Master's thesis in Finance Stockholm School of Economics

# Privately held firms: A study of relative valuation in the Nordic region 1998-2005

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#### Abstract

The notion that a closely held company all other things equal should attract a lower valuation compared to its publicly traded peers is widely accepted among both valuation professionals and academics. Limited marketability, lack of diversification for major shareholders and the monitoring benefits of public stock markets are some potential determinants of this discrepancy. This thesis provides a detailed description of the theories relevant to the private company discount and in addition presents an empirical study on the Nordic market. For a sample of 78 transactions of privately held firms between 1998 and 2005, we estimate a median discount of 8.9 percent based on the enterprise value-to-sales multiple and 4.5 percent based on the enterprise value-to-EBIT multiple, results that are not statistically significant. The data exhibits a trend of decreasing discounts over time, which we suggest could be due to the proliferation of organised private equity. A regression framework used indicates that the probability of a discount could be related to the size of the company and its risk of financial distress.

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# 1. Introduction

Appraising the value of privately held businesses is a pivotal and often challenging task for financial professionals. Private equity fund managers and other investors in the private market continuously monitor public market valuations as well as relevant transactions of non-traded and as well traded firms in order to form a view on the appropriateness of alternative routes of exit. Although private equity<sup>1</sup> characteristically differs from public equity across a number of dimensions – marketability of securities, financial reporting requirements and regulatory costs to name a few – standard valuation textbooks the likes of Copeland et al. (2000) pays little or no attention to this distinction. Furthermore, a number of methodological difficulties arise when analysing private equities, such as the lack of observable market prices for the company itself as well as other private companies, which makes the estimation of input risk parameters a complex and subjective exercise. The CAPM assumption of perfect diversification appears for example to be in disharmony with the fact that owners of private companies.<sup>2</sup>

All other things equal, conventional wisdom has it that private companies should trade at a discount to their listed peers, primarily due to the absence of a ready market offering liquidity for the shares of the company. This *discount for lack of marketability* ('DLM') is generally adjusted for among practitioners either by deducting an appropriate percentage of the derived market value or by adding an illiquidity 'soft factor' to the applicable cost of capital,<sup>3</sup> which is used in conjunction with standard valuation practices such as discounted cash flow valuation. The quantum of the DLM for private firms is a question which has received substantial attention both in an extensive body of professional appraisal literature<sup>4</sup> and, to a lesser degree, by the academic community.

Although the concept of liquidity impairment has gained a high degree of acceptance, its application and estimation remains a controversy:

- Differences in value driver characteristics (e.g. long-term growth, capital intensity and through-thecycle margins) between private and public companies complicate the DLM estimation.
- Controlling interests in private companies are associated with a premium, which some studies have found to be correlated with the DLM.<sup>5</sup>

<sup>&</sup>lt;sup>1</sup> The terms 'private equity', 'privately held companies', 'closely held companies' will be used interchangeably in this thesis referring to non-listed companies in a broader sense, not exclusively encompassing what Fenn et al. (1995) terms 'the organised private equity', i.e. buy-out firms and venture capitalists.

<sup>&</sup>lt;sup>2</sup> Moskowitz and Vissing-Jørgensen (2002), Müller (2004).

 $<sup>^{3}</sup>$  In a survey by Petersen et al. (2005) of valuation methodologies for private companies among Danish private equity investors and investment bankers, 19 of the 39 respondents claimed to use the discount approach and 23 the risk premium approach – which indicates that the methods are commonly used and often in combination.

<sup>&</sup>lt;sup>4</sup> Mainly purposed to advance the methodologies accepted for liquidity discounting of private businesses for tax purposes, an overview is provided by Pratt et al. (2000).

<sup>&</sup>lt;sup>5</sup> See for example Philips and Freeman (1999), Nath (1997), Pratt et al. (2000).

The tremendous expansion of the organised private equity market in recent years has considerably increased the liquidity and professionalism of private equity markets – in Europe the volume of private equity and venture capital investments increased by a multiple of seven from 1995 to 2005 and amounted to EUR 38.5bn in 2005.<sup>6</sup>

In the light of the above considerations, it may no longer be obvious that the cross-section of public equity should trade at a premium.

The purpose of this thesis is to provide an overview of the contemporary theory and research in this field of study, an addition to performing a study on the valuation of private companies, using the widespread technique of comparables. In the thesis, we relate purchase prices to accounting data for a sample of 78 transactions of closely held companies in the Nordic region between January 1999 and April 2005, and compare these multiples to a concurrent set of comparable listed companies' multiples. Our ambition is to address the following questions:

- 1. Are there significant differences in valuation between privately held and publicly traded companies?
- 2. Have valuations evened out over time as a result of a higher degree of professionalism in private market mergers & acquisitions ('M&A') and credit expansion?
- 3. How is the likelihood of a firm selling at a discount or premium related to its characteristics?

The results will help in expanding the knowledge of private equity market valuation over the past few years and complement previous research in the field, which to the authors' knowledge have focused on other markets, applied different methodologies and/or used a sample containing smaller transactions.

The thesis is structured in the following manner:

- Section 2 outlines some of the current trends and characteristics of private equity markets, to form a backdrop for subsequent analysis.
- Section 3 provides the theoretical framework, highlighting the trade-off benefits of being private versus publicly traded.
- Section 4 summarises relevant previous empirical research relating to the private company discount.
- Section 5 presents the hypotheses to be addressed.
- Section 6 gives an overview of the data used and its sources.
- Section 7 describes the methodology used and the model specification in the cross-sectional analysis.
- Section 8 contains summaries of results obtained.
- Section 9 recapitulates the main conclusions of the analysis.
- Section 10 discusses suggestions for further research.

<sup>&</sup>lt;sup>6</sup> EVCA (2006).

## 2. Characteristics and trends of the private equity markets

In terms of aggregate market capitalisation, non-public equity is at least equivalent in magnitude to public according to studies on the U.S. market.<sup>7</sup> The proportion of private equity value is most likely higher in continental Europe, with traditionally weaker public equity markets for smaller firms and relatively more large corporations held privately. The sheer size of private equity makes it worthwhile studying, yet financial research efforts have so far mostly been devoted to publicly traded equity.

In recent years there has however emerged a literature focusing on the risk and return characteristics of private equity markets. This literature can be partitioned into two rather distinct strings, the first focusing on intermediated private equity,<sup>8</sup> i.e. investments of professional private equity funds, whereas the second string of research deals with entrepreneurial finance.<sup>9</sup> The literature generally corroborates the *private equity premium puzzle* due to Moskowitz and Vissing-Jørgensen (2002), referring to the fact that households invest substantial amounts of their wealth in privately held companies seemingly without being compensated for the higher idiosyncratic risk exposure incurred. The estimated expected returns of private equity are no higher in their sample than the public equity index returns during the sample period, which is remarkable given the higher risk of a single private investment. The volatility of a typical private investment might be as high as 50 percent, which is strikingly high considering that entrepreneurs on average invest 40-60 percent of their net worth in their companies.<sup>10</sup> Some of the possible explanations offered by Moskowitz and Vissing-Jørgensen are significant nonpecuniary benefits, a preference for return skewness and an overoptimistic view on the probability of success.

For private equity fund investments the results obtained are more mixed, for example Kaplan and Schoar (2005) find no evidence of returns in excess of the S&P 500 in a large sample of U.S. data between 1970 and 2001. The returns are however very heterogeneous across different funds in the sample and are furthermore persistent, i.e. a historically successful investor is ex ante more likely to outperform in the future.

According to Berger and Udell (1998), smaller private companies' main sources of finance are the principal owner, commercial banks and trade credit (70.1 percent of total funding). Due to their informational opaqueness, smaller firms' dominant source of external finance is bank debt (with the exception of high-growth young companies for which agency problems may be more prevalent).

<sup>&</sup>lt;sup>7</sup> Moskowitz and Vissing-Jørgensen (2002) estimate the total value of public and private equity to be similar in magnitude (with public market value falling short across most of the sample period 1989-1998), using data from the Survey of Consumer Finances and selected national accounts. We are not aware of any similar studies based on European data, however we would suspect the relative importance of private equity to be greater for most of the European markets, considering that private firms have been found to be far more likely to undergo an IPO in the U.S. (for example by LaPorta, Lopez-de-Silanes, Shleifer and Vishny (1997)).

<sup>&</sup>lt;sup>8</sup> See for example Gompers and Lerner (1997), Kaplan and Schoar (2005) and Ljungqvist and Richardson (2003).

<sup>&</sup>lt;sup>9</sup> See for example Hamilton (2000), Moskowitz and Vissing-Jørgensen (2002).

<sup>&</sup>lt;sup>10</sup> Heaton and Lucas (2000).

In terms of M&A activity, privately held companies constitutes a large and increasing share of total market volume. Ang and Kohers (2001) estimate that the take-over volume of private companies exceeded 22,000 in the U.S. during the period 1984 to 1996, while the corresponding number of public market transactions was more than 8,000. Using a British data set of acquisitions between 1981 and 2001, Draper and Paudyal (2006) estimate that over 88 percent of targets and 55 percent of acquirers were not listed. Not only the size of the market for not listed equity but also its growth trajectory makes it worthwhile studying. Alongside the prosperity of private equity M&A, generational change is another important driver of the current growth. In Sweden, NUTEK (2004) estimates that as many as 45,000 to 50,000 Swedish companies can be classified as belonging to a generational change risk group, which corresponds to 13 percent of the total number of SMEs. This is a far-flung pattern in developing countries with similar succession issues observed in the North America, Europe and parts of Asia, and may have substantial effects considering that as much as 85 percent of European companies are family businesses.<sup>11</sup>

Another noticeable trend is the large number of publicly traded companies that go private. This trend has been especially marked in the U.S. where the Sarbanes-Oxley act's auditing and reporting requirements has played part in the IPO slowdown and caused record-breaking volumes of public-to-private deals.<sup>12</sup> A plethora of new regulation are also affecting listed European companies; some examples include the implementation of IFRS, the European Union's adoption of the Eight Company Law Directive for auditing consistency across the region and the new Swedish corporate governance code. Mainly smaller companies find coping with the new requirements too costly, although over the past years the activity in large-size public-to-private transactions have increased.

This tendency is very probable to continue as buy-out funds are increasingly entering the public domain and target larger public investments, on the back of larger fund sizes<sup>13</sup> and joint efforts becoming more common. Buy-out funds are also increasingly taking minority or convertible positions in listed companies<sup>14</sup> ('PIPE'), for example Blackstone's purchase of 4.5 percent in Deutsche Telekom in April 2006, <sup>15</sup> and listing funds on the public market to raise a permanent pool of money, such as KKR's USD 5bn float on the Euronext in May 2006.<sup>16</sup> Considering the parallel development of the traditionally illiquidity-shy hedge funds increasingly

<sup>&</sup>lt;sup>11</sup> Pictet (2003).

<sup>&</sup>lt;sup>12</sup> According to the American Shareholders Association (2006) approximately 191 public companies have gone private since the inception of the SOX in 2002 (the total dollar value of deals has not increased since the transactions are smaller on average) and annual regulatory costs surged from 4.8 percent of market capitalisation in 1999 to 9.9 percent in 2002.

<sup>&</sup>lt;sup>13</sup> Private Equity Intelligence (2006) reports that global private equity fundraising amounted to USD 150bn during the first half of 2006, excluding the new record-breaking funds of Permira (GBP 7.6bn; June 2006) and Blackstone (USD 15.6bn; July 2006).

<sup>&</sup>lt;sup>14</sup> Private investment in public equity. The motives are to enable certain acquisitions, to obtain a first-mover advantage for access to divestitures of non-core assets, to serve as a basis for a future full takeover or to simply broaden investment scope, according to Harper and Schneider (2004).

<sup>&</sup>lt;sup>15</sup> The Deal (2006)

<sup>&</sup>lt;sup>16</sup> International Tax Review (2006)

investing in privately held companies (now about 6-7 percent of total assets under management), <sup>17</sup> there is a clear trend towards increased convergence between private equity funds and other alternative asset managers. The emergence of 'blended' funds could potentially change the structure of equity markets and affect the valuation of liquidity.

The traditional view of buy-out companies as 'corporate raiders' that frequently engage in hostile takeovers may also be in need of a revision. The theory of a market for corporate control, which regards takeovers to be a disciplinary device to oust underperforming management teams, is one of widespread acceptance in the academic community. Yet, today hostile takeovers represent a minor fraction of total M&A volumes<sup>18</sup> and incumbent management teams often join as equity partners in a MBO arrangement, with the benefits of both increased flexibility and the prospects of substantial capital gains. It may simply no longer be obvious that management teams of quoted companies seek to build empires and entrench themselves in the light of the extraordinary gains made by management teams in private equity exits recently.<sup>19</sup>

<sup>&</sup>lt;sup>17</sup> Financial Times (2006).

<sup>&</sup>lt;sup>18</sup> Rossi and Volpin (2002) report that hostile takeovers never exceed the 6.46 percent observed in the U.S. in their sample of M&A activity in 49 countries. In the Nordics, the non-friendly fraction is much larger in Norway (5.86 percent) and Sweden (3.74) compared to Denmark (0.81 percent) and Finland (0.91).

<sup>&</sup>lt;sup>19</sup> A Swedish example is Com Hem CEO Gunnar Asp, whose 3 percent stake earned him SEK 315 million when the company was divested in December 2005, two and a half years after being hired, according to Dagens Industri (2005).

# 3. Theoretical foundations

The theory of the private company discount has been progressed in a number of research strands – to name a few: studies of IPO determinants, liquidity, acquisitions of public versus private companies, organised private equity and going private decisions. Although the studies have had different perspectives and ambitions, the fundamental question relevant to this thesis is whether private companies on average have intrinsic values that are below their market capitalisation, or vice versa. As mentioned above, standard asset pricing theories does not make such distinction of closely held and publicly traded entities. In this section, theories of why this view may be incomplete are presented in three groups: the benefits of a listing, the costs of a listing and characteristic differences (summarised in table I).

Benefits of a listing	Costs of a listing	Characteristic differences
Liquidity	Control reduction	Smaller private company bidders
Access to capital markets	Information asymmetry	Lack of financial information
Diversification	Administrative costs	Differing operating characteristics
Monitoring	Potential for high leverage	
Exploit 'windows of opportunity'	Release of sensitive information	
Investor recognition	Market pressure	
Customer and employee goodwill		

Table I. Summary of theories relevant to the private company discount concept

## 3.1. Benefits of a stock market listing

## 3.1.1. Liquidity

A standard definition of liquidity is how quickly and readily investors can convert an asset into cash without incurring considerable transaction costs or price concessions.<sup>20</sup> All other things equal, investors tend to price liquidity as an extended period of marketing will expose them to price changes and cause opportunity costs due to foregone investments with higher returns, in addition to the transaction costs, which can be dire if a ready market is not available. For private companies, restricted marketability is imperative as the number of prospective buyers is often limited and the transaction costs often considerable.

Amihud and Mendelson (1986) suggest that the price of an asset reflects the present value of expected future transaction costs. They model the bid-ask spread as the measure of transaction costs and the discount for illiquidity is a function of expected investor holding periods (the shorter, the higher the discount) and turnover (the more often, the higher discount). Vayanos (1998) argues that the effect of transaction costs is more limited than Amihud and Mendelson suggest, as investors tend to adapt their holding periods in response to changes in transaction prices (sometimes even to the extent that higher transaction prices can lead to *higher* asset prices). Other types of liquidity studies have found evidence that not only the absolute levels of illiquidity, but also its systematic risk is related to asset pricing. Acharya and Pedersen (2005) find that 80 percent of the average 1.1 percent annualised risk premium associated with illiquid stocks is

<sup>&</sup>lt;sup>20</sup> Bajaj, Denis, Ferris and Sarin (2001).

determined by the covariance between a stock's illiquidity with the market's return and illiquidity. Pástor and Stambaugh (2003) document an incremental return of 7.5 percent for companies whose liquidity exhibits a high sensitivity to market gyrations.<sup>21</sup>

Marketability can also be viewed as an option, for a hypothetical investor with perfect market timing ability.<sup>22</sup> Longstaff (1995) uses option pricing theory to derive an upper bound<sup>23</sup> for the value of liquidity under such assumptions. The cost of illiquidity is then the difference in present value between the selling price at the end of the period of restricted marketability and the peak selling price, and hence the illiquidity discount is related to restriction period and standard deviation of returns. Another conclusion from Longstaff's analysis is that DLMs can be large even if the restriction period is limited in time.

LaPray (2002) introduces the concept of *hypothecation impairment* as a component in the marketability discount. It represents an opportunity cost for investors in non-marketable securities caused by the fact that the shares in publicly traded companies are generally accepted as collateral while those of private companies are not.

Some of the factors which potentially could explain the size of marketability discounts put forth by researchers are:<sup>24</sup>

- 1. Uncertainty of asset value. Sansing (1999) develops a model of valuation discounts and concludes that heterogeneous preferences among investors regarding the value of the asset increases the discount demanded. According to Bajaj et al. (2001), the higher the uncertainty the more significant is the opportunity cost of illiquidity borne by investors.
- 2. *Prevalence of substitute investments*. If there are many similar investments, trading activity is often increased and consequently the liquidity is higher.
- 3. *Duration of marketability restriction*. Following Longstaff's conclusion, the expected DLM should be a function of the restriction horizon.
- 4. *Liquidity of assets.* Firms with substantial cash holdings or assets that are readily marketable (e.g. real estate, public equity investment companies) should have a lower discount. DeAngelo et al. (2002) showed in a case study of L.A. Gear that asset liquidity provides management with time to potentially perform a turnaround under adverse circumstances.
- 5. *Likelihood of future IPO*. In cases where the company fulfils the requirement for a public listing (adequate market timing, quality of financial reporting and corporate governance etc.), the discount should be smaller.

<sup>&</sup>lt;sup>21</sup> Damodaran (2002) suggests that marketability discounts may be correlated to market liquidity and that firms tend to go public when liquidity spreads are high.

<sup>&</sup>lt;sup>22</sup> I.e. the ability to predict at what point the security price reaches its maximum.

<sup>&</sup>lt;sup>23</sup> Because the hypothetical investor in question is a perfect market timer.

<sup>&</sup>lt;sup>24</sup> Based on the discussion in Bajaj et al. (2001) and Damodaran (2002).

6. *Size.* Larger private firms should have smaller discounts than other firms, for example because they could more easily obtain other types of external financing such as issuing publicly traded bonds.

Shareholders in quoted companies not only have a liquidity advantage with respect to trades intermediated in the stock market, but studies have also shown that the sales processes of these companies involve a larger number of competing bids and often more opaque sales processes.<sup>25</sup>

#### 3.1.2. Access to capital markets

A distinct advantage of a public listing is the increased access to capital markets. Providing access to the primary equity capital is one of the main functions of the public equity markets, and a quotation allows a company to raise larger amounts of external capital more cheaply and more quickly. Something that renders moot this factor as an explanation of private company discounts is that some researchers have found evidence that firms that go public on average actually *decrease* their levels of capital expenditures.<sup>26</sup> This is not supportive of the idea that growth companies turn to the public markets to fund investment opportunities ahead.

