS AB
PREVAS AB	180,950	0.9984	MALMBERGS ELEKTRISKA
PROACT IT GROUP AB	307,470	1.9654	SENSYS GATSO
REJLERKONCERNEN AB	441,986	1.8995	SENSYS GATSO
SAAB AB	7,428,560	0.8040	ICA GRUPPEN AB
SEAMLESS DISTRIBUTION AB	21,350	2.2403	G5 ENTERTAINMENT
SECTRA AB	1,197,750	1.9992	FAGERHULT
SOFTRONIC AB	235,790	1.4647	RAYSEARCH LABS. 'B'
TELEFONAKTIEBOLAGET LM ERICSSON AB	175,494,000	1.2462	SKANSKA 'B'
TRELLEBORG AB	3,897,320	0.3839	NCC 'B'
WISE GROUP AB	23,610	0.5914	FINGERPRINT CARDS 'B'
VITEC SOFTWARE GROUP AB	70,370	1.3170	G5 ENTERTAINMENT

* IMAGE SYSTEMS AB has a negative book-to-market ratio since its book value of equity is negative on Dec 31st 2008.