Debt financing might also be readily available for the more transparent listed company. Rajan (1992) develops a model in which companies who release more information to the public lower their cost of capital, due to their strengthened bargaining position relative to lenders, who previously enjoyed rents due to their possession of privileged information. Pagano et al. (1998) provide evidence that IPO companies lower their cost of capital by studying a sample of Italian companies; their results are both statistically and economically significant.

Having a liquid secondary market also enables making acquisitions using stock as the method of payment. The flexibility to potentially use the stocks as 'currency' is cited as the primary reason for IPOs in Brau and Fawcett's (2006) survey of CFOs regarding decision-making in the IPO process. Helwege and Packer (2003) argue that a public stock price serves as an objective estimate of firm value, which is useful in fulfilling contracts such as share-financed M&A and investments in venture capital.

#### 3.1.3. Diversification

The scope for diversification is another important benefit of a listing and can be performed both directly (shareholders relocate parts of their holding to alternative investments) or indirectly (company raises equity to invest in other entities). In the absence of diversification, shareholders of closely held companies will tend to price idiosyncratic risk to a higher extent, which will cause a private company discount. Pagano (1993) argues that entrepreneurs will seek to list publicly if their portfolios will be sufficiently diversified post-IPO, and that

<sup>&</sup>lt;sup>25</sup> Bradley, Kim and Desai (1988), Officer (2005).

<sup>&</sup>lt;sup>26</sup> Pagano, Panetta and Zingales (1998), Loughran et al. (1994).

these decisions ultimately will explain the differences in stock market evolution across countries. Bodnaruk et al. (2005) study a sample consisting of all Swedish IPOs between 1995 and 2001 and find that the degree of portfolio diversification of the controlling shareholders is positively related to the IPO probability as well as the magnitude of underpricing. The illiquidity discount may also be a function of the level of diversification, Kahl et al. (2003) document that an entrepreneur with a five-year restriction of his holding which represents 50 percent of his total wealth would prefer selling immediately at a discount of 20-70 percent.

Increased diversification may also serve to increase pricing. According to Pagano (1993), a company that goes public adds to the variety and supply of stocks in the market and consequently also increases the level of diversification attainable by other investors – resulting in higher demand for the stock.

Zingales (1995) presents a theory where the entrepreneur seeks to sell the entire firm. By listing the company, the entrepreneur changes the proportions of cash flow rights and control rights. If the market for control is not perfectly competitive, the incumbent will extract parts of the bidders cash flow surplus due to a free riding problem created by the ownership in the dispersed stock market which enables a higher bid premium.<sup>27</sup> The IPO consequently changes the ownership structure in order to maximise the seller's total proceeds.

#### 3.1.4. Monitoring

Another advantage of being listed is the monitoring role played by stock markets, which has two mechanisms. Firstly, a listed company is exposed to the market for corporate control and can be subject to a takeover. If management is replaced upon a takeover, there should be a clear disciplinary effect which reduces agency costs. Secondly, the stock price provides valuable information which could serve as basis for managerial compensation packages in the forms of stock options or stocks. According to Holmström and Tirole (1993) concentrated ownership reduces the information content of stock prices by reducing liquidity, which renders the monitoring less effective. The monitoring function of public markets can also serve to eliminate overmonitoring, which Pagano and Röell (1998) argue could occur in a private company with many owners which is about to undertake an investment of large proportions. In such a situation, these excess agency costs could exceed the IPO costs which entails that a listing would be optimal.

#### 3.1.5. Exploit 'windows of opportunity'

Ritter (1991) suggests that there are periods of higher IPO activity when privately held companies perceive their listed industry peers to be overvalued and seize the opportunity. Already having the organisational form of a listed company, a company can in a similar vein conduct a seasoned equity offering ('SEO'). Loughran and Ritter (1997) find evidence that suggests that companies that do SEOs underperform concurrent market

<sup>&</sup>lt;sup>27</sup> Rydqvist and Högholm (1995) present data that support this theory by showing that 35 percent of the Swedish IPOs that took place in the 1980s are taken over within a period of five years of listing.

returns and have a deteriorating operating performance. While a listed company could potentially time the market, other researchers emphasise the timing freedom of owners of private companies. Ang and Kohers (2001) argue that private companies do not have the pressure from uninformed external investors (further discussed below in section 3.2.2). and therefore have the opportunity to wait for an optimal timing of the divestment.

#### 3.1.6. Investor recognition

Having a listing on a stock market could serve as an advertisement for the company, and expand the knowledge of the company among prospective investors which were simply not aware of the company or ignored its existence. Merton's (1987) incomplete information model indicates that share prices should be higher in equilibrium the more investors are aware of the securities. Subrahmanyam and Titman (1999) stress the role of serendipitous information, i.e. valuable information gathered without intent in the investor's everyday activities. If the company has a quoted stock price, the serendipitous information will be reflected in the stock price more efficiently.

## 3.1.7. Product market and employee goodwill

A further advantage of being a listed company is the strengthened image of the company from the perspective of groups other than investors. Not only management can be offered stock options, nowadays ESOPs targeting broader groups of employees are commonplace in many industries.

## 3.2. Costs of a stock market listing

## 3.2.1. Control reduction

The most often cited cost of a public quotation is the loss of control. Closely held companies are often controlled by a family or a group of investors which reduce the potential agency conflicts. The theoretical value of control can be regarded as the difference in value of the company when run by an 'optimal' management team compared to the incumbent one.<sup>28</sup> Management teams in privately held companies have the opportunity to take substantial equity stakes, which reduces agency problems due to the separation of ownership and control (Berle and Means, 1932; Jensen and Meckling, 1976) by improving efforts and reducing the consumption of perquisites by internalising the expropriation costs. A problem which can however arise in closely held companies is the above described overmonitoring in the case of a limited number of shareholders. Wolfenzon, Nagar and Petroni (2003) show empirically that the operational performance of private companies is U-shaped in the ownership of the largest shareholders, i.e. sub-optimal when the dominating shareholder is medium-sized. These firms may have the problems of a controlling shareholder too small to internalise expropriation and an ownership structure which lacks the diversity to

<sup>&</sup>lt;sup>28</sup> Damodaran (2005b).

prevent excess monitoring. Family owners have been found to have larger benefits of control compared to companies owned by corporations, e.g. subsidiaries.<sup>29</sup>

The notion that private companies enjoy control benefits is widely accepted among practitioners. In Brau and Faucett's (2006) survey, the CFOs rank maintaining decision-making control as the main reason to remain private. Empirical evidence also bears out the value of control. For example, Boehmer and Ljungqvist (2004) show that privately held firms with a large controlling shareholder are considerably less likely to go public. Numerous studies also document the control premia paid in acquisitions of publicly traded companies, generally consistent with the range of 20-30 percent of Jarrell and Poulsen (1989).

The private company form of organisation does not necessarily entail more effectiveness in many circumstances. Coles et al. (2003) find that the CEO turnover of closely held companies is no more sensitive to changes in profitability than what are public firms.

Among business appraisal professionals there is a strong consensus that the illiquidity discount applied should be greater for minority stakes in private companies<sup>30</sup>, due to the difficulty of marketing such positions and the higher risk of minority expropriation in non-listed entities.

#### 3.2.2. Information asymmetry

Another issue is caused by the fact that management is generally more informed about the intrinsic value of the company compared to the investors. In the event of a tender offer for the company falling short of this value, this may be problematic for the management as it is under pressure to convince the outside shareholders about the company's true worth. The company may also be reluctant to raise equity if the stock price is trading at a bargain to fundamental value, which could result in positive-NPV projects missed.<sup>31</sup> According to Leland and Pyle (1977), the asymmetric information causes an adverse selection problem in IPOs, which results in lower-quality companies going to the market. This problem is more acute for young growth companies than it is for older, more mature companies with documented revenue and earnings histories.<sup>32</sup> The asymmetric information may also limit the benefits of diversification, as entrepreneurs can be forced to maintain a substantial shareholding to 'put their money where their mouth is'.<sup>33</sup>

Boot et al. (2006) present a model in which an entrepreneur balances private versus public ownership as a trade-off between lower cost of capital and managerial autonomy (ability to make decisions that go against the

<sup>&</sup>lt;sup>29</sup> Burkart, Panuzi and Shleifer (2003) is a recent example.

<sup>&</sup>lt;sup>30</sup> Please refer to appendix D which contains Pratt's (2004) levels of value model which is an example of a framework to analyse illiquidity and minority discounts.

<sup>&</sup>lt;sup>31</sup> Myers and Majluf (1984).

<sup>&</sup>lt;sup>32</sup> Chemmanur and Fulghieri (1999).

<sup>&</sup>lt;sup>33</sup> Bill Gates and Microsoft is one example of this phenomenon. When Gates announced his intention to withdraw from day-to-day routines at Microsoft, he pointed out that he was not leaving the company and that he was proud to remain the company's largest shareholder (AFX, 2006).

investors' agreement). An outcome of their analysis is that when companies go public due to perceived undervaluation, the cause could be the potential for disagreement with external investors rather than just heterogeneous views.

#### 3.2.3. Administrative costs

Listed companies face substantial administrative costs. An IPO process involves substantial costs incurred, including not only direct fees to investment bankers, lawyers, auditors and other consultants (translators, investor relations specialists, public relations specialists etc.) but also the costs for underpricing, regulatory and market fees and opportunity costs for management time spent. According to DeAngelo et al. (1984), the company in addition faces ongoing costs as a listed company, including registration and listing fees etc. to market regulators, expenses for financial reporting and filing of proxy statements, the stock exchange's listing fees and the costs of investor relations activities etc. However, as noted by Morgenstern and Nealis (2004) many private companies choose voluntarily to comply with some of the requirements to satisfy claimholders. As many LBOs typically involve public debt or other forms of sophisticated lending, the de facto savings are lower than one would expect.

#### 3.2.4. Potential for high leverage

A private company could have a gearing which might be viewed as inappropriately aggressive for a listed company. Leverage creates a decision-making constraint which might reduce excessive investment and sharpen operational performance, a well-documented phenomenon in academic literature.<sup>34</sup> Some theories for the benefits of LBOs that have been advanced are the reduction of free cash flow available to management for empire building and perquisite consumption (Jensen 1986, 1989) and incentive realignment between managers and shareholders. One proof of the benefits of leverage for private firms is Busaba et al. (2001), who show that IPOs launched by high-leverage firms are more likely to be pulled.

#### 3.2.5. Release of sensitive information

Another pitfall of being listed is the fact that sensitive information may need to be disclosed, in areas such as research and development and marketing. Campbell (1979) and Yosha (1995) point out that this may cause companies in need of confidentiality in these areas to deter capital markets. Maksimovic and Pichler (2001) show that pioneering firms that are financed publicly have lower variance of returns, which could be due to investors releasing proprietary information to potential industry entrants that causes the industry's ROI to drop.

<sup>&</sup>lt;sup>34</sup> See for example Lehn and Poulsen (1988).

## 3.2.6. Market pressure

The importance of short-term earnings performance of the 'street' is another disadvantage of the public domain according to some industrialists. According to Stein (1988), the short-termism can be detrimental if managers need to focus excessively on quarterly results to avoid takeover attempts. The dividend preference of some public investors might also be a problem, if the payout level leads to underinvestment.

## 3.3. Characteristic differences

## 3.3.1. Smaller private company bidders

According to several studies, buyers of private companies are on average smaller companies. The fact that they are less prestigious may prevent empire building which could lead to more efficient buying activities.<sup>35</sup> Officer (2005) makes the point that smaller targets are easier and less costly to integrate.

## 3.3.2. Differing attributes and limited financial information

Private companies may have different operational characteristics and generally disclose relatively sparse financial information. According to Chang (1998), this could lead to information costs for potential acquirers and eventually a less competitive market for private companies.

<sup>&</sup>lt;sup>35</sup> Draper and Paudyal (2006).

# 4. Previous empirical research

The vagueness of the lack-of-marketability concept, let aside the challenges of estimating the size of the discrepancy, has spurred the development of a number of different approaches in the academic community. Generally, five different methodologies for determining marketability company discounts can be identified:<sup>36</sup> the restricted stock approach, the IPO approach, the acquisition multiples approach, the venture capital discount approach and the options approach.

## 4.1. Restricted stock studies

The restricted stock approach compares the price of quoted stocks with issues of common stock of the same firm whose marketability is limited by resale covenants, i.e. restricted stock. Ceteris paribus, the difference in price should reflect the illiquidity discount required by investors.

Silber (1991) was a seminal paper in this field of study and uses a sample of 69 firms who issued shares in private placements under the SEC's rule 144 between 1981 and 1988. He reports that the privately placed stocks sold at an average discount of 33.8 percent. However, dividing into two sub-samples containing reported discounts of more and less than 35 percent reveals that the results may be distorted; the average company of the latter group was both larger and more profitable. Other restricted stock studies often cited are Wruck (1989) and Hertzel and Smith (1993), which present estimates of 17.6 percent and 13.5 percent respectively. Notably, Hertzel and Smith find evidence of informational costs associated with the liquidity discount. Investors may demand compensation for the increased monitoring it can be expected to provide, while the firm may obtain a favourable stock price reaction partly due to the monitoring and also a positive signalling effect. According to Hertzel and Smith there is a higher representation of firms with a smaller proportion of tangible assets, which are engaged in speculative development of products in new areas and which are in a situation of financial distress in the sample of firms placing equity privately, i.e. supportive of high monitoring costs.

Bajaj, Denis, Ferris and Sarin (2001) is the most recent academic study based on restricted stock, and uses 88 observations between 1990 and 1995. Bajaj et al. estimate a 22.2 percent average full-sample discount, but point out the sizeable difference between the 14.0 percent registered placement mean and the 28.1 percent unregistered sub-sample counterpart.<sup>37</sup> To isolate the lack-of-marketability effect, the authors factor out extraneous effects in a multivariate regression, controlling for which a modest 7.2 percent compensation conceded to private placement investors is detected.

<sup>&</sup>lt;sup>36</sup> Other methodologies that have been used are for example proportional bid-ask spreads (Chipalkatti, 2001) and delisting event studies (Abbott, 2003). This section only describes studies that relate to the issue of marketability of privately held stock, as this is the main focus of our study – although we recognise that the private company discounts reflect a number of other factors.

<sup>&</sup>lt;sup>37</sup> The issuing firms in their sample are predominately operating in technology sectors and most trade in the over-the-counter market, indicating that the information asymmetries detected by Hertzel and Smith should prevail in the sample.

The main methodological problem of restricted stock studies is that the discount captures a number of factors<sup>38</sup> other than the liquidity discount. Counterparties in this market are often very large, long-term profile institutional investors which may not require deep discounts to purchase the issue. Furthermore, most of the placements represent very small fractions of the investors' aggregate wealth which implies that idiosyncratic risk should not be of any great concern. Recent innovations in derivatives markets such as equity swaps and zero-cost collars also allow investors to effectively liquidise their holdings.

Empirical study	Publication year	Sample period	Transactions	Mean discount (%)
SEC	1971	1966-1969	388	25.8
Trout	1977	1968-1972	60	33.5
Hertzel and Smith <sup>a</sup>	1993	1980-1987	106	20.1
Silber	1991	1981-1988	69	33.8
Johnson	1999	1991-1995	70	20.0
FMV Opinions Inc.	2001	1980-1997	230	22.3
Bajaj, Denis, Ferris and Sarin	2001	1990-1995	88	22.2

Table II. Summary of marketability discounts from restricted stock studies

<sup>a</sup> Full-sample, not controlling for any other effects.

## 4.2. Pre-IPO transactions

This approach compares prices of initial public offerings to prior stock transactions when the firm was not quoted.<sup>39</sup> Emory has published a series of studies, the latest using 543 observations from 1980 to 2000 indicating an average marketability discount of 46 percent (Emory et al., 2002). The study uses data from transactions which occurred no more than five months before the IPO and include option transactions. The estimated discounts from Emory's studies have ranged from a high of 60 percent to a low of 42 percent.

As noted by Bajaj (2002), there are several severe limitations that render this approach questionable from a methodological perspective. Firstly, the discounts are too large to be reasonable ex ante illiquidity discounts required by investors.<sup>40</sup> Secondly, the transactions are generally not arm's length as the typical buyers are insiders, such as venture capitalists and corporate management, which purchase shares at a substantial discount for management compensation. Thirdly, the procedure does not take into account the probability of an IPO failure, hence introducing a substantial selection bias since investors are likely to price this rather considerable risk and data will only be observable if the firm goes public.<sup>41</sup>

<sup>&</sup>lt;sup>38</sup> Feldman (2004), Kania (2001).

<sup>&</sup>lt;sup>39</sup> These transactions prices need to be registered with the United States Securities and Exchange Commission and are hence readily available.

<sup>&</sup>lt;sup>40</sup> Bajaj (2002) notes that a 45 percent discount translates to an 82 percent return for a semi-annual holding period, which in turn corresponds to an incremental annualized rate of return of 231 percent – clearly a large figure.

<sup>&</sup>lt;sup>41</sup> As a point of reference, Cochrane (2005) estimates the probability of an IPO for fourth-stage VC rounds to 31 percent, and also notes that IPO mean log returns are higher for IPOs (81%) than returns to a new round or acquisition (51%).

## 4.3. Acquisition multiples

In these studies the price discrepancy between closely held and publicly traded firms is estimated by comparing private transaction accounting multiples to trading or transaction multiples of public peers in the same line of business.

## 4.3.1. Comparable transaction multiples

Koeplin, Sarin and Shapiro<sup>42</sup> (2000) is the most frequently quoted study that implements the acquisition approach. They use a sample of 192 acquisitions of private companies between 1984 and 1998 from the SDC database, 82 of which were U.S. transactions. Only acquisitions when a controlling interest was achieved by the buyer are included in the sample. To match the firms with comparable public transactions, Koeplin identify acquisitions made in the same year and country. Comparables are also matched industrywise by using transactions in the same 4-digit SIC-code.<sup>43</sup> When several acquisitions were identified in the same industry the comparable firm closest in size, as measured by sales, was used. Koeplin use four different enterprise value multiples, namely EBIT, EBITDA, sales and book value of the sum of shareholder's equity and interest-bearing debt.

	Private t	Private targets		argets	Discount (%)	
	Mean	Median	Mean	Median	Mean	Median
Panel A: U.S. transactions						
Enterprise Value/EBIT	11.76	8.58	16.39	12.37	28.26**	30.62***
Enterprise Value/Sales	1.35	1.13	1.32	1.14	-2.28	0.79
Panel B: Foreign transactions						
Enterprise Value/EBIT	16.26	11.37	28.97	12.09	43.87***	5.96
Enterprise Value/Sales	2.63	1.35	4.59	1.63	42.70	17.18

Table III: Koeplin, Sarin and Shapiro (2000) acquisition discount estimates

\*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively.

The results of the Koeplin study are exhibited in table III. Private companies on average sold at a lower valuation than quoted, consistent across all ratios. Earnings-based multiples produced more pronounced results for domestic companies. The statistical significance of the discounts holds even when controlling for size and growth divergences using cross-sectional multivariate regression analysis.

Another acquisition approach study is Kooli, Kortas and L'Her (2003).<sup>44</sup> Their research extends the Koeplin methodology by using reference portfolios of public firm acquisitions for a sample of 331 U.S. deals between 1995 and 2002, based on data from the DoneDeals and SDC databases. To the extent possible, the authors attempt to match reference portfolios industry-, time- and sizewise to each private acquisition, but whenever year or industry requirements are not met requirements are relaxed.

<sup>&</sup>lt;sup>42</sup> Hereinafter Koeplin.

<sup>&</sup>lt;sup>43</sup> 13% of comparables do however not conform to this requirement.

<sup>&</sup>lt;sup>44</sup> Hereinafter Kooli.

	Private targets	Public targets	Discount (%)
	Median multiple	Median multiple	Median
Price/Sales	1.4	1.6	17**
Price/Earnings	15.3	24.4	34***
Price/Cash flow	11.2	15.1	20*

Table IV. Kooli	, Kortas and	L'Her (2003)	acquisition	discount estimat
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\*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively.

Table IV displays the results from the Kooli study. In our view, a flaw in their approach is the use of equity prices rather than enterprise values, which as a measure puts the companies' capital structures on equal footing. The authors also estimate a cross-sectional regression which includes year, industry, assets and price to shareholders' equity variables. Controlling for these, Kooli estimates a 15.5 percent discount for lack of marketability. They also provide evidence that the DLM varies more due to growth than to size and conclude that high-growth private firms tend to exhibit low marketability discounts.

Officer (2005) is the only study which uses portfolios of both trading prices and transactions to construct the reference portfolios. The data set is sizeable as it covers the time period 1979 to 2003 and is equivalently to the two aforementioned studies based on SDC transaction data. Officer identifies traded peers using industry (2-digit SIC) and size (±20 percent of book assets) to obtain industry multiples for each of the 607 private transactions. The results show that private acquisitions actually took place at a premium to trading multiples, approximately 15 percent for stand-alone companies and 3 percent for unlisted subsidiaries (medians). When instead using public transactions to form reference portfolios, the premiums turn into discounts of 21 percent for stand-alone companies and 34 percent for unlisted subsidiaries.

	Trading multir Stand-alone	oles, discount (%)	Transaction multip	oles, discount (%)
	(median)	Subsidiary (median)	Stand-alone (median)	Subsidiary (median)
Enterprise value/EBITDA	-7.59*	8.04	17.59***	28.21***
Enterprise Value/Sales	-13.13***	9.29**	18.67***	41.52***
Average <sup>a</sup>	-15.09***	-3.14***	20.65**	34.05***

Table V.	Officer	(2005)	acquisition	discount	estimates
rable v.	Onicer	(200)	acquisition	uiscount	countaico

\*\*\*, \*\*, and \* denote significance at the 1%, 5%, and 10% levels, respectively (two-sided Wilcoxon).

<sup>a</sup> Average of Book/Market (equity), P/E, EV/EBITDA and EV/Sales.

## 4.3.2. Comparable trading multiples

Rijken, Booij and Buckley<sup>45</sup> (1999) preceded Koeplin in the use of accounting multiples to derive marketability discounts. Their approach could however not be described as a pure acquisition approach, due to their use of trading multiples rather than transaction multiples for quoted companies. Rijken group their 1991 to 1997 sample of United Kingdom private companies from the Acquisitions Monthly publication into 15 sub-portfolios based on size and compare these to 25 public company portfolios. The authors estimate a

<sup>&</sup>lt;sup>45</sup> Hereinafter Rijken

40 percent average raw discount, but controlling for size the valuation disparity diminishes to a range of 16 percent to 6 percent for transactions between sizes GBP 0.5 million to GBP 55 million, with an average of 10. Interestingly, size seems to have a very robust impact on valuations and the regression slopes of the privately and publicly held companies are closely matched.<sup>46</sup> The authors interpret the 10 percent size-adjusted discount as being comparable to the 8 percent IPO discount of Ritter (1987), and note that when adding a control premium per DeAngelo et al. (1984) of 30 percent (considering that the listed share prices represent typically non-controlling stakes), the estimate of an average size-adjusted discount approximates Silber's (1991) 34 percent. Although this reasoning is in our opinion somewhat ad-hoc, the paper provides strong evidence of a relation between the DLM and size. The inclusion of a very large number of small firms in the sample, the arbitrary exclusion of large public portfolios and the application of multiples (mix of leading and trailing, not unlevered) are however some caveats.

In a study that implements a similar methodology, Andersson and Norinder (2004) analyse the size-adjusted liquidity premia on the Swedish market based on data from a Förvärv & Fusioner special report of 1997. They create 22 portfolios for the 130 publicly traded companies and 14 for the 85 private companies. The regressions of size on P/E multiples prove only to be of statistical significance for the private transactions sample. They report a raw discount of 47.5 percent, but find no clear evidence of a consistent size effect for both groups.

## 4.4. Venture capital discount approach

In a recent paper, Das, Jagannathan and Sarin (2003) use a new framework for analysing discounts for the lack of marketability. Das et al. use a sample of over 52,000 financing rounds in more than 23,000 companies across the time period 1980-2000 for VC firms to estimate exit probabilities, exit multiples, time to exit and the resulting returns to private equity investments. The expected exit multiple is modelled as a function of these parameters, and these estimates are in turn used to quantify the discounts. They find evidence of discounts of 11 percent and 80 percent for late-stage and early-stage venture-backed companies respectively. The authors do however point out that the discounts arise from a number of factors (see for example Gompers and Lerner (2001) for a discussion of services provided by VCs to portfolio companies) other than non-tradeability.

## 4.5. Options approach

The idea that marketability could be priced as a put option to vend a non-marketable stock at the free market price was introduced by Chaffe (1993). He uses the Black and Scholes (1973) formula for European put options to derive DLM estimates in the range of 28 to 49 percent. Longstaff (1995) and Trout (2003) also use options methodology to analyse marketability discounts. This approach has become popular among some

<sup>&</sup>lt;sup>46</sup> Coefficients on ln(size) of 1.95 and 1.94 for privately held and publicly held regressions respectively.

practitioners, but has received its share of critique. Robak and Hall (2001) point out that one of the assumptions of the Black & Scholes framework is continuous, frictionless trading and hence does not offer any insight into liquidity pricing.

# 5. Hypotheses

H1. On average, privately held companies should sell at a discount to traded comparables.

In spite of the above listed benefits of being private, our first hypothesis states that a typical private company should sell at a discount. The empirical literature provides rather strong evidence in favour of the private company discount, which leads us to expect that the benefits of being public, and especially the marketability aspect, should outweigh the disadvantages.

H2. Over time the valuation differences have diminished.

The expansion of private equity markets and the associated increases in professionalism and liquidity in the private market is a factor we expect to influence the size of the private company discount over time. This tendency is expected to be further exacerbated by rising regulatory costs and increased availability of debt funding.

H3. Industry membership should explain some of the cross-sectional variation in the private company discount.

Asset liquidity, internal cash flow generation, leverageability and other means to evoke liquidity events as well as asymmetric information problems and private benefits of control are some of the issues which could be partially reflected in industry differences.

H4. Firm size is expected to negatively influence the likelihood of a discount.

Not only the above mentioned economies of scale for administrative costs could be drivers of a size correlation, but also stock market liquidity and investor attention considerations.

H5. Financial distress is more likely to be penalised in a private setting.

Due to the considerably lower level of diversification of investors in closely held companies, idiosyncratic risk in the form of a weak balance sheet should be compensated for. H6. Private equity sponsors tend to acquire firms at lower valuation multiples compared to trade buyers.

Previous research has documented 'multiple riding' gains to private equity companies, which implies that the funds tend to exit at higher multiples than they acquire. Access to superior private information about the true state of the company,<sup>47</sup> more experience and knowledge of M&A transactions and perhaps even a superior ability to time the market and exploit temporary misvaluation are some of the potential motivations.

#### H7. Profitable firms exhibit smaller valuation rebates.

Profit-generating, well-run companies produce earnings which allow for capital distribution to shareholders and reduce the duration of the investment. A track record of earnings also facilitates going public in the future and hence increases liquidity.<sup>48</sup>

<sup>&</sup>lt;sup>47</sup> DeAngelo (1986) argues that the use of private information may be more important in the case of MBOs and suggests that in some instances management could go as far as to manipulate earnings forecasts to downplay the transaction valuation.

<sup>&</sup>lt;sup>48</sup> Damodaran (2005a). Jeng and Wells (2000) report that young growth companies in many countries of continental Europe face problems with markets not welcoming companies without long earnings track records.

# 6. Data

In this section we begin with a description of how the data set of private company transactions has been constructed. We then proceed by presenting stylised facts of the data set. Finally, we conclude this section with a presentation of the data underlying our cross-sectional analysis of the private company discount.

## 6.1. Transaction data for private companies

## 6.1.1. Data collection

Obtaining market value data and other financial information for public companies is not problematic, while for privately held companies it clearly is in many cases. To produce a reliable sample of transaction multiples for private company acquisitions in the Nordic region, we run the following search in the Mergermarket and Thomson SDC Platinum databases:

Target nationality: Swedish, Norwegian, Danish or Finnish.
Acquisition type: Private target.
Deal enterprise value:<sup>49</sup> Larger or equal to USD 10 million.
Target revenues: Larger or equal to USD 10 million.
Ownership percentage held upon the completion of the transaction: 100.
Time period: 01/01/1998 - 30/04/2005.
Deal status: Completed.

## 6.1.2. Data selection and sample adjustments

In our initial search in the Mergermarket and Thomson SDC Platinum databases, a total of 1,150 private transactions were identified. One drawback of the Mergermarket and Thomson databases is that both treat a public takeover followed by a delisting of the target as a private acquisition. After controlling for this issue of mislabelling, we exclude 334 public transactions from our initial sample, resulting in a raw sample of 816 private observations.

As previously mentioned the data availability for private companies is less widespread compared to their public counterparts. The main reasons behind this feature are as previously mentioned the differing accounting requirements for public and private companies and the public companies' responsibility to provide investors with sufficient data to evaluate the companies' performance. Even so, the two types of companies show even larger differences in the amount of information they provide to the public when they are engaged in M&A activity. In a public takeover, the offer price is publicly available information. On the

<sup>&</sup>lt;sup>49</sup> For a detailed definition of enterprise value please refer to table VIII, 'Definition of valuation metrics'.

contrary, the buyer involved in private M&A deals normally has no obligation to disclose the consideration offered to the target company's shareholders and in some circumstances (mainly in organised private equity-backed acquisitions) do not wish to share this information with the general public.

These issues curtail the availability of the data underlying our analysis of the private company discount. To be able to extract as many private observations as possible from our raw sample we focus on acquisitions for which there exist reliable data reported for the EV/Sales and EV/EBIT transaction multiples. Due to the poor disclosure of financial data in our raw sample we omit an additional 696 observations leaving us with 120 private market transactions that abide by our previously listed transaction selection criteria.

As a means to further refine our data sample we exclude all private acquisitions of companies in the financial services sector from our sample (firms with 1-digit SIC-code 6, with the exception of firms with 2-digit SIC-code 65) and all acquisitions of regulated utilities (firms with 2-digit SIC-code 49). The motivation behind these exclusions originate from the lack of public comparables for private transactions involving regulated utilities and the fact that it is not meaningful to value financial services companies on the basis of enterprise value multiples, due to these firms' unique balance sheet structure.<sup>50</sup>

Furthermore, we adjust the raw sample with respect to outliers<sup>51</sup> and exclude private transaction observations that involve a unique target company for which no public industry counterpart could be identified, using the methodology presented in section 7.1.2. After implementing the above adjustments, our final sample consists of 78 observations with respect to the sales multiple and 59 observations with respect to the EBIT multiple.

For each of the 78 private observations we try to gather income statement data and balance sheet data for the latest financial year ending prior to the announcement date of the acquisition from the Amadeus database (Bureau van Dijk), the Affärsdata database and the respective companies' homepages and press releases. For 24 of the 78 private observations we are not able to identify any additional financial data, except for the information provided in the press release describing the transaction, as these observations for example include acquisitions of a non-separate legal entity in the form of a division in a private company. As a consequence, the data sample of private acquisitions that forms the basis for the cross-sectional analysis of the determinants of the private company discount comprises 54 observations with respect to the sales multiple.

<sup>&</sup>lt;sup>50</sup> Copeland et al. (2000) recommend the use of the equity rather than the enterprise DCF method for banks and insurance companies, because the operations and financing are intertwined for these types of companies. A similar argument could be made for valuation multiples.

<sup>&</sup>lt;sup>51</sup> We define an observation to be an outlier if the absolute difference of the private transaction multiple and the public reference portfolio multiple is larger than two standard deviations of the pairwise difference in mean of the public and private valuation multiples in the sample.

### 6.1.3. Stylised facts of the acquisition data

Exhibit I displays the transaction activity as measured in number of deals and the total deal value for each year of the private transaction sample. 51 (65.4 percent) of the 78 private acquisitions took place in just three of the sample years, namely 2002, 2003 and 2004. The total deal volume for these three years corresponds to 76.3 percent of the total deal volume for the 1998-2005 period.

Exhibit I. Private transactions: deal volume and number of deals per annum, 1998-2005



Table VI shows that 65 (83.3 percent) of the 78 of the private acquisitions in our sample belong to three specific SIC code industry groups, namely manufacturing, services and wholesale and retail trade.

Table VI.	Private	acquisitions	by	industry
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			Frequency (%	Total value	Value	Median value
Industry	SIC-codes	Frequency	of total)	(USDm)	(% of total)	(USDm)
Agricultural & mining	01-14	1	1.28%	625	2.47%	625
Construction	15-17	1	1.28%	42	0.16%	42
Manufacturing	20-39	37	47.44%	15,576	61.47%	94
Transportation & comm.	40-49	10	12.82%	4,642	18.32%	96
Wholesale & retail trade	50-59	11	14.10%	2,007	7.92%	60
Real estate	65	1	1.28%	234	0.92%	234
Services	70-88	17	21.79%	2,216	8.74%	59
Total		78	100%	25,340	100%	70





Exhibit III. Domestic vs. cross-border



# 7. Methodology

In this section we will outline the acquisition approach and the comparable companies valuation approach which we use to compare the valuation of Nordic public and private companies.

Our methodology is straightforward. As a starting point we identify a set of acquisitions of closely held companies during our sample period. For each of these private transactions we attempt to construct a public reference portfolio, consisting of publicly quoted companies belonging to the same industry and sharing the same characteristics as the private acquisition target.

For each private observation we try to identify the trailing<sup>52</sup> enterprise value-to-sales transaction multiple ('EV/Sales') and the trailing enterprise value-to-earnings before interest and taxes transaction multiple ('EV/EBIT'). The corresponding data based on trading prices are gathered for the sample of listed companies included in our reference portfolios as close in time as possible to each respective private observation.

To examine whether private companies in the Nordic region attract lower valuations compared to their publicly traded peers, we apply the method of comparable companies valuation. For each private observation we compare the two transaction multiples EV/Sales and EV/EBIT to the median of its public reference portfolios' corresponding trading multiples. As a next step, following Koeplin, we define the private company discount relative to the public reference portfolios according to equation I.

$$Pr ivate company discount_{i} = 1 - \frac{Pr ivate company multiple_{i}}{Public reference portfolio median multiple_{i}}$$
(I)

For each of the two multiples in our private company sample, a specific private observation could either be valued in line with its public reference portfolio (private company discount = 0), with a discount to its public reference portfolio (private company discount > 0) or with a premium to its public reference portfolio (private company discount < 0).

As a final step in our analysis we statistically test the significance of the estimated private company discounts/premiums. In addition, we attempt to explain the cross-sectional determinants of the deviations using regression analysis and compare these results with the set of hypotheses of section 5.

<sup>&</sup>lt;sup>52</sup> Here we define a trailing valuation metric as: the deal or trading enterprise value divided by the latest reported fiscal year's financial parameter, in this case represented by either the company's sales or earnings before interest and taxes figures.

## 7.1. Construction of public reference portfolios

## 7.1.1. Choice of matching firm technique

Koeplin apply a matching firm technique based on acquisition multiples as opposed to trading multiples. Hence, for each private observation, an acquisition of a public company is identified in the same country, year and in a comparable industry. However, identifying a single public transaction considered to be a comparable peer transaction based on these criteria presupposes that each public observation adequately reflects the market's current valuation of public companies in the industry at hand. Kooli, further improved upon Koeplin's matching firm technique by constructing public reference portfolios, which include all public transactions in the same industry, in a similar year, and with a comparable size. In the cases where no transactions meet the requirements, the year and industry criteria are relaxed.

Focusing on acquisition multiples of public companies rather than trading multiples may potentially limit the influence of valuation difference among the public and private companies related to control premiums, since the public transactions represent control positions while minority shares are normally the bulk of trading. Nevertheless, the matching firm technique based on public transaction data widely limits the number of matching firms to be compared to the private observation. We argue that trading multiples provide more robust cross-sectional estimates of the market's view of a certain industry as it relaxes the constraints regarding the number of peers' multiples that can be obtained. Additionally, we are of the opinion that the matching firm technique based on trading multiples as opposed to transaction multiples is more representative of how practitioners value a potential transaction. Although, valuation metrics of public M&A transactions are often worthful information, the number of comparable transactions is often limited and hence many practitioners tend to put the concept of a discount for private companies in relation to trading prices.

## 7.1.2. Identification of publicly traded peers

A key feature of our analysis is the construction of public reference portfolios. We seek to make certain that the public companies included in each private observation's reference portfolio share the same fundamental characteristics as the private company.

For each private observation we identify the company's primary Standard Industrial Classification code ('SIC-code').<sup>53</sup> For each of our 78 observations we consequently have one company-specific 4-digit SIC-code.

As a first step to match publicly quoted companies with the private observations, we use the Amadeus and Factiva databases to find publicly quoted Nordic companies that belong to the same primary 4-digit SIC-code

<sup>&</sup>lt;sup>53</sup> The Standard Industrial Classification (SIC) code is a U.S. Department of Commerce system that organises all industry types. Each business establishment is classified according to its primary activity, signified by a 4-digit SIC-code. The primary SIC-code is the first SIC code in the list of all SIC-codes for each company. It typically reflects the company's main line of business.

industry group and Factiva industry classification group as the private observation at hand. In addition, we use analyst and industry reports from the major brokerage houses in the Nordic region for peer companies with identical 4-digit SIC-codes and/or Factiva industry classification as the private company to find preconstructed public reference portfolios for a specific industry, e.g. Nordic engineering, Nordic construction, Nordic telecom operators etc. After evaluating the candidate public companies to be included in the private transaction observation's reference portfolio with respect to similarities in quality/sustainability in earnings and size<sup>54</sup> we form a set of 78 company specific public reference portfolios.

Weiner (2005) analyses the impact of the choice of industry classification schemes on financial research. His analysis identifies six systems that are commonly used by researchers and practitioners and apply these systems separately for a company valuation approach based on the method of comparable companies. Weiner's results indicate that the valuation accuracy differs among the different industry classification schemes. Further, the analysis concludes that the use of Compustat GICS-codes<sup>55</sup> lead to lower valuation errors than the other industry classification systems. Even so, as the study document that Worldscope and Compustat SIC-codes produce results similar to the GICS-codes, we feel comfortable in using SIC-codes as a means to construct our set of public reference portfolios. This conclusion is further corroborated by Weiner's study as he shows that most financial researchers apply the SIC-scheme as the main industry classification system.

For the public companies included in each public reference portfolio we used the JCF Factset database and screened analyst reports from Nordic brokerage houses to gather historical valuation multiples with respect to the sales and EBIT multiples at an equivalent point in time as the corresponding private company transaction was announced. For each of the 78 public reference portfolios we then compute the implicit multiples as the median observation.

Table VII shows that 87.2 percent of the 78 public reference portfolios include more than 3 public companies. The corresponding number for the 59 public reference portfolios with respect to the EBIT multiple is 78.0 percent. As previously discussed, the accuracy in the attempt to construct a public reference portfolio that reflects the market's valuation of a certain industry at a given point in time should increase with the number of public companies included in the public reference group.

<sup>&</sup>lt;sup>54</sup>Since the universe of public companies in the Nordic region is limited, it is cumbersome to fully adjust each public reference portfolio with respect to the size criterion. Consequently, the median company in our sample of public companies has higher revenues, assets and Tobin's Q compared to the median private company. These features may give rise to a potential size bias being present in our sample. <sup>55</sup> Global Industry Classification Standard codes.

<b>№</b> of companies	10	9	8	7	6	5	4	3	2	1	Total
Panel A: EV/Sales											
Frequency	2	2	4	17	11	19	13	9	1	0	78
Frequency (%)	2.6	2.6	5.1	21.8	14.1	24.4	16.7	11.5	1.3	0.0	
Cum. freq. (%)	2.6	5.1	10.3	32.1	46.2	70.5	87.2	98.7	100.0	100.0	
Panel B: EV/EBIT											
Frequency	0	0	4	2	16	13	11	6	6	1	59
Frequency (%)	0.0	0.0	6.8	3.4	27.1	22.0	18.6	10.2	10.2	1.7	
Cum. freq. (%)	0.0	0.0	6.8	10.2	37.3	59.3	78.0	88.1	98.3	100.0	

Table VII. Number of public companies included in the public reference portfolios

#### 7.1.3. Method of calculating the comparable multiple

In our analysis we match private transaction multiples to the *median* multiple of each private observation's public reference portfolio. It could be argued that alternative measures such as the harmonic mean, the simple mean or the value-weighted mean of the public reference portfolios' multiples would prove as a better measure for the purpose of valuation. In their analysis of the comparable companies valuation methodology's accuracy, Liu et al. (2002), argue that it improves when multiples are calculated by using the harmonic mean as opposed to the simple mean or the median of the multiples of the comparables. Albeit these findings, the most widely accepted approach is to apply the median multiple of the comparable firms when applying the method of comparable companies valuation, see for example Kim and Ritter (1999) and Lie and Lie (2002).

## 7.2. Valuation multiples

#### 7.2.1. Overview of selected accounting multiples

When analysing valuation differences, it is crucial to use valuation metrics that can be applied to both categories of companies. Unfortunately, it is not possible to determine ex ante which of the valuation metrics are the best-suited for this specific purpose.

In their study of the reliability of the relative valuation method, Kaplan and Ruback (1995) estimate valuations for a sample of highly leveraged transactions based on enterprise value-to-EBITDA. The benchmark multiples are the median multiples for companies in the same industry and/or companies that were involved in similar transactions. For comparison, Kaplan and Ruback also compute valuations by using the DCF method. For their sample of 51 transactions between 1983 and 1989, they found both the DCF and the method of comparable companies to be useful valuation tools with similar levels of precision. Depending on the benchmark multiple used, 37–58 percent of the valuations fell within 15 percent of the actual transaction value.

Kim and Ritter (1999) use several measures for the matching companies in the valuation of IPO companies. The multiples used in their study are share price-to-earnings per share (P/E), market value of equity-to-book value of equity, share price-to-sales per share, enterprise value-to-sales, and enterprise value-to-EBITDA. Kim and Ritter find that all of these multiples yield positively biased estimates but that the EBITDA multiple results in the most precise valuation, particularly for the more established IPO companies. They also show that valuations improve when forecasted earnings rather than historical earnings are applied and when the comparable companies are chosen by a specialist research firm rather than a mechanical algorithm.

We employ two different types of valuation multiples, one of which is based on profits – earnings before interest and taxes. This measure is deemed as more appropriate vis-à-vis an after-tax earnings multiple, because the valuation based on the EBIT multiple is independent of the capital structure of the acquired company and hence allows for comparisons across firms with different financial leverage. In contrast, two companies with identical operational profit generating capabilities may have differing earnings ratios solely due to gearing differences. In addition, EBIT (more commonly referred to as operating profit), is a standard accounting measure that most companies report in their statutory accounts, as opposed to pro forma metrics such as EBITDA and EBITA. This may give rise to more consistent computation of the EBIT multiples compared to other earnings multiples.

Equally, it can be argued that EBIT could be used as an accounting proxy for a company's cash flow available to service debt payments and dividends. The most common measure of cash flow in company valuation is free cash flow ('FCF'), which is computed by adding back depreciation of fixed tangible assets and amortisation of intangible assets to EBIT and subsequently subtracting capital expenditures and adjusting for increments in the company's net working capital. To the extent that capital expenditures in the company's fixed tangible/non-goodwill intangible assets approximate depreciation and amortisation, EBIT would be a fairly good substitute for free cash flow. Academic studies have so far favoured the EBITDA multiple to EBIT,<sup>56</sup> Kim and Ritter (1999) and Lie and Lie (2002) find for example that the former yields more correct estimates using U.S. data. The EBIT multiple is however commonly used among valuation professionals on the Nordic market according to the authors' experience and its potential to capture cross-sectional differences in capital intensity<sup>57</sup> was another reason why it is selected.

The other valuation metric employed in our analysis is the enterprise value-to-sales multiple. Companies in the course of expanding their business are often evaluating a potential acquisition target with respect to the price they have to pay per additional amount of sales. The value of this metric depends partly on the expected returns on the capital invested in the transaction and is in general strongly correlated to operational profitability. As an illustration exhibit IV below, displays the relationship between the sales multiple and operating profit margins for a sample of listed Nordic service companies.

<sup>&</sup>lt;sup>56</sup> Several European studies does however use EBIT multiples, for example Dittmann and Weiner (2005).

<sup>&</sup>lt;sup>57</sup> Damodaran (2005) argues for example that low values of the EBITDA multiple could reflect high anticipated levels of capital expenditures.

#### Exhibit IV. Nordic service sector: EV/Sales 2006E vs. average EBIT margin 2006E-2007E



Source: SEB Enskilda 2006-05-01.

#### 7.2.2. Multiple determinants

Mathematically, the relationship between the sales and EBIT multiples to the standard DCF valuation drivers can be described in the below manner, following Damodaran (2004):

$$\frac{EV}{Sales} = \frac{FCF_{Sales}}{k-g} = \frac{EBIT_{Sales}(1+g)(1-t)(1-\theta)}{k-g}$$
(II)

Where

k = the company's weighted average cost of capital.

g = forecasted growth rate (in sales and EBIT).

t = the company's marginal corporate tax rate.

 $\theta$  = the reinvestment rate, i.e. <sup>58</sup> (CapEx +  $\Delta$ NWC – Depr)/EBIT(1 – t)

A typical assumption in a DCF valuation is that of a two-stage growth scenario with lower growth in a condition of steady-state reached after a finite forecasting horizon. Equation II can in such a scenario be developed into equation III.

$$\frac{EV}{Sales} = OM\left[\frac{(1-\theta)(1+g_1)(1-(1+g_1)^n(1+k)^{-n})}{k-g_1} + \frac{(1-\theta)(1+g_1)^n(1+g_2)}{(1+k)^n(k-g_2)}\right]$$
(III)

Where

OM = operating margin (after tax).<sup>59</sup>

- $g_1$  = forecasted growth rate in the forecasting period.
- g<sub>2</sub> = forecasted growth rate in steady-state.
- n = duration of the forecasting horizon.

 $<sup>^{58}</sup>$  CapEx = capital expenditures,  $\Delta$ NWC = investments in net working capital, Depr = depreciation.

<sup>&</sup>lt;sup>59</sup> This corresponds to the NOPLAT margin in the standard DCF terminology of Copeland et al. (2000).

According to equations II and III, the sales multiple is an increasing function of the operating margin and the anticipated growth rate, while it is negatively related to the level of risk, the reinvestment rate and the marginal corporate tax rate. It is in our view not unrealistic to perceive the operating margin and growth prospects of the business and its investments risk as the main determinants of the sales multiple, with reinvestment policy and taxation having more of a long-term impact, although substantial short-term expected expenses are likely to yield a lower multiple.

The EBIT multiple can similarly be related to the FCF-based definition of enterprise value, as displayed in equation IV.

$$\frac{\text{EV}}{\text{EBIT}} = \frac{(1+g)(1-t)(1-\theta)}{k-g}$$
(IV)

Assuming that the depreciation and amortisation is a perfect substitute for actual net investments and ignoring the first-year growth, equation IV can be further simplified.

$$\frac{\text{EV}}{\text{EBIT}} = \frac{(1-t)}{k-g} \tag{V}$$

The EBIT multiple is in this framework a function of the cost of capital, the predicted growth, the tax rate and the capital expenditures and other investments. Relating to the discussion of using multiples based on EBIT rather than EBITDA in order to capture differences in capital intensity, it should be noted that the better a surrogate D&A is for proper investments, the lesser the impact of its absolute size on the multiple. A detailed description of the financial parameters included in our comparable companies valuation of private and public companies are provided in table VIII.

Enterprise value (EV)	The enterprise value of a transaction or a public company is calculated by multiplying the total number of outstanding shares of the target/public company by the offering/quoted price and then adding the book value of the target's/public company's interest bearing financial liabilities less the target's/public company's interest bearing financial assets.
Sales multiple (EV-to-Sales)	Enterprise value divided by the target's/public company's net sales for the 12 months ending on the date of the last day of the most recent financial year prior to the announcement of the transaction.
EBIT multiple (EV-to-EBIT)	Enterprise value divided by EBIT: EBIT is defined as earnings before interest income, interest expense, taxes and minority interest for the 12 months ending on the date of the last day of the most recent financial year prior to the announcement of the transaction.

#### Table VIII. Description of valuation metrics

## 7.3. Analysing the private company discount

Due to the fact that the mathematical expression of the private company discount according to equation I generates observations from a skewed distribution with observation values ranging from  $\infty$  to 1 we choose not to use this definition as a test variable when performing the regressions, and focus instead on absolute deviations which are symmetrical.

Consequently, we analyse the valuation difference (H1) between Nordic public and private companies by performing a pairwise difference-in-mean t-test for our sample of 78 private observations with respect to the sales multiple and 59 private observations with respect to the EBIT multiple. In order to address hypotheses 2 and 3 – i.e. the private company discount's development over time and industry differences – equivalent tests are performed on time and industry dummy variables using the differences in mean of the public and private sales and EBIT multiples as the dependent variable.

## 7.4. Cross-sectional regression analysis

In order to examine the cross-sectional determinants of the private company discount a binary logistic regression model is used as specified in equation IV. The dependent variable in this econometric model is binary and defined as '1' if the private firm trades a discount compared to its public reference portfolio and '0' otherwise, with respect to the sales multiple.<sup>60</sup>

$$logit(\pi) = ln\left(\frac{\pi}{1-\pi}\right) = \alpha + \beta_1 ln Assets_i + \beta_2 Z'_i + \beta_3 PEbuyer_i + \beta_4 ROE_i + e_i$$
(VI)

or equivalently,

$$\pi = \frac{e^{\alpha + \beta_1 \ln Assets_i + \beta_2 Z'_i + \beta_3 PE buyer_i + \beta_4 ROE_i + e_i}}{1 + e^{\alpha + \beta_1 \ln Assets_i + \beta_2 Z'_i + \beta_3 PE buyer_i + \beta_4 ROE_i + e_i}}$$

<sup>&</sup>lt;sup>60</sup> We focus solely on the sales multiple due to the limited number of observations in our data sample with regards to the EBIT multiple.

where,

$$\pi = \Pr(\text{Discount} = 1)$$

$$\text{Discount} \begin{cases} 1 \text{ if } \text{Private company multiple } \pi \text{ Public company multiple} \\ 0 \text{ if } \text{Private company multiple} \ge \text{Public company multiple} \end{cases}$$

We prefer to use a binary logistic regression model rather than an ordinary least square regression model because we are primarily interested in analysing the factors behind the private equity discount and not to quantify each individual regressor's size of impact for predictive use out-of-sample.<sup>61</sup> Table IX provides a brief summary of the independent variables and their predicted signs on the basis of hypothesis 4-7 of section 5.

Variable	Description	Predicted sign
InAssets	The natural logarithm of the book value of total assets stated <sup>62</sup> in USDm is used as a proxy	Negative
	for firm size. The natural logs are taken in order to improve the distribution features of	
	the variable.	
Z	A measure of the financial strength of a private company, the higher the score the	Negative
	healthier are the company's finances. This score uses statistical techniques (multiple	
	discriminant analysis) to predict a company's probability of failure. For a more thorough	
	description of the Z' estimate, an adaptation for closely held companies of Altman's (1968)	
	original model, see Altman (2000). <sup>63</sup>	
PEbuyer	Dummy variable defined as '1' if the acquirer of the private firm is a financial sponsor,	Negative
	defined as belonging to 2-digit SIC-codes 60-64, and '0' otherwise.	
ROE	Net income for the latest financial year ending prior to the announcement of the	Negative
	transaction divided by opening book value of shareholders' equity. <sup>64</sup>	

Table IX. Summary description and predicted signs of regressors

<sup>&</sup>lt;sup>61</sup> This is a common motive for many studies in the area; please refer to Feldman (2002) for a cautionary discussion on using regression models to predict DLMs.

<sup>&</sup>lt;sup>62</sup> Exchange rates as of the end of each company's respective financial year.

 $<sup>^{63}</sup>$  Altman (2000) uses the following definition of Z':

Z'=0.717(Working capital/Total assets)+0.847(Retained earnings/Total assets)+3.107(EBIT/Total assets)+0.420(Book value of equity/Book value of total liabilities)+0.998(Sales/Total assets)<sup>64</sup> Please note that neither net income nor the book value of shareholders' equity have been adjusted with respect to goodwill.

# 8. Results

In this section we present our findings when analysing the private company discount and check for the robustness of the results in order to address hypotheses H1 to H3. We then proceed by performing a cross-sectional regression analysis using a binary logistic specification. The objective of the second part of the analysis is to study the determinants of the cross-sectional variations in the private company discount outlined in hypothesis H4 to H8.

## 8.1. The private company discount

#### 8.1.1. Quantification of the private company discount

Table X displays a summary of the estimation of each valuation multiple for private and public companies in the sample.

Table X.	Multiples and	l private	company discoun	ts of sampl	e transactions
I HOIC I LI	manipico and	private	company abcount	to or oumpi	e transactions

	Private targets		Public po	ortfolios	Raw discount (%)	
	Mean	Median	Mean	Median	Mean	Median
EV/Sales	1.24	1.00	1.37	1.10	9.45	8.87
EV/EBIT	12.82	11.16	13.78	11.67	7.00	4.41

The median sales multiples are 1.00 for closely held firms and 1.10 for the quoted comparables, which is lower than the multiples for Koeplin's domestic firms and especially the foreign firms and Officer (median of 1.85 for stand-alone). Looking at the median, the public company estimate is very close to Koeplin's 1.14 and the discount comes about due to a lower multiple for the private targets, 1.00 vs. 1.13. Because our median company is slightly larger than Koeplin's (USD 99.8m vs. 56.3m), we do not expect this to be a size-related difference but could rather be related to differences in profitability. Koeplin does however not report their median EBIT margin for private targets (ours is 7.8 percent). For EBIT, our private company estimates come out above Koeplin's while the public equity figures are below. The valuation differences appear to be smaller in our sample, and the differences are symmetric comparing means with the medians. To obtain a local benchmark, we used data from Carnegie's *Nordic equity strategy report* for the autumn of 2005 to compute comparable trailing estimates (please refer to appendix E). The Nordic market-value weighted average valuation is higher than the average of our public portfolios for the sales multiple (1.9 vs. 1.4), but for the EBIT multiple the valuations are identical (13.8).

The consistently higher valuation ratios of the public reference portfolios support the theory of private companies attracting lower valuations compared to their public peers. The statistical precision of the results is however low, with p-values for the mean and median discount in the range of 15 percent for both multiples. Based on the sales multiple, the median discount is 8.9 percent, which is higher than Koeplin's 0.8 percent

for domestic transactions in the U.S., but lower than the 17.2 percent reported for foreign transactions.<sup>65</sup> The EBIT multiple discount is uniformly smaller than Koeplin's, who documented 30.6 percent and 6.0 percent for U.S. domestic transactions and foreign transactions, respectively. It should be noted that the number of private transactions differs with the availability of each multiple, hence 19 transactions included in the sample are missing observations with respect to the EBIT multiple.

Previous researchers have analysed the private company discount on an aggregate sample level rather than for each individual observation (i.e. using unpaired testing). Newbold et al. (2002) argue that a paired test should be used when data points in one group are more closely correlated with a specific value in the reference group than with a random observation in the latter group. Since the paired nature of the data has not been accounted for in previous empirical research, we believe that the testing methodology could be improved upon by using a paired t-test.

Taking into account the skewed properties of the private company discount distribution,<sup>66</sup> we test whether the multiples of our samples of privately held and publicly traded companies have identical population means,<sup>67</sup> rather than using the discounts as our variable of examination. The results of our pairwise analysis for our two sets of multiples are presented in table XI.

Table XI. Summary of paired t-test f	or private com	pany discounts			
	Mean	Std. error mean	t-stat	df	p-value (one-sided)
EV/Sales public minus private	0.1298	0.1193	1.088	77	0.1400
EV/EBIT public minus private	0.9654	1.0120	0.954	58	0.1720

The results are supportive of the less advantageous relative valuation of private companies. Nevertheless, the differences are not large enough to provide evidence of statistical significance at levels below 14 percent. From an economic standpoint we argue that even discounts as small (that is, compared to previous research) as 5 to 10 percent are significant given the average size of the deals. Our analysis suggests that the probability of a private company selling at a discount to its public peers appears to be slightly higher than the contrary, but the low statistical power of the analysis does not allow for any firm conclusions regarding the quantum of

H1. The data suggests that private companies have been priced at a discount to listed peers – however the results have not been found to be statistically significant at any level below 14 percent.

the private company discount.

<sup>&</sup>lt;sup>65</sup> For reference, Kooli report a discount on the unlevered price-to-sales multiple of 17 percent.

<sup>&</sup>lt;sup>66</sup> When defined according to equation I.

<sup>&</sup>lt;sup>67</sup> The paired t-test methodology assumes that paired differences are independently and normally distributed. Although we find that the differences are heavily skewed and not normally distributed according to the Kolmogorov-Smirnov test, we have used the parametric t test in lieu of a non-parametric alternative such as the Wilcoxon matched pairs test. The reason is our belief that the sample sizes of 58 and 78 are sufficiently large to assume the means to be normally distributed.

#### 8.1.2. Discount development over time

Exhibit V below provides an overview of the time series properties of each of the multiples for the private and the publicly traded companies over the sample period.

#### Exhibit V. Valuation multiples of private and public companies, 1998-2005



A simple graphical analysis leads to the conclusion that H2 appears to be borne out by the data, as both multiples of closely held companies appears to approach those of the public reference portfolios over the sample period. Data is however very noisy, which calls for a more rigorous statistical examination. The limited number of observations for certain of the earlier years of the sample renders annual dummy variables inefficient; consequently we prefer to group the sample into transactions that took place in 1998-2000 and 2001-2005 respectively and to test the discounts development over time by running the regression specified in equation VII.

Public multiple<sub>i</sub> – Pr ivate multiple<sub>i</sub> = 
$$\alpha + \beta \cdot \text{Pre2001} + \varepsilon_i$$
 (VII)

	£			nvalue	
	Coefficients	Std. error	t-stat	(two-sided)	$\mathbf{R}^2$
Panel A: EV/Sales					
Constant	0.0159	0.1328	0.1195	0.9052	0.0425
Pre2001	0.5225	0.2845	1.8362	0.0702	
Panel B: EV/EBIT					
Constant	0.1460	1.1623	0.1256	0.9005	0.0332
Pre2001	3.2231	2.3052	1.3982	0.1675	

Table XII. Regression of discounts on pre-2001 indicator

The results from running equation VII are presented in table XII. Both regressions provide evidence of larger discounts in the first three years of the sample period, which is coherent with H2:s prediction. While only the sales multiple is significant at the 10 percent level, the differences are large enough (lower difference in multiples of about 0.5 and 3.2 based on sales and EBIT) to conclude that the differences are noteworthy from an economic standpoint. The evolution of private equity markets during the later part of the sample

period seems to have a stronger impact than the vibrant IPO climate of the earlier years, considering the leveling of relative valuation.

H2. The anticipation of decreasing differences in valuation over time is confirmed by the data, a result which is robust to the choice of accounting multiple.

## 8.1.3. Discount by industry

	Agricult.			Transp.	Wholes.			
	& min.	Constr.	Manufact.	& comm.	& retail	Real estate	Services	Total
SIC-codes	01-14	15-17	20-39	40-49	50-59	65	70-88	
Panel A: EV/Sale	s							
Private	1.21	0.22	1.00	1.87	0.66	1.06	1.28	1.00
Public	1.39	0.50	0.82	1.70	0.60	0.92	1.70	1.10
Disc. (%)	13.1	56.6	-22.0	-10.3	-9.2	-15.7	24.8	8.9
Frequency	1	1	37	10	11	1	17	78
Panel B: EV/EBI	Г							
Private	n.a.	5.46	10.48	6.85	10.29	n.a.	17.37	11.16
Public	n.a.	10.90	11.20	13.20	10.95	n.a.	16.20	11.67
Disc. (%)	n.a.	49.9	6.5	48.1	6.1	n.a.	-7.2	4.4
Frequency	0	1	33	6	8	0	11	59

Table XIII. Median valuation multiples and private company discounts

From table XIII, there seems to be a rather substantial amount of variation between different industries. Comparing our estimates to Carnegie's trailing sector multiples, the figures seem to match rather closely for transportation and communications (compared to 'transportation'), services ('software & services'), manufacturing ('capital goods') but not for wholesale and retail ('consumer discretionary'/'consumer staples').

With respect to the sales multiple, several industries sell at a premium, most notably manufacturing which encompasses a rather large number of observations (37). The EBIT multiple is more consistent with all industries except services recording discounts. In all, results are mixed or even contradictory in many cases.<sup>68</sup> Furthermore, statistical power is very meagre and regressions using industry dummy variables provide no proof of statistical significance below 45 percent. The industry effect is in our view most likely an important determinant of the relative valuation of privately held companies which needs a larger cross-section to lend itself to a more detailed study.

H3. Evidence of cross-sectional variation between industries is mixed and even contradictory with very low statistical significance.

<sup>&</sup>lt;sup>68</sup> Kooli obtain equally contradictory results in their estimation of industry discounts.

## 8.2. Robustness checks

Previous empirical research has similarly to our analysis based their investigation of the private company discount upon different samples of private transaction data depending on the valuation metric at hand. In our case, we have 78 observations with respect to the sales multiple and 59 observations with respect to the EBIT multiple. Albeit this inconsistency, neither Kooli nor Rijken investigate the robustness of their results by performing equivalent tests on samples including identical private observations. As a means to examine this problem we perform a paired t-test on the difference in means between our smaller sample of 59 observations with regard to the sales multiple. We then find statistical evidence of a private company discount being present in the sample on the five percent level of significance, which indicates that our previous findings may not be robust.

## 8.3. Cross-sectional regression analysis

The outcome of the sales multiple based regression of equation VI are summarized in table XIV.

Panel A. Model summary								
Number of observa	tions					R <sup>2</sup> approxi	mations	
54						Cox & Snell	Nagelkerke	
						0.132	0.180	
Block likelihood ra	tio test					Hosmer-Lem	eshow test	
-2LogL	$\chi^2_{obs}$	df	Sig.			$\chi^2_{obs}$	df	Sig.
62.759	7.493	4	0.112			7.306	8	0.504
Panel B. Regressor	tion							
	$\beta_{obs}$	$se(\beta_{obs})$	Wald stat.	df	Sig.	$\exp(\beta_{obs})$	95% CI+	95% CI-
Intercept	6.88	3.131	4.832	1	0.028	976.168	n.a.	n.a.
InAssets	-0.510	0.237	4.619	1	0.032	0.600	0.377	0.956
Ζ'	-0.230	0.152	2.290	1	0.130	0.795	0.590	1.070
PEbuyer	0.304	0.673	0.203	1	0.652	1.355	0.362	5.070
ROE	-0.041	0.267	0.024	1	0.878	0.960	0.568	1.621

Table XIV. Summary of binomial logistic regression on discount probability

The model seems to have a moderate fit and the standard chi-square test based on a likelihood ratio test rejects significance at the 10 percent level. Contrarily, the Hosmer-Lemeshow test's insignificance implies that the model's estimates fit the data at an acceptable level. However, Pampel (2000) points out that the latter test tends to overestimate fit (i.e. type I error) when the model includes non-continuous explanatory variables – which is indeed the case in this model – and when the number of cases tied by any one covariate pattern is limited comparing to the full number of observations. The impression of a meagre fit is corroborated by the pseudo R<sup>2</sup> measures, which reveal a limited strength of association. 67.9 percent of the observations were correctly predicted by the model, a lacklustre improvement of 5.6 percentage points to the base case of 62.3 percent.<sup>69</sup> Further regression output materials are provided in appendix B.

<sup>&</sup>lt;sup>69</sup> The outcome of selecting the most frequent category, i.e. '1' for discount.

Looking at the Wald statistics of individual independent variables, the natural logarithm of assets is statistically significant at the five percent level. The negative sign is consistent with theory and the  $\exp(\beta_{obs})$  of 0.6 could be interpreted as an odds ratio: the odds that a company is valued at a discount decreases by 40 percent for each incremental unit of lnAssets (controlling for changes in the other independents). The evidence that size is an important determinant of liquidity is consistent with previous research, documented by among others by Rijken and Kooli. This finding is intuitive as larger private companies are likely to be more prepared to turn to public markets either in an IPO or by issuing bonds and exceed the investment size thresholds of many local and international private equity investors.

H4. Analysis of cross-sectional data provides results that are in line with the size effect hypothesis.

According to theory, investors will require a higher discount for privately held companies the higher the risk of business failure, to compensate for the higher idiosyncratic risk exposure assumed. Because larger values of the Z'-Score are an indication of financial health, the negative sign is in line with expectations but the coefficient is not significant at the 10 percent level. In Altman's (2000) adaptation for privately held firms the non-bankrupt group's mean Z'-Score was 4.14 and the lower cut-off value was 1.23. Translating these values in the light of our model, the odds that a single firm scoring at the lower end would be priced at a discount is (4.14-1.23)(0.795/1-1) or approximately 60 percent higher compared to an average non-distressed company. While this is not a minor effect, it is neither breathtakingly large nor statistically certain which leads us to conclude that there is insufficient evidence as to whether bankruptcy is indeed an important determinant.

H5. Although the data shows signs of a business failure risk penalty relating to the discount, the results are not statistically significant.

The private equity buyer indicator variable has the relationship expected by theory: when the acquirer is a professional investor, the probability of the transaction closing at a multiple discount to peers increase. The effect is rather sizeable considering that the odds ratio of a discount occurring for a private equity buyer is about 1.35 times the odds of a trade buyer. Notwithstanding the size of the coefficient, the private equity buyer influence can not be pinned down with statistical significance due to the very large standard errors.

H6. Whether the buyer is a financial investor or not do not affect the probability of a discount.

Finally, the effect of profitability – proxied by the return on equity – on the probability of valuation impairment is found not to be of statistical significance. The coefficient is very small, as indicated by the proximity to one of the odds ratio, and the standard errors are considerable. The results indicate that the lack

of profitability is not a component of the private company discount, at least when controlling for other influences.

H7. Profitability measured in terms of ROE does not have a statistically significant impact on the likelihood of a discount.

A potential methodological problem may be multicollinearity between the ROE and other explanatory variables. More specifically, the Z'-Score captures both balance sheet and income statement specifics and could be negatively correlated with the ROE.

Table 7.V. Contention matrix						
	Intercept	InAssets	Z'	PEbuyer	ROE	
Intercept	1.000	-0.970	-0.578	-0.343	0.068	
InAssets	-0.970	1.000	0.441	0.200	-0.055	
Z'	-0.578	0.441	1.000	0.122	-0.208	
PEbuyer	-0.343	0.200	0.122	1.000	0.002	
ROE	0.068	-0.055	-0.208	0.002	1.000	

Table XV. Correlation matrix

The relationship between Z'-Score and ROE is negative as predicted with a negative correlation of 20.8 percent. In addition, the association of Z' to asset size is positive – i.e. larger firms seem to be more financially stable. Firms acquired by private equity sponsors have higher Z'-Scores, which is not in line with this type of investors primarily seeking turnaround targets. This relationship may however be attributable to a size effect as PEbuyer is positively correlated to InAssets.

# 9. Concluding remarks

This thesis has a twofold objective: to describe some of the central theories relating to the private company discount notion and to perform an empirical study using Nordic data.

Sections 2.4 addressed the first part. In section 2, we described some of the characteristics that set private equity apart from public equity, including the apparent nonpecuniary benefits, and described the phenomenal growth in the intermediated private equity markets. Section 3 delineated a theoretical framework for analysing the private company discount concept. Enhanced marketability, scope for diversification and increased access to capital markets were some of advantages of the public organisation form identified, while owners of privately held firms enjoy autonomy and are less exposed to problems of asymmetric information. Section 4 gave an overview of the empirical studies of illiquidity and private company discounts, which provide a wide range of discount outcomes that illustrates the estimation difficulties.

The theories do not provide a magic formula for determining the relative valuation, but should rather be considered in the valuation context at hand. Our main conclusions are:

- 1. Size is an important determinant of liquidity; larger corporations do not run the risk of becoming 'public orphans' with low investor attention and have economies in scale with respect to administrative costs.
- 2. A 'unique' company could achieve a premium valuation as a listed company if it offers exposure to a sector not represented in the local investment universe, if it is not too complex and difficult for outsiders to value.
- The emergence of organised private equity has the potential to reshape the equity market landscape both in the regards of liquidity – more capital available for investments in the private domain – and increased efficiency in the private market.

The second half of the thesis is empirical and focuses on the question of whether or not a private company discount can be estimated for a set of Nordic transactions. We find evidence of a median discount for privately held firms of 4-9 percent, which are small figures compared to most of the previous literature. The discounts in our sample are also more closely matched in size across the different valuation metrics. Although the discounts are not large, they are of economic importance (at least in the upper end of the interval) considering the average transaction size of the companies in the sample (USD 325m).

Statistically, the estimated discounts are not significant below the 15 percent level for any of the multiples. This could be due to a number of different factors:

1. We compare acquisitions with minority trading prices, i.e. the lack-of-marketability discounts cannot be estimated due to counterbalancing control premiums or synergistic premiums.

- 2. The sample size is limited both with regards to the number of private transactions included and the thin availability of comparable listed companies in the Nordic investment universe.
- 3. It could be the case that there simply is no discount for private companies on the Nordic market.

An interesting finding is that there seems to be a time-trend in the relative valuation; the gap seems to close in the last years of the sample period, which is statistically significant although weakly. In our view, this could be related to the expansion of the organised private equity and the favourable credit market development over the sample period. This finding goes against academic theories which suggest that the discounts should be larger when the IPO markets are less active, which was the case for the period 2002-2005.

Regarding the question whether the marketability impairments is higher in certain industries, we find no evidence of such differences.

The regression model implemented has a moderate fit, but provides evidence of a clear size-pattern in the probability of a discount. This is in line with both previous research and theory in the field. Furthermore, the regression suggests that a low risk of bankruptcy decreases the likelihood of a discount (significance at the 10 percent level). Private equity buyers do not seem to affect the likelihood and neither does a higher ROE.

# 10. Suggestions for further research

Some of the potential studies we have identified during the course of our work are:

- Perform a survey on valuation practices among practitioners with a special focus on how they
  incorporate limited marketability in their analysis and how that estimate reflects for example transaction
  costs, expected holding horizon and market timing considerations. From our experience, not all
  professionals apply liquidity discounts for private companies on the Swedish market today.
- Use the 'pure' acquisition approach and find matching public market acquisitions that are size-adjusted. This would most likely need to be made on a pan-European basis (alternatively U.S.) to increase the data availability.
- Relate private company discounts to share price reactions of listed firms that acquire private targets to see if there is on average an 'overreaction' and, if there is, what causes it.
- Study minority transactions in private companies in greater detail. How deep is the marketability discount for minority positions?
- Examine whether the theory has predictive power for the choice of public versus private organisational form.

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# 12. Appendices

# 12.1. Appendix A: Overview of the data

#### Table A1. Private transaction data

1         25mar08         Hurre Croop         Manufacturing         19         0.6         7.7           2         20mar08         Danies Supply         Manufacturing         200         1.9         1.39           4         01cke-98         Ovjens Towverk         Manufacturing         2.7         1.1         7.8           5         05gang/99         Wecomed Plaarma         Manufacturing         2.7         1.3         9.0           7         25ging/99         Wecomed Plaarma         Manufacturing         2.7         1.3         9.0           7         25ging/99         Parce Group         Manufacturing         2.7         1.4         1.12           8         07.feb.00         Nyeomed Diagnostics         Manufacturing         2.3         8.8           9         1.5 mar.00         Sipa Autoplastics         Manufacturing         1.3         1.6           11         1.4 dap-0.0         EV Consulting Demanark         Streices         4.8         2.6         1.8.4           12         1.1.3         1.5         1.5         1.9         1.3         1.5         1.5         1.3         1.5         1.5         1.3         1.5         1.5         1.4         1.9         1		Date	Target company	Industry	EV (USDm)	EV/Sales	EV/EBIT
2         2 Ampjö8         Danic Supply         Manufacturing         19         0.8         7.7           3         12.0ka98         Cyproc Group         Manufacturing         200         1.9         13.9           4         01.de.298         Vojens Towerk         Manufacturing         27         1.3         7.8           5         05.jan.99         Wornas         Wholesale & retal rade         118         0.9         7.4           6         05.majby         Nycomed Platma         Manufacturing         35         2.3         8.8           8         07.4eb.00         Nycomed Diagnostics         Manufacturing         139         1.1         112           11         14.ap.00         Sapa Autoplastics         Manufacturing         138         0.6         12.3           11         14.ap.00         Abbror Industris         Manufacturing         139         1.1         11.2           12         1.4map.00         Abbror Industring         Saro Saro Saro Saro Saro Saro Saro Saro	1	25-mar-98	Huurre Group	Manufacturing	39	0.6	7.6
3         12 skr.98         Copyrec Troup         Manufacturing         210         1.9         13.9           4         01 dec.98         Vojems Toværk         Manufacturing         27         1.1         7.8           6         05 smaj.99         Weromas         Witoksale & strail trade         118         0.9         7.4           6         05 smaj.99         Parce Group         Manufacturing         241         0.0         12.4           8         07 deb.00         Nycomed Diagnostics         Manufacturing         134         0.4         26.0           10         07 appe/O         Ahlstrom Pumps         Manufacturing         139         1.1         112.1           11         14 appe/O         EV Consulting Demanal         Services         65         0.5         47.5           13         15 maj/O.0         Alistor Industriss         Manufacturing         16.9         1.0         n.m.           16         17 spin/O         Jysk Rengering         Services         65         0.5         47.5           17         30 cokacO         Aler Mar. Deepwater Div.         Agriculture & mining         625         1.2         m.a.           16         17 spin/O         Sain Marine Electronics	2	20-maj-98	Danica Supply	Manufacturing	19	0.8	7.7
4       0.1dac.98       Wojens Towark       Manufaruring       27       1.1       7.8         5       05jan.99       Wenas       Wholesale & tetal trade       118       0.9       7.4         6       05maj99       Nicomed Pharma       Manufaruring       257       1.3       9.0         7       29jan.99       Paroc Group       Manufaruring       242       1.0       12.4         8       07/rebO       Nycomed Diagnostic       Manufaruring       134       0.4       26.0         11       14-gar-20       Sapa Auroplastics       Manufaruring       139       1.1       11.2         11       14-gar-20       EV Consulting Demark       Services       48       2.6       18.4         12       11-maj/20       Aldistrom Fluenzy       Manufaruring       158       0.6       12.3         13       15-maj/20       Elek Eregoring       Services       65       0.5       47.5         14       19jun-00       Jelek Rengoring       Services       65       0.6       1.0       n.m.         14       19jun-01       SubkoO       Blarnal       Manufaruring       30       1.2       1.4.7         15       3aph/01 <t< td=""><td>3</td><td>12-okt-98</td><td>Gyproc Group</td><td>Manufacturing</td><td>200</td><td>1.9</td><td>13.9</td></t<>	3	12-okt-98	Gyproc Group	Manufacturing	200	1.9	13.9
5         05jmp.99         Wenass         Wholesale & retail trade         118         0.9         7.4           6         05jmp.99         Parce Group         Manufacturing         557         1.3         9.0           7         29jum.99         Parce Group         Manufacturing         35         2.3         8.8           9         15mar.00         Sapa Acceptatics         Manufacturing         139         1.1         1122           11         14-part.00         Albstrom Pumps         Manufacturing         158         0.6         12.3           12         11-msj0.00         Albstrom Pumps         Manufacturing         138         0.6         12.3           13         15maj.00         Elick Fire & Safery         Manufacturing         1498         1.0         n.m.           14         19-jun.00         Albt Relagaring         Services         65         0.5         47.5           15         19-jun.00         Albt Relagaring         Services         666         1.0         47.5           14         19-jun.00         Albt Relagaring         Manufacturing         30         1.2         1.7           13         15-jan.01         Sab Marine Electronics         Manufacturing	4	01-dec-98	Vojens Tovværk	Manufacturing	27	1.1	7.8
6         05map99         Naconde Dharma         Manufacturing         557         1.3         9.0           7         29jun-99         Paroc Group         Manufacturing         242         1.0         12.4           8         07f-6500         Nicomed Diagnostics         Manufacturing         134         0.4         26.0           10         07.apr.00         Alabtrom Purups         Manufacturing         139         1.1         112.1           11         14.apr.00         EV Consulting Denmark         Services         48         2.6         18.4           12         11.amj.00         Alabtorg Industries         Manufacturing         138         1.5         1.6         0.6         1.2           13         15.amj.00         Elek Free & Safery         Manufacturing         1.498         1.0         n.m.           14         19.jun-00         Jydak Rengoring         Services         6.5         0.5         47.5           15         19.jun-00         Alfa Laval         Manufacturing         1.408         1.0         n.m.           17         30.dt:00         Alfa Laval         Manufacturing         3.0         1.2         n.a.           14         19.jun-01         Moltotes	5	05-jan-99	Wenaas	Wholesale & retail trade	118	0.9	7.4
7         29μμρ99         Parce Group         Manufacturing         242         1.0         12.4           8         07/6b/00         Nycomed Diagnostics         Manufacturing         35         2.3         8.8           9         15-mar/CO         Sapa Auroplastics         Manufacturing         139         1.1         112           11         14-apr00         Ableron Pumps         Manufacturing         158         0.6         12.3           13         15-maj/00         Elck Fire & Safety         Manufacturing         33         1.3         10.5           14         19jun/OO         Johd Kengoring         Services         65         0.5         47.5           15         19jun/OO         Johd Kengoring         Services         65         0.5         1.0         4.7           16         27 oke00         Billerud         Manufacturing         1.498         1.0         n.m.           16         15 jaur01         Saab Marine Elecronics         Manufacturing         94         1.6         13.6           12         12 marc01         Medicotest         Manufacturing         35         0.6         10.1           12         13 apt01         Saab Marine Elecronics         Manufa	6	05-maj-99	Nycomed Pharma	Manufacturing	557	1.3	9.0
8         07.4eb.00         Nycomed Diagnostics         Manufacturing         35         2.3         8.8           9         13-mar.00         Sapa Autoplastics         Manufacturing         134         0.4         26.0           10         07-apr.00         Alistrom Pumps         Manufacturing         139         1.1         11.1           11         14-apr.00         Elsek Fire & Safery         Manufacturing         133         1.3         10.5           13         15-map.00         Elsek Fire & Safery         Manufacturing         1.4         19.9         1.0         n.m.           15         19-jum.00         Alfa Laval         Manufacturing         6.06         1.0         4.7           16         27-dekc0         Billerud         Manufacturing         6.06         1.0         4.7           17         30-clrC0         Aker Marine Electronics         Manufacturing         30         1.2         1.4           10         2-marc01         Medicotest         Manufacturing         30         1.2         1.4.7           11         2-marc01         Medicotest         Manufacturing         30         1.2         1.4.7           12         2-marc01         Medicotest <t< td=""><td>7</td><td>29-jun-99</td><td>Paroc Group</td><td>Manufacturing</td><td>242</td><td>1.0</td><td>12.4</td></t<>	7	29-jun-99	Paroc Group	Manufacturing	242	1.0	12.4
9         13-mar-00         Sapa Autoplastics         Manufacturing         134         0.4         26.0           10         07-apr-00         EY Consulting Denmark         Services         48         2.6         18.4           11         14-apr/00         EY Consulting Denmark         Services         48         2.6         18.4           12         11-mar/00         Evel Kengoring         Services         65         0.5         47.5           14         19-junc/00         Jidk Kengoring         Services         65         0.5         47.5           15         19-junc/0         Alfa Laval         Manufacturing         6.06         1.0         n.m.           16         27-okt-00         Billend         Manufacturing         6.05         1.2         n.a.           18         15-jan/01         Saab Marine Electronics         Manufacturing         30         1.2         14.7           20         0-3agr/01         Wolking         Manufacturing         35         0.6         10.1           21         26-jun/01         Powercom         Transportation & comm.         102         3.4         5.8           23         0-5-jul/01         Kongaberg Automotive         Manufacturing	8	07-feb-00	Nycomed Diagnostics	Manufacturing	35	2.3	8.8
10         07.ape.00         Ahistrom Pumps         Manufacturing         139         1.1         11.2           11         14-ape.00         EY Consulting Denmark         Services         48         2.6         18.4           13         15 maj.00         Eltek Fire & Safety         Manufacturing         138         0.6         12.3           15         19.jun.00         lyds Rengering         Services         65         0.5         47.5           16         127.okc.00         Billerud         Manufacturing         0.498         1.0         n.m.           16         27.okc.00         Billerud         Manufacturing         30         1.2         n.a.           17         30.okc.00         Aker Mar. Deepwater Div.         Agriculture & mining         625         1.2         n.a.           18         15.jan.01         Sam Marine Electronics         Manufacturing         30         0.6         10.1           12.0         0.jap.01         Weikosale & treatil trade         71         0.7         5.4           20.0         13.00.01         Fretorn         Wholesale & treatil trade         51         0.4         15.0           21         2.jun.01         Considue Volkosage         Services <td>9</td> <td>13-mar-00</td> <td>Sapa Autoplastics</td> <td>Manufacturing</td> <td>134</td> <td>0.4</td> <td>26.0</td>	9	13-mar-00	Sapa Autoplastics	Manufacturing	134	0.4	26.0
11         14-apr.00         EV Consulting Denmark         Services         48         2.6         18.4           12         11-maj.00         Aalkorg Industries         Manufacturing         158         0.6         12.3           14         19-jun-00         Jydsk Rengoring         Services         65         0.5         47.5           15         19-jun-00         Alfa Laval         Manufacturing         1,498         1.0         n.m.           16         27-okto0         Billend         Manufacturing         666         1.0         4.7.7           17         30-okt-00         Alfa Laval         Manufacturing         30         1.2         14.7           19         12-mar.01         Medicotest         Manufacturing         30         1.2         14.7           20         03-apt.01         Wolking         Manufacturing         35         0.6         10.1           21         2-jun-01         Precorm         Transportation & comm.         102         3.4         5.8           22         2-jun-01         Frectorm         Manufacturing         136         0.9         18.1           24         2-ju-01         Frickexa         Services         587         3.0	10	07-apr-00	Ahlstrom Pumps	Manufacturing	139	1.1	11.2
12         11-mapQ0         Aalborg Industries         Manufacturing         158         0.6         12.3           13         15-mapQ0         Eltek Fre & Safety         Manufacturing         33         1.3         10.5           14         19-jun-00         Alfa Laval         Manufacturing         1,498         1.0         n.m.           16         27-okr00         Billerod         Manufacturing         66         1.0         4.7           17         3Ockr00         Aker Mar. Deepwater Div.         Agriculture & mining         625         1.2         n.a.           18         15-jan-01         Saab Marine Electronics         Manufacturing         30         0.2         14.7           20         03-gpc01         Wediking         Manufacturing         35         0.6         10.1           21         26-jun-01         Powercom         Transportation & comm.         102         3.4         5.8           22         29-jun-01         Tretorn         Wholesale & retail trade         27         0.7         5.4           23         06-jul-01         Kongsberg Automotive         Manufacturing         136         0.9         18.1           24         27-jul-01         Consiva Group	11	14-apr-00	EY Consulting Denmark	Services	48	2.6	18.4
13         15-majQO         Eltek Fire & Safety         Manufacturing         33         1.3         10.5           14         19-juno O         Jydsk Rengoring         Services         65         0.5         47.5           15         19-juno O         Alfa Laval         Manufacturing         1.498         1.0         n.m.           16         27-okr-00         Billerud         Manufacturing         606         1.0         4.7           17         30-okr-00         Aker Mar. Deepwater Div.         Agriculture & mining         625         1.2         n.a.           18         15-jano O         Madiane Electronics         Manufacturing         30         1.2         14.7           20         03-apc O1         Medicotest         Manufacturing         30         1.2         14.7           21         26-juno I         Tretorn         Wholesale & retail trade         27         0.7         5.4           23         06-jul I         Kongsberg Automotive         Manufacturing         136         0.9         18.1           24         27-jul I         Findexa         Services         27         0.6         8.1           25         17-sep-01         Findexa         Services <t< td=""><td>12</td><td>11-maj-00</td><td>Aalborg Industries</td><td>Manufacturing</td><td>158</td><td>0.6</td><td>12.3</td></t<>	12	11-maj-00	Aalborg Industries	Manufacturing	158	0.6	12.3
14       1940000       Jydk Rengøring       Services       65       0.5       47.5         15       194000       Alfa Laval       Manufacturing       1,498       1.0       n.m.         16       27-okc00       Billerud       Manufacturing       606       1.0       4.7         17       30-okr00       Aker Mar. Deepwater Div.       Agriculture & mining       625       1.2       n.a.         18       15/an-01       Saab Marine Electronics       Manufacturing       30       1.2       14.7         20       03-apt-01       Wolfking       Manufacturing       35       0.6       10.1         21       26-jun-01       Powercom       Transportation & comm.       102       3.4       5.8         22       29-jun-01       Tretorn       Wholesale & retail trade       51       0.4       15.0         23       06-jul.01       Kongsberg Automotive       Manufacturing       136       0.9       18.1         24       27-jul.01       Consiva Group       Wholesale & retail trade       51       0.4       15.0         21       17-senka Volkswagen       Wholesale & retail trade       50       0.7       n.m.         27       14-an-02 <t< td=""><td>13</td><td>15-maj-00</td><td>Eltek Fire &amp; Safety</td><td>Manufacturing</td><td>33</td><td>1.3</td><td>10.5</td></t<>	13	15-maj-00	Eltek Fire & Safety	Manufacturing	33	1.3	10.5
15         19-jun-00         Alfa Laval         Manufacturing         1.498         1.0         n.m.           16         27-okk-00         Billerud         Manufacturing         606         1.0         4.7.           17         30-okt-00         Aker Mar. Deepwater Div.         Agriculture & mining         625         1.2         n.a.           18         15-jan-01         Saab Marine Electronics         Manufacturing         30         1.2         14.7           20         03-apr-01         Medicotesr         Manufacturing         35         0.6         10.1           21         26-jun-01         Powercom         Transportation & comm.         102         3.4         5.8           22         29-jun-01         Tretorn         Wholesale & cretail trade         27         0.7         5.4           23         06-jul-01         Kongsberg Automotive         Manufacturing         150         0.4         15.0           24         27-jul-01         Findexa         Services         587         3.0         17.4           26         28-jan-02         Svenska Volkswagen         Wholesale & retail trade         596         0.7         n.m.           27         17-sep-01         Findexa	14	19-jun-00	Jydsk Rengøring	Services	65	0.5	47.5
16         27.0kr00         Billerud         Manufacturing         606         1.0         4.7           17         30.0kr00         Aker Mar. Deepwater Div.         Agriculture & mining         625         1.2         n.a.           18         15.jan-01         Madi Marine Electronics         Manufacturing         94         1.6         13.6           19         12.mar-01         Medicotest         Manufacturing         30         1.2         14.7           20         03.apr-01         Wolfking         Manufacturing         35         0.6         10.1           21         26.jun-01         Powercom         Transportation & comm.         102         3.4         5.8           22         29.jun-01         Treetorn         Wholesale & retail trade         27         0.7         5.4           25         17.sep.01         Findexa         Services         587         3.0         17.4           26         28.jan-02         Svenska Volkswagen         Wholesale & retail trade         596         0.7         n.m.           27         31.jan-02         NVS         Construction         42         0.2         5.5           28         18.mar-02         Folygon         Services         <	15	19-jun-00	Alfa Laval	Manufacturing	1,498	1.0	n.m.
17       30.0kr.00       Aker Mar. Deepwater Div.       Agriculture & mining       625       1.2       n.a.         18       15.jan.01       Saab Marine Electronics       Manufacturing       30       1.2       14.7         20       03.apr.01       Wolfking       Manufacturing       35       0.6       10.1         21       26.jun.01       Powercom       Transportation & comm.       102       3.4       5.8         22       29.jun.01       Tretorm       Wholesale & retail trade       27       0.7       5.4         23       06.jul.01       Kongsberg Automotive       Manufacturing       136       0.9       18.1         24       27.jul.01       Consiva Group       Wholesale & retail trade       51       0.4       15.0         25       17.sep.01       Findexa       Services       587       3.0       17.4         26       28.jan.02       NovS       Construction       42       0.2       5.5         28       18.mar.02       Polygon       Services       27       0.6       8.1         29       18.mar.02       Fibertex       Manufacturing       13       17       7.9         31       13.apr.02       Nordo Link <td>16</td> <td>27-okt-00</td> <td>Billerud</td> <td>Manufacturing</td> <td>606</td> <td>1.0</td> <td>4.7</td>	16	27-okt-00	Billerud	Manufacturing	606	1.0	4.7
18         15.jan.01         Saab Marine Electronics         Manufacturing         94         1.6         13.6           19         12.mar.01         Medicotest         Manufacturing         30         1.2         14.7           20         03.apr.01         Wolfking         Manufacturing         35         0.6         10.1           21         26.jun.01         Powercom         Transportation & comm.         102         3.4         5.8           22         29.jun.01         Tretorn         Wholesale & retail trade         27         0.7         5.4           23         06.jul.01         Kongsberg Automotive         Manufacturing         136         0.9         18.1           24         27.jul.01         Constiva Group         Wholesale & retail trade         51         0.4         15.0           25         17.sep.01         Findexa         Services         587         3.0         17.4           26         28.jan.02         Svenska Volkswagen         Wholesale & retail trade         596         0.7         n.m.           27         31.jan.02         NVS         Construction         42         0.2         5.5           28         18.mar.02         Folygon         Services	17	30-okt-00	Aker Mar. Deepwater Div.	Agriculture & mining	625	1.2	n.a.
19         12-mar-01         Medicotest         Manufacturing         30         1.2         14.7           20         03-apr-01         Wolfking         Manufacturing         35         0.6         10.1           21         26-jun-01         Powercom         Transportation & comm.         102         3.4         5.8           22         29-jun-01         Tretorn         Wholesale & creail trade         27         0.7         5.4           23         06-jul-01         Kongsberg Automotive         Manufacturing         136         0.9         18.1           24         27-jul-01         Consiva Group         Wholesale & creail trade         51         0.4         15.0           25         17-sep.01         Findexa         Services         587         3.0         17.4           26         28-jan-02         Svenska Volkswagen         Wholesale & retail trade         506         0.7         n.m.           27         31-jan-02         NVS         Construction         42         0.2         5.5           28         18-mar-02         Polygon         Services         27         0.6         8.1           30         11-apr-02         Kronans Droghandel         Wholesale & retail trade <td>18</td> <td>15-jan-01</td> <td>Saab Marine Electronics</td> <td>Manufacturing</td> <td>94</td> <td>1.6</td> <td>13.6</td>	18	15-jan-01	Saab Marine Electronics	Manufacturing	94	1.6	13.6
20         03 spr.01         Wolfking         Manufacturing         35         0.6         10.1           21         26 jun.01         Powercom         Transportation & comm.         102         3.4         5.8           22         29 jun.01         Tretorn         Wholesale & retail trade         27         0.7         5.4           23         06 jul.01         Kongsberg Automotive         Manufacturing         136         0.9         18.1           24         27 jul.01         Consiva Group         Wholesale & retail trade         51         0.4         15.0           25         17 sep.01         Findexa         Services         587         3.0         17.4           26         28 jan.02         Svenska Volkswagen         Wholesale & retail trade         596         0.7         n.m.           71         31 jan.02         NVS         Construction         42         0.2         5.5           28         I8 mar.02         Fibertex         Manufacturing         82         1.1         7.6           30         11 apr.02         Kronans Droghandel         Wholesale & retail trade         150         0.1         12.3           31         23 apr.02         Nordo Link         Transporta	19	12-mar-01	Medicotest	Manufacturing	30	1.2	14.7
21         26jun-01         Powercom         Transportation & comm.         102         3.4         5.8           22         29jun-01         Tretorn         Wholesale & retail trade         27         0.7         5.4           23         O6jul-01         Kongsberg Automotive         Manufacturing         136         0.9         18.1           24         27jul-01         Consiva Group         Wholesale & retail trade         51         0.4         15.0           25         17.sep-01         Findexa         Services         587         3.0         17.4           26         28jan-02         Svenska Volkswagen         Wholesale & retail trade         596         0.7         n.m.           27         1.6         Manufacturing         82         1.1         7.6           31         Barar-02         Polygon         Services         27         0.6         8.1           31         1.9apr-02         Kronans Droghandel         Wholesale & retail trade         150         0.1         12.3           31         2.3apr-02         Nordo Link         Transportation & comm.         89         1.7         7.9           32         15-maj-02         Geijerträ         Manufacturing         307	20	03-apr-01	Wolfking	Manufacturing	35	0.6	10.1
22         29-jun-01         Tretorn         Wholesale & retail trade         27         0.7         5.4           23         06-jul-01         Kongsberg Automotive         Manufacturing         136         0.9         18.1           24         27-jul-01         Consiva Group         Wholesale & retail trade         51         0.4         15.0           25         17-sep-01         Findexa         Services         587         3.0         17.4           2         28-jan-02         Svenska Volkswagen         Wholesale & retail trade         596         0.7         n.m.           27         31-jan-02         NVS         Construction         42         0.2         5.5           28         18-mar-02         Fibertex         Manufacturing         82         1.1         7.6           31         23-apr-02         Nordo Link         Transportation & comm.         89         1.7         7.9           32         15-maj-02         Geijetträ         Manufacturing         307         1.2         n.a.           33         11-jun-02         BCI         Manufacturing         11         0.9         12.4           34         27-jun-02         Dandy         Manufacturing         1.1	21	26-iun-01	Powercom	Transportation & comm.	102	3.4	5.8
23         Objul01         Kongsberg Automotive         Manufacturing         136         0.9         18.1           24         27-jul01         Consiva Group         Wholesale & retail trade         51         0.4         15.0           25         17-sep.01         Findexa         Services         587         3.0         17.4           26         28-jan.02         Svenska Volkswagen         Wholesale & retail trade         596         0.7         n.m.           27         31-jan.02         NVS         Construction         42         0.2         5.5           28         18-mar-02         Polygon         Services         27         0.6         8.1           29         18-mar-02         Fibertex         Manufacturing         82         1.1         7.6           31         12-apr.02         Kronans Droghandel         Wholesale & retail trade         150         0.1         12.3           31         23-apr.02         Nordo Link         Transportation & comm.         89         1.7         7.9           21         I5-maj02         Geijerträ         Manufacturing         10         0.4         7.5           33         11-jun-02         BCI         Manufacturing         17 <td>22</td> <td>29-jun-01</td> <td>Tretorn</td> <td>Wholesale &amp; retail trade</td> <td>27</td> <td>0.7</td> <td>5.4</td>	22	29-jun-01	Tretorn	Wholesale & retail trade	27	0.7	5.4
2427 julo1Consive GroupWholesale & retail trade510.415.02517.sep-01FindexaServices5873.017.42628 jan-02Svenska VolkswagenWholesale & retail trade5960.7n.m.2731.jan-02NVSConstruction420.25.52818-mar-02FolygonServices270.66.12918-mar-02FibertexManufacturing821.17.63011-apr-02Kronans DroghandelWholesale & retail trade1500.112.33123-apr-02Nordo LinkTransportation & comm.891.77.93215-maj-02GeijerträManufacturing110.912.43427-jun-02DandyManufacturing3071.2n.a.3505-jul-02SMARTServices1171.2n.a.3605-jul-02Swenska FoderWholesale & retail trade730.4n.a.3710-okr-02Svenska FoderWholesale & retail trade730.4n.a.3830-okr-02NycomedManufacturing1,1262.221.43913-dec-02UnomedicalManufacturing1581.01.2.7404-mar-03Huurre GroupManufacturing1580.01.2.74104-mar-03Huurre GroupManufacturing1440.59.04104-mar-03	23	06-jul-01	Kongsberg Automotive	Manufacturing	136	0.9	18.1
25       17.sep-01       Findexa       Services       587       3.0       17.4         26       28.jan-02       Svenska Volkswagen       Wholesale & retail trade       596       0.7       n.m.         27       31.jan-02       NVS       Construction       42       0.2       5.5         28       18-mar-02       Polygon       Services       27       0.6       8.1         29       18-mar-02       Fibertex       Manufacturing       82       1.1       7.6         31       23-apr-02       Nordo Link       Transportation & comm.       89       1.7       7.9         31       23-apr-02       Nordo Link       Transportation & comm.       89       1.7       7.9         32       15-maj-02       Geijerträ       Manufacturing       11       0.9       12.4         34       27.jun-02       Dandy       Manufacturing       307       1.2       n.a.         35       05-jul-02       Swaka Foder       Wholesale & retail trade       73       0.4       n.a.         36       05-jul-02       Swenska Foder       Wholesale & retail trade       73       0.4       n.a.         37       10-okt-02       Svenska Foder	24	2.7-jul-01	Consiva Group	Wholesale & retail trade	51	0.4	15.0
2628 jan-02Svenska VolkswagenWholesale & retail trade5960.7n.m.2731.jan-02NVSConstruction420.25.52818-mar-02PolygonServices270.68.12918-mar-02FibertexManufacturing821.17.63011-apr-02Kronans DroghandelWholesale & retail trade1500.112.33123-apr-02Nordo LinkTransportation & comm.891.77.93215-maj02GeijerträManufacturing470.47.53311.jun-02BCIManufacturing3071.2n.a.3505-jul-02DandyManufacturing3071.2n.a.3710-okt-02Svenska FoderWholesale & retail trade730.4n.a.3830-okt-02NycomedManufacturing1,1262.221.43913-de-02UnomedicalManufacturing1,581.012.74016-de-02NavionTransportation & comm.350.815.74104-mar-03Huurre GroupManufacturing1581.012.74204-mar-03HindicareManufacturing440.59.04410-apr-03IncatelWholesale & retail trade151.39.64523.apr-03ComhemTransportation & comm.2582.0n.a.4607-maj-03 <t< td=""><td>25</td><td>17-sep-01</td><td>Findexa</td><td>Services</td><td>587</td><td>3.0</td><td>17.4</td></t<>	25	17-sep-01	Findexa	Services	587	3.0	17.4
27       31-jan-02       NVS       Construction       42       0.2       5.5         28       18-mar-02       Polygon       Services       27       0.6       8.1         29       18-mar-02       Fibertex       Manufacturing       82       1.1       7.6         30       11-apr-02       Kronans Droghandel       Wholesale & retail trade       150       0.1       12.3         31       23-apr-02       Nordo Link       Transportation & comm.       89       1.7       7.9         32       15-maj-02       Geijerträ       Manufacturing       11       0.9       12.4         34       27-jun-02       Dandy       Manufacturing       307       1.2       n.a.         35       05-jul-02       SMART       Services       101       1.7       16.0         36       29-aug-02       Bautas       Services       117       1.2       n.a.         37       10-okt-02       Svenska Foder       Wholesale & retail trade       73       0.4       n.a.         38       30-okt-02       Nycomed       Manufacturing       1,126       2.2       2.1 4         39       13-dec-02       Unomedical       Manufacturing       158	26	28-jan-02	Svenska Volkswagen	Wholesale & retail trade	596	0.7	n.m.
28         18-mar-02         Polygon         Services         27         0.6         8.1           29         18-mar-02         Fibertex         Manufacturing         82         1.1         7.6           30         11-apr-02         Kronans Droghandel         Wholesale & retail trade         150         0.1         12.3           31         23-apr-02         Nordo Link         Transportation & comm.         89         1.7         7.9           32         15-maj-02         Geijerträ         Manufacturing         47         0.4         7.5           33         11-jun-02         BCI         Manufacturing         307         1.2         n.a.           35         05-jul-02         SMART         Services         101         1.7         16.0           36         05-jul-02         Bautas         Services         117         1.2         n.a.           37         10-okt-02         Svenska Foder         Wholesale & retail trade         73         0.4         n.a.           38         30-okt-02         Nycomed         Manufacturing         1,126         2.2         21.4           39         13-dec-02         Unomedical         Manufacturing         158         1.0	27	31-jan-02	NVS	Construction	42	0.2	5.5
29       18-mar-02       Fibertex       Manufacturing       82       1.1       7.6         30       11-apr-02       Kronans Droghandel       Wholesale & retail trade       150       0.1       12.3         31       23-apr-02       Nordo Link       Transportation & comm.       89       1.7       7.9         32       15-maj-02       Geijerträ       Manufacturing       47       0.4       7.5         33       11-jun-02       BCI       Manufacturing       307       1.2       n.a.         35       05-jul-02       SMART       Services       101       1.7       16.0         36       29-aug-02       Bautas       Services       117       1.2       n.a.         36       05-jul-02       Swenska Foder       Wholesale & retail trade       73       0.4       n.a.         37       10-okt-02       Svenska Foder       Wholesale & retail trade       71       0.4       n.a.         38       30-okt-02       Nycomed       Manufacturing       1,126       2.2       21.4         39       13-dec-02       Unomedical       Manufacturing       158       1.0       12.7         41       04-mar-03       Hunure Group       M	28	18-mar-02	Polygon	Services	27	0.6	8.1
30       11-apr.02       Kronas Droghandel       Wholesale & retail trade       150       0.1       12.3         31       23-apr.02       Nordo Link       Transportation & comm.       89       1.7       7.9         32       15-maj.02       Geijerträ       Manufacturing       47       0.4       7.5         33       11-jun-02       BCI       Manufacturing       11       0.9       12.4         34       27-jun-02       Dandy       Manufacturing       307       1.2       n.a.         35       05-jul.02       SMART       Services       101       1.7       16.0         36       29-aug.02       Bautas       Services       117       1.2       n.a.         37       10-okt.02       Svenska Foder       Wholesale & retail trade       73       0.4       n.a.         38       30-okt.02       Nycomed       Manufacturing       1,126       2.2       2.1,4         39       13-dec.02       Unomedical       Manufacturing       175       1.2       17.3         40       16-dec.02       Navion       Transportation & comm.       800       0.7       5.8         41       04-mar.03       Hiumre Group       Manufacturin	29	18-mar-02	Fibertex	Manufacturing	82	1.1	7.6
31       23-apr-02       Nordo Link       Transportation & comm.       89       1.7       7.9         32       15-maj-02       Geijerträ       Manufacturing       47       0.4       7.5         33       11-jun-02       BCI       Manufacturing       11       0.9       12.4         34       27-jun-02       Dandy       Manufacturing       307       1.2       n.a.         35       05-jul-02       SMART       Services       101       1.7       16.0         36       29-aug-02       Bautas       Services       117       1.2       n.a.         37       10-okt-02       Svenska Foder       Wholesale & retail trade       73       0.4       n.a.         38       30-okt-02       Nycomed       Manufacturing       1,126       2.2       21.4         39       13-dec-02       Unomedical       Manufacturing       175       1.2       17.3         40       16-dec-02       Navion       Transportation & comm.       800       0.7       5.8         41       04-mar-03       Huurre Group       Manufacturing       158       1.0       12.7         42       04-mar-03       Incatel       Wholesale & retail trade	30	11.apr-02	Kronans Droghandel	Wholesale & retail trade	150	0.1	12.3
32         15-maj 02         Geijerträ         Manufacturing         47         0.4         7.5           33         11-jun-02         BCI         Manufacturing         11         0.9         12.4           34         27-jun-02         Dandy         Manufacturing         307         1.2         n.a.           35         05-jul-02         SMART         Services         101         1.7         16.0           36         29-aug-02         Bautas         Services         117         1.2         n.a.           37         10-okr-02         Svenska Foder         Wholesale & retail trade         73         0.4         n.a.           38         30-okr-02         Nycomed         Manufacturing         1,126         2.2         21.4           39         13-dec-02         Unomedical         Manufacturing         1,126         2.2         21.4           39         13-dec-02         Navion         Transportation & comm.         800         0.7         5.8           41         04-mar-03         Huurre Group         Manufacturing         158         1.0         12.7           42         04-mar-03         Handicare         Manufacturing         44         0.5         9.	31	23-apr-02	Nordo Link	Transportation & comm.	89	1.7	7.9
33       11 jun-02       BCI       Manufacturing       11       0.9       12.4         34       27 jun-02       Dandy       Manufacturing       307       1.2       n.a.         35       05 jul-02       SMART       Services       101       1.7       16.0         36       29 aug-02       Bautas       Services       117       1.2       n.a.         37       10 okt-02       Svenska Foder       Wholesale & retail trade       73       0.4       n.a.         38       30 okt-02       Nycomed       Manufacturing       1,126       2.2       21.4         39       13 dec-02       Unomedical       Manufacturing       275       1.2       17.3         40       16 dec-02       Navion       Transportation & comm.       800       0.7       5.8         41       04-mar-03       Huure Group       Manufacturing       158       1.0       12.7         42       04-mar-03       Finnmark       Transportation & comm.       35       0.8       15.7         43       24-mar-03       Incatel       Wholesale & retail trade       15       1.3       9.6         45       23 apr.03       Comhem       Transportation & comm.	32	15-mai-02	Geijerträ	Manufacturing	47	0.4	7.5
34       27-jun-02       Dandy       Manufacturing       307       1.2       n.a.         35       05-jul-02       SMART       Services       101       1.7       16.0         36       29-aug-02       Bautas       Services       117       1.2       n.a.         37       10-okt-02       Svenska Foder       Wholesale & retail trade       73       0.4       n.a.         38       30-okt-02       Nycomed       Manufacturing       1,126       2.2       21.4         39       13-dec-02       Unomedical       Manufacturing       275       1.2       17.3         40       16-dec-02       Navion       Transportation & comm.       800       0.7       5.8         41       04-mar-03       Huurre Group       Manufacturing       158       1.0       12.7         42       04-mar-03       Finnmark       Transportation & comm.       35       0.8       15.7         43       24-mar-03       Handicare       Manufacturing       44       0.5       9.0         44       10-apr-03       Incatel       Wholesale & retail trade       15       1.3       9.6         45       23-apr-03       Comhem       Transportation & comm.	33	11-jun-02	BCI	Manufacturing	11	0.9	12.4
35       05-jul-02       SMART       Services       101       1.7       16.0         36       29-aug-02       Bautas       Services       117       1.2       n.a.         37       10-okt-02       Svenska Foder       Wholesale & retail trade       73       0.4       n.a.         38       30-okt-02       Nycomed       Manufacturing       1,126       2.2       21.4         39       13-dec-02       Unomedical       Manufacturing       275       1.2       17.3         40       16-dec-02       Navion       Transportation & comm.       800       0.7       5.8         41       04-mar-03       Huurre Group       Manufacturing       158       1.0       12.7         42       04-mar-03       Finnmark       Transportation & comm.       35       0.8       15.7         43       24-mar-03       Incatel       Wholesale & retail trade       15       1.3       9.6         45       23-apr-03       Comhem       Transportation & comm.       258       2.0       n.a.         46       07-maj/03       Nopal       Manufacturing       41       0.4       8.5         47       12-jun-03       TAC       Manufacturing	34	2.7-jun-02	Dandy	Manufacturing	307	1.2	n.a.
36       29-aug-02       Bautas       Services       117       1.2       n.a.         37       10-okt-02       Svenska Foder       Wholesale & retail trade       73       0.4       n.a.         38       30-okt-02       Nycomed       Manufacturing       1,126       2.2       21.4         39       13-dec-02       Unomedical       Manufacturing       275       1.2       17.3         40       16-dec-02       Navion       Transportation & comm.       800       0.7       5.8         41       04-mar-03       Huurre Group       Manufacturing       158       1.0       12.7         42       04-mar-03       Finnmark       Transportation & comm.       35       0.8       15.7         43       24-mar-03       Handicare       Manufacturing       44       0.5       9.0         44       10-apr-03       Incatel       Wholesale & retail trade       15       1.3       9.6         45       23-apr-03       Comhem       Transportation & comm.       258       2.0       n.a.         46       07-maj-03       Nopal       Manufacturing       41       0.4       8.5         47       12-jun-03       TAC       Manufacturin	35	05-jul-02	SMART	Services	101	1.7	16.0
37       10-okt-02       Svenska Foder       Wholesale & retail trade       73       0.4       n.a.         38       30-okt-02       Nycomed       Manufacturing       1,126       2.2       21.4         39       13-dec-02       Unomedical       Manufacturing       275       1.2       17.3         40       16-dec-02       Navion       Transportation & comm.       800       0.7       5.8         41       04-mar-03       Huure Group       Manufacturing       158       1.0       12.7         42       04-mar-03       Finnmark       Transportation & comm.       35       0.8       15.7         43       24-mar-03       Handicare       Manufacturing       44       0.5       9.0         44       10-apr-03       Incatel       Wholesale & retail trade       15       1.3       9.6         45       23-apr-03       Comhem       Transportation & comm.       258       2.0       n.a.         46       07-maj-03       Nopal       Manufacturing       41       0.4       8.5         47       12-jun-03       TAC       Manufacturing       34       2.2       3.7         49       08-sep-03       Utfors       Transporta	36	29-aug-02	Bautas	Services	117	1.2	n.a.
38         30-okt-02         Nycomed         Manufacturing         1,126         2.2         21.4           39         13-dec-02         Unomedical         Manufacturing         275         1.2         17.3           40         16-dec-02         Navion         Transportation & comm.         800         0.7         5.8           41         04-mar-03         Huure Group         Manufacturing         158         1.0         12.7           42         04-mar-03         Finnmark         Transportation & comm.         35         0.8         15.7           43         24-mar-03         Handicare         Manufacturing         44         0.5         9.0           44         10-apr-03         Incatel         Wholesale & retail trade         15         1.3         9.6           45         23-apr-03         Comhem         Transportation & comm.         258         2.0         n.a.           46         07-maj-03         Nopal         Manufacturing         41         0.4         8.5           47         12-jun-03         TAC         Manufacturing         34         2.2         3.7           49         08-sep-03         Utfors         Transportation & comm.         49	37	10-okt-02	Svenska Foder	Wholesale & retail trade	73	0.4	n.a.
39       13-dec-02       Unomedical       Manufacturing       275       1.2       17.3         40       16-dec-02       Navion       Transportation & comm.       800       0.7       5.8         41       04-mar-03       Huure Group       Manufacturing       158       1.0       12.7         42       04-mar-03       Finnmark       Transportation & comm.       35       0.8       15.7         43       24-mar-03       Handicare       Manufacturing       44       0.5       9.0         44       10-apr-03       Incatel       Wholesale & retail trade       15       1.3       9.6         45       23-apr-03       Comhem       Transportation & comm.       258       2.0       n.a.         46       07-maj-03       Nopal       Manufacturing       41       0.4       8.5         47       12-jun-03       TAC       Manufacturing       34       2.2       3.7         49       08-sep-03       Utfors       Transportation & comm.       49       0.6       n.a.         50       19-nov-03       Ki Consulting & Solutions       Services       162       1.3       n.a.         51       24-nov-03       Hilding Anders	38	30-okt-02	Nycomed	Manufacturing	1,126	2.2	21.4
40       16-dec-02       Navion       Transportation & comm.       800       0.7       5.8         41       04-mar-03       Huurre Group       Manufacturing       158       1.0       12.7         42       04-mar-03       Finnmark       Transportation & comm.       35       0.8       15.7         43       24-mar-03       Handicare       Manufacturing       44       0.5       9.0         44       10-apr-03       Incatel       Wholesale & retail trade       15       1.3       9.6         45       23-apr-03       Comhem       Transportation & comm.       258       2.0       n.a.         46       07-maj-03       Nopal       Manufacturing       41       0.4       8.5         47       12-jun-03       TAC       Manufacturing       496       1.2       11.6         48       24-jul-03       Carmeda       Manufacturing       34       2.2       3.7         49       08-sep-03       Utfors       Transportation & comm.       49       0.6       n.a.         50       19-nov-03       Ki Consulting & Solutions       Services       162       1.3       n.a.         51       24-nov-03       Hilding Anders       Ma	39	13-dec-02	Unomedical	Manufacturing	275	1.2	17.3
41       04-mar-03       Huure Group       Manufacturing       158       1.0       12.7         42       04-mar-03       Finnmark       Transportation & comm.       35       0.8       15.7         43       24-mar-03       Handicare       Manufacturing       44       0.5       9.0         44       10-apr-03       Incatel       Wholesale & retail trade       15       1.3       9.6         45       23-apr-03       Comhem       Transportation & comm.       258       2.0       n.a.         46       07-maj-03       Nopal       Manufacturing       41       0.4       8.5         47       12-jun-03       TAC       Manufacturing       496       1.2       11.6         48       24-jul-03       Carmeda       Manufacturing       34       2.2       3.7         49       08-sep-03       Utfors       Transportation & comm.       49       0.6       n.a.         50       19-nov-03       Ki Consulting & Solutions       Services       162       1.3       n.a.         51       24-nov-03       Hilding Anders       Manufacturing       476       1.0       8.2	40	16-dec-02	Navion	Transportation & comm.	800	0.7	5.8
42       04-mar-03       Finnmark       Transportation & comm.       35       0.8       15.7         43       24-mar-03       Handicare       Manufacturing       44       0.5       9.0         44       10-apr-03       Incatel       Wholesale & retail trade       15       1.3       9.6         45       23-apr-03       Comhem       Transportation & comm.       258       2.0       n.a.         46       07-maj-03       Nopal       Manufacturing       41       0.4       8.5         47       12-jun-03       TAC       Manufacturing       496       1.2       11.6         48       24-jul-03       Carmeda       Manufacturing       34       2.2       3.7         49       08-sep-03       Utfors       Transportation & comm.       49       0.6       n.a.         50       19-nov-03       Ki Consulting & Solutions       Services       162       1.3       n.a.         51       24-nov-03       Hilding Anders       Manufacturing       476       1.0       8.2	41	04-mar-03	Huurre Group	Manufacturing	158	1.0	12.7
43       24-mar-03       Handicare       Manufacturing       44       0.5       9.0         44       10-apr-03       Incatel       Wholesale & retail trade       15       1.3       9.6         45       23-apr-03       Comhem       Transportation & comm.       258       2.0       n.a.         46       07-maj-03       Nopal       Manufacturing       41       0.4       8.5         47       12-jun-03       TAC       Manufacturing       496       1.2       11.6         48       24-jul-03       Carmeda       Manufacturing       34       2.2       3.7         49       08-sep-03       Utfors       Transportation & comm.       49       0.6       n.a.         50       19-nov-03       Ki Consulting & Solutions       Services       162       1.3       n.a.         51       24-nov-03       Hilding Anders       Manufacturing       476       1.0       8.2	42	04-mar-03	Finnmark	Transportation & comm.	35	0.8	15.7
4410-apr-03IncatelWholesale & retail trade151.39.64523-apr-03ComhemTransportation & comm.2582.0n.a.4607-maj-03NopalManufacturing410.48.54712-jun-03TACManufacturing4961.211.64824-jul-03CarmedaManufacturing342.23.74908-sep-03UtforsTransportation & comm.4990.6n.a.5019-nov-03Ki Consulting & SolutionsServices1621.3n.a.5124-nov-03Hilding AndersManufacturing4761.08.2	43	24-mar-03	Handicare	Manufacturing	44	0.5	9.0
45       23-apr-03       Comhem       Transportation & comm.       258       2.0       n.a.         46       07-maj-03       Nopal       Manufacturing       41       0.4       8.5         47       12-jun-03       TAC       Manufacturing       496       1.2       11.6         48       24-jul-03       Carmeda       Manufacturing       34       2.2       3.7         49       08-sep-03       Utfors       Transportation & comm.       49       0.6       n.a.         50       19-nov-03       Ki Consulting & Solutions       Services       162       1.3       n.a.         51       24-nov-03       Hilding Anders       Manufacturing       476       1.0       8.2	44	10-apr-03	Incatel	Wholesale & retail trade	15	1.3	9.6
4607-maj.03NopalManufacturing410.48.54712-jun.03TACManufacturing4961.211.64824-jul.03CarmedaManufacturing342.23.74908-sep.03UtforsTransportation & comm.490.6n.a.5019-nov-03Ki Consulting & SolutionsServices1621.3n.a.5124-nov-03Hilding AndersManufacturing4761.08.2	45	23-apr-03	Comhem	Transportation & comm.	258	2.0	n.a.
4712-jun-03TACManufacturing4961.211.64824-jul-03CarmedaManufacturing342.23.74908-sep-03UtforsTransportation & comm.490.6n.a.5019-nov-03Ki Consulting & SolutionsServices1621.3n.a.5124-nov-03Hilding AndersManufacturing4761.08.2	46	07-mai/03	Nopal	Manufacturing	41	0.4	8.5
4824-jul-03CarmedaManufacturing342.23.74908-sep-03UtforsTransportation & comm.490.6n.a.5019-nov-03Ki Consulting & SolutionsServices1621.3n.a.5124-nov-03Hilding AndersManufacturing4761.08.2	47	12.jup.03	TAC	Manufacturing	496	1.2	11.6
4908-sep-03UtforsTransportation & comm.490.6n.a.5019-nov-03Ki Consulting & SolutionsServices1621.3n.a.5124-nov-03Hilding AndersManufacturing4761.08.2	48	24-jul-03	Carmeda	Manufacturing	34	2.2	3.7
5019-nov-03Ki Consulting & SolutionsServices1621.3n.a.5124-nov-03Hilding AndersManufacturing4761.08.2	49	08-sep-03	Utfors	Transportation & comm.	49	0.6	n.a.
51 24-pov-03 Hilding Anders Manufacturing 476 1.0 8.2	50	19-nov-03	Ki Consulting & Solutions	Services	162	1.3	n.a
	51	24-nov-03	Hilding Anders	Manufacturing	476	1.0	8.2

52	10-dec-03	Sonofon	Transportation & comm.	1,649	2.5	22.8
53	18-dec-03	Scandinavian IT Group	Services	260	1.0	31.8
54	23-dec-03	Pronova Biocare	Manufacturing	64	1.4	n.a.
55	19-jan-04	Pharmacia Diagnostics	Services	575	2.0	n.a.
56	21-jan-04	Momentum Ind. Maint.	Wholesale & retail trade	60	0.8	11.0
57	19-feb-04	XOR Group	Services	15	1.0	10.1
58	19-feb-04	Carlsberg Breweries	Manufacturing	7,105	0.9	17.6
59	05-mar-04	Expan	Manufacturing	24	0.3	6.9
60	08-mar-04	Dahl International	Wholesale & retail trade	849	0.5	12.1
61	17-mar-04	Parere	Services	59	2.0	16.9
62	21-apr-04	Tribon Solutions	Services	34	1.3	22.0
63	30-apr-04	CBB Mobil	Transportation & comm.	18	3.5	5.7
64	03-jun-04	Ortofon	Manufacturing	28	1.6	4.8
65	04-jun-04	Jensen Møbler	Manufacturing	25	0.6	11.3
66	29-jun-04	Engel-Yhtymä	Real estate	234	1.1	n.a.
67	08-jul-04	Orange	Transportation & comm.	1,577	4.9	n.a.
68	30-jul-04	IO Interactive	Services	43	3.2	n.a.
69	19-aug-04	Jarowskij	Services	11	0.4	15.8
70	06-sep-04	Marsing & Co	Wholesale & retail trade	20	0.4	n.m.
71	12-sep-04	Buksesnedkeren	Wholesale & retail trade	47	0.8	9.6
72	26-okt-04	Thule	Manufacturing	800	2.6	28.5
73	05-nov-04	Elitfönster	Manufacturing	67	0.4	5.0
74	29-nov-04	Grenland Framnæs	Services	36	1.8	n.m.
75	01-dec-04	NetDesign	Services	62	1.2	18.4
76	15-dec-04	Sense Comm. Int'l	Transportation & comm.	65	0.7	n.a.
77	09-feb-05	Arca Systems Int'l	Manufacturing	383	1.6	n.m.
78	21-mar-05	Yomi Software	Services	14	0.6	n.a.

#### Table A2. Public reference portfolio sample

Portf	olio №	Peer 1	Peer 2	Peer 3	Peer 4	Peer 5	Peer 6	Peer 7	Peer 8	Peer 9	Peer 10	Median EV/Sales	Median EV/EBIT
	1	Audiodev	Electrolux	Incap	Micronic	Vacon	Vaisala					0.0	12.5
	2	Incap	Nor. Semic.	Vmetro								2.5	12.5
	3	Flügger	H+H Int'l	Nord. Solar	Rockwool	Rocla	Sanistäl					0.5	7.1
	4	Atlas Copco	Kone	Konecranes	Metso	Rocla	Sandvik	VT Holding				0.7	11.0
	5	H&M	Lindex	Marimekko	New Wave							1.2	17.9
	6	AstraZeneca	H. Lundb.	Novo Nordisk	Orion	Q-MED						4.2	24.3
	7	H+H Int'l	Nord. Solar	Rockwool	Sanistäl							0.4	7.7
	8	Ambu	Coloplast	Elekta	Gambro	Getinge	GN St. Nord	Radiometer				1.5	10.7
	9	Haldex	Hexagon	Höganäs	Nokian Renk.	Nolato	Trelleborg					1.6	12.7
	10	Atlas Copco	Metso	Sandvik	Seco Tools	SKF						2.0	12.8
	11	Cybercom	EDB	Enea	HiQ	Sigma	Teleca	TietoEnator	Enea			3.6	43.2
	12	Hexagon	Kongsb. Gr.	Nibe Ind.	Saab							0.8	9.4
	13	Consilium	Eltek	Incap	LPG Allgon	Nera	RTX Telecom					1.3	27.3
	14	ISS	Las. & Tik.	Securitas								1.1	36.3
	15	CenCorp	Electrolux	Karolin M. T.	Larox	Metso	Seco Tools	Trelleborg				0.8	n.m.
	16	SCA	Holmen	M-Real	Norske Skog	Rottneros	Stora Enso	UPM-Kym.				1.1	10.5
	17	Fred Ols. E.	Petrol. Geo.	Petrolia Drill.	Prosafe	Smedvig						1.4	n.a.
	18	Benefon	Consilium	Kongsb. Gr.	Strømme							0.6	14.6
	19	Ambu	Biohit	Capio	Coloplast	Elekta	Gambro	Getinge				1.4	13.3
	20	CenCorp	Haldex	Kyro	Metso	Munters	Strälfors	Tomra Sys.				0.8	14.4
	21	Elisa	TDC	Tele2	Telenor	TeliaSonera	Utfors					2.8	27.9
	22	Conseptor	Fenix Out.	H&M	JC	Lindex	New Wave					0.9	10.3
	23	Autoliv	Haldex	Munters								0.6	8.0
	24	Cloetta Faz.	Danisco	Karlshamns	Orkla	Sardus						0.8	11.5
	25	Alma Media	Eniro	MTG	Sanomawsoy	Schibsted	Talentum	TV4				1.7	19.0
	26	And. & Mar.	Bilia	Lastas	Scania	Volvo						0.3	n.m.
	27	Gunnebo	Hexagon	Munters	Nibe Ind.	Trelleborg						0.5	10.9
	28	ISS	Las. & Tik.	Munters	Securitas							1.3	13.6
	29	Borås W.	Egetaepper	Gabriel Hldg	Rand. Rebs.	Schouw & Co.	Suominen	Tamfelt				0.7	9.1
	30	Meda	Plandent	Tamro								0.2	9.4

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31	Damp. Tor.	DOF	Farstad Ship.	Mols Linien	Solstad Offsh.				3.1	7.8
32	CF Berg	M-real	Rörvik Tim.	Stora Enso					0.5	11.7
33	Ballingslöv	Ekornes	Expanda	Håg	Nobia				0.7	7.6
34	Cloetta Fazer	Danisco	Orkla	Sardus					1.1	n.a.
35	Basware	Norman	Orc Software	Readsoft	SimCorp	Telecomput.	Telelogic		2.0	19.1
36	Atlas Copco	Rak. Kone.	Ramirent						1.4	n.a.
37	BioMar	Hedegaard	HK Ruokatalo	Län. Tehtaat	Raisio				0.3	n.a.
38	AstraZeneca	H. Lundb.	Karo Bio	Medivir	Novo Nordisk	Orion	Q-MED		4.9	20.9
39	Ambu	Coloplast	Elekta	Gambro	Getinge	GN St. Nord	Nobel Biocare		1.5	14.4
40	Damp. Tor.	DOF	Farstad Ship.	Mols Linien	Solstad Offsh.				3.1	7.8
41	Audiodev	Electrolux	Micronic	Vacon	Vaisala				1.1	11.2
42	Birka Line	Damp. Tor.	DFDS	DOF	Farstad Ship.	Finnlines	Solstad Offsh.	Birka Line	1.5	10.9
43	Ambu	Coloplast	Gambro	Getinge	Nobel Biocare				1.4	10.8
44	IBS	IFS	Intentia	Software Inn.	SuperOffice	Telecomput.			0.6	11.1
45	Glocalnet	Song	TDC	Tele2	Telenor	TeliaSonera	Thalamus		1.3	n.a.
46	Axfood	Cloetta Faz.	Danisco	Orkla	Rieber & Son				1.1	10.3
47	Audiodev	Elektrobit	Micronic	Nord. Solar	Tandberg	Vacon	Vaisala		1.4	13.4
48	Bavarian N.	Gambro	Karo Bio	Medivir	Neurosearch	Ortivus			1.3	11.7
49	Glocalnet	Song	TDC	Tele2	Telenor	TeliaSonera	Thalamus		1.3	n.a.
50	Ementor	HiQ	Teleca	TietoEnator	WM-Data				0.5	n.a.
51	Ballingslöv	Ekornes	Expanda	Nobia	Svedbergs				0.7	7.2
52	Elisa	GN St. Nord	TDC	Tele2	Telenor	TeliaSonera			1.3	19.9
53	Aldata Sol.	EDB	F-Secure	IFS	Norman	Orc Software	SimCorp		0.8	11.0
54	Aarhus Utd	Karlshamns	Meda	Novozymes					0.7	n.a.
55	Ambu	Elekta	Gambro	Getinge	Nobel Biocare				1.0	n.a.
56	Assa Abloy	Atlas Copco	Kone	Metso	Sandvik	SKF			1.1	11.6
57	IBS	Norman	Orc Software	SimCorp	Telelogic	Visma			1.9	13.1
58	Bryggr.	Carlsberg	Harboes Br.	Olvi					0.8	9.7
59	Flugger	H+H Intl.	Nord. Solar	Rockwool	Sanistāl	Spæncom	Wewers		0.5	10.4
60	DLH	A&O Joh.	Nord. Solar	Sanistäl					0.4	10.8
61	F-Secure	Nexus	Norman	Orc Software	SimCorp	Telelogic	Visma		2.5	16.2
62	F-Secure	Nexus	Norman	Orc Software	SimCorp	Telelogic	Visma		2.5	16.2

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63	Elisa	TDC	Tele2	Telenor	TeliaSonera					1.7	15.5
64	Audiodev	Bang & Olu.								1.6	13.4
65	Ballingslöv	Ekornes	Nobia							0.8	10.0
66	ISS	Las. & Tik.	Securitas							0.9	n.a.
67	Elisa	Millicom	Saunalahti	TDC	Tele2	Telenor	TeliaSonera			1.7	n.a.
68	Aspiro	Boss Media	Daydream	Digital Ill.	Orc Software					2.2	n.a.
69	Alma Media	MTG	MTV	Schibsted	Talentum	TV4				1.0	13.9
70	Meda	Orion	Plandent							0.5	n.m.
71	Fenix Out.	H&M	JC	Lindex	Marimekko	New Wave				1.0	9.6
72	Haldex	Kabe	Mekonomen	Sc. Brake Sys.						0.5	14.3
73	Ballingslöv	Hexagon	Nobia	Tulikivi						0.8	8.4
74	Fred Ols. E.	J. Pöyry	Ocean Rig	Petrol. Geo.	Prosafe	Smedvig	Solstad Offsh.	Solstad Offsh.		2.2	n.m.
75	F-Secure	Nexus	Norman	Orc Software	RTX Telecom	SimCorp	Telelogic	TietoEnator	WM-Data	1.7	15.9
76	Elisa	Millicom	Saunalahti	TDC	Tele2	Telenor	TeliaSonera			1.7	n.a.
77	Huhtamäki	Kemira	Nilörn-gr.	Nolato						0.7	n.m.
78	Birdstep T.	Comptel	Tecnomen							2.8	n.a.

## 12.2. Appendix B: Additional regression output materials

Exhibit A1. Classplot of predicted probabilities



The model seems to perform rather well in assessing cases that are really discounts ('1'), as can be seen by the large frequency of ones at the upper end of the X axis. For the cases that are not discounts, quite a few are incorrectly coded and very few are classified as zeros correctly with high precision.





The Pearson residual is a most commonly used residual measure. A thumb rule identification of outliers is ±2 standard deviations, a definition which encompasses the transactions of IO Interactive, Incatel and CBB Mobil.

0.227

PEbuyer

0.671

## 12.3. Appendix C: Regression excluding ROE

Panel A.	Panel A. Model summary										
Number of observations R <sup>2</sup> approximations											
	54						Cox & Snell	Nagelkerke			
							0.127	0.172			
Block likel	ihood ratio test						Hosmer-Lemesh	ow test			
	-2LogL	$\chi^2_{obs}$	df	Sig.			$\chi^2_{ob}$	df	Sig.		
	64.828	7.343	3	0.062			9.034	8	0.339		
Panel B.	Regressors in th	e equatio	n								
	$\beta_{obs}$	se(β <sub>ob</sub>	,)	Wald stat.	df	Sig.	$\exp(\beta_{obs})$	95% CI+	95% CI-		
Intercept	7.033	3.11	0	5.113	1	0.024	1133.006	n.a.	n.a.		
InAssets	-0.539	0.23	7	5.177	1	0.023	0.583	0.367	0.928		
Z'	-0.185	0.13	8	1.807	1	0.179	0.831	0.635	1.088		

Table A3. Summary of binomial logistic regression on discount probability excluding ROE

The chi-square test shows improved significance, now the model is statistically significant at the 10 percent level. Coefficients of Z' and PEbuyer increase in magnitude and their p-values drop, while the effect is the opposite for InAssets.

1

0.736

1.254

0.337

4.673

0.114

# 12.4. Appendix D: Pratt's levels of value model<sup>70</sup>



Exhibit A3. The levels of value model for marketability and control factors

Control shares in a privately held company may also be subject to some discounts for lack of marketability, but usually not nearly as much as minority shares.
 Minority and marketability discounts normally are multiplicative rather than additive.

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12.5.	Appendix E:	Carnegie Res	search sector multiples
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Sector	Sector weight	<b>№</b> of companies	EV/EBIT 2004	EV/EBIT 2005E	EV/Sales 2004	EV/Sales 2005E
Capital goods	16.6%	17	12.9	10.0	0.9	0.8
Commercial services & supplies	1.6%	2	14.6	11.7	0.8	0.7
Consumer discretionary	9.4%	9	15.4	14.2	1.5	1.4
Consumer staples	4.0%	7	15.6	13.8	1.5	1.2
Healthcare	19.9%	11	18.5	12.3	3.7	3.3
Materials	9.2%	13	13.3	14.7	1.0	1.0
Software & services	0.7%	3	11.1	13.4	1.3	1.2
Technology hardware & equipm.	20.1%	3	11.7	10.4	1.9	1.7
Telecom services	9.4%	6	9.7	9.2	1.5	1.4
Transportation	9.0%	6	12.1	9.0	1.7	1.5
Nordic total	100.0%	77	13.8	11.4	1.9	1.7

#### Table A4. Enterprise value-based multiples for traded Nordic companies in different sectors

The above data show sector trading multiples based on trading prices for 77 listed companies in the Nordic region covered by Carnegie Research. Multiples have been computed by the authors based on data provided in the Nordic equity strategy report for the autumn of 2005. 2004 figures have been adjusted for one-offs. Aggregate numbers are market value-weighted.