UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Master Degree Project in Finance

Indirect Bankruptcy Costs

Evidence from Swedish Bankruptcies

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Master Degree Project No. 2014:93
Graduate School

University of Gothenburg
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Spring 2014

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Abstract

We estimate direct and indirect bankruptcy costs for 23 traded Swedish firms with completed bankruptcy procedures. We estimate direct costs of bankruptcy to on average 0.81-5.48% of enterprise value prior to financial distress and indirect costs of bankruptcy to on average 58-79%. Our analysis builds on previous work by Andrade and Kaplan (1998). In contrast to U.S. bankruptcy laws, Swedish procedures force a court appointed bankruptcy trustee to auction off the firm as parts or as an on-going concern. The characteristics of our Swedish data thus enable us to estimate the market value of firms after the occurrence of bankruptcy. We combine that data with estimates of direct costs of bankruptcy and data on the market value of firms before onset of financial distress in order to estimate the indirect costs of bankruptcy for each firm in our sample. We conclude that indirect costs of bankruptcy are of significant importance in firms' capital structure decision and that direct costs of bankruptcy should be of trivial importance. Further, our results indicate that Swedish bankruptcy regulations may have an augmenting effect on indirect costs of bankruptcy.

Keywords: Indirect bankruptcy costs, Direct bankruptcy costs, Capital structure, Bankruptcy procedures, Financing decision, Empirical corporate finance.

Tutor: Professor Martin Holmén
Date: 27 May 2014

Acknowledgements: We would like to thank our tutor Martin Holmén, Professor at the Centre for Finance, University of Gothenburg, for his guidance and insightful feedback throughout the writing process. We would also like to thank Sridhar Arcot, Assistant Professor at the Department of Finance, ESSEC Business School in Paris, for his valuable and inspirational input in discussions on the topic of this paper.

1. Introduction

We exploit information available in Swedish bankruptcy files in order to estimate the total costs of bankruptcy for 23 Swedish firms who were traded on four different stock exchanges just prior to bankruptcy. Total costs of bankruptcy consist of direct costs of bankruptcy and indirect costs of bankruptcy. Direct costs relate to administrative charges that can be directly linked to the occurrence of bankruptcy. Indirect costs however are harder to quantify and include the loss of sales and profits caused by the financial distress itself. Indirect costs of bankruptcy arise because suppliers and customers might become reluctant to do business with a firm severely affected by bankruptcy risk.

The aim of this paper is to indicate the size and significance of direct and indirect costs of bankruptcy for Swedish firms. The size of total bankruptcy costs is important for both researchers and finance practitioners. Firstly, the size of total bankruptcy costs is important for the trade-off theory of capital structure, and a better understanding of bankruptcy costs would have implications for firm valuations and the choice between debt and equity for managers that aim to maximize firm value. Secondly, it is important for managers to be aware of how indirect costs may impact firm value in times of financial distress since both sales and profits will be negatively affected when customers and suppliers become reluctant to do business with the distressed firm. For example, car manufacturers provide their customers with aftermarket services such as spare parts and warranties. Hortaçsu et al. (2013) show that when a car company is under bankruptcy risk, the future provision of these services is threatened, which reduces consumers' willingness-to-pay for cars of that brand. Media speculations regarding the bankruptcy of the car manufacturer SAAB Automobile 2011 exemplify this phenomenon. Media reported about a significant drop in sales for SAAB just prior to the bankruptcy and also about the possible negative value effects SAAB owners could expect for their cars on the second-hand market. Just as this example illustrates, the financial health of a company can lead to indirect bankruptcy costs which might reduce the value of the firm.

Our method extensively builds on previous work by Andrade and Kaplan (1998) who also studied the puzzle of bankruptcy costs. Their study primarily focuses on American firms while our study solely includes traded Swedish firms that have gone bankrupt. The main

difference with our data is that we have access to the exact liquidation value of the firm after bankruptcy and that we rely on expert opinions by bankruptcy trustees when deciding the pre-distress date. Given financial theories and previous research findings, our data enables us to estimate the indirect costs of bankruptcy for all firms in our sample. In Sweden the incumbent management is replaced by a bankruptcy trustee when the firm files for bankruptcy. We therefore expect the design of the Swedish bankruptcy system to yield higher estimates of indirect bankruptcy costs, since the bankruptcy trustee might not be able to fully appreciate the true value of the company.

Modigliani and Miller (1963) showed that a firm should, in perfect capital markets, maximize the level of debt in order to maximize the value of the firm. Since real markets are not fully perfect and indeed exhibit both transaction costs and bankruptcy costs, firms should generally not rely solely on debt financing. Kraus and Litzenberger (1973) formally introduce the importance of bankruptcy costs and tax advantage in the financing decision. They illustrate that there should exist a level of debt where the marginal benefits of debt no longer exceed the expected marginal costs of bankruptcy. This relationship is formally known as the trade-off theory of capital structure.

To estimate the indirect costs of bankruptcy for each firm in our sample we begin by calculating enterprise value on the financial distress date. The date of financial distress has been estimated by a bankruptcy trustee with access to private information and is for each of our 23 observations presented in the bankruptcy file. From these files we collect data on liquidation values of assets, which serve as the estimated value of the firm after the bankruptcy has ended. The difference in value between these two dates is thus the total value loss caused by the bankruptcy itself. From this value we deduct direct costs of bankruptcy to arrive at an estimation of indirect costs of bankruptcy.

We estimate direct costs of bankruptcy to on average 0.81-5.48% of enterprise value prior to financial distress, and indirect bankruptcy costs to lie between 58% and 79%. Direct costs are coherent with previous findings, e.g. Warner (1977) who estimates direct costs of bankruptcy to 1.00-5.30% of firm value prior to bankruptcy. Our estimation of indirect costs of bankruptcy is higher than what has been estimated before, compared to for instance Andrade and Kaplan (1998) who estimate indirect bankruptcy costs to 10-20% of firm value, and Altman (1984) who estimates indirect costs to 17.30%. There might be several explanations to our high estimates of indirect bankruptcy costs. We do however argue that the most plausible explanation descends from a combination of the growth characteristics of firms in our sample and the effect on firm value that the Swedish

bankruptcy procedure has when it replaces a strategically important asset, i.e. the management, with a bankruptcy trustee and by that immediately reducing the value of an already distressed firm. The value reduction of a replaced management is most likely higher for growth companies, since they in many cases are owned and led by entrepreneurs on whom the company relies heavily to prompt future growth and success.

We conclude that the direct costs are negligible in a firm's financing decision and that indirect costs of bankruptcy are of significant size and therefore relevant in the choice of capital structure for managers of any firm. Our findings are relevant for researchers since they indicate that indirect costs of bankruptcy might be higher than what has been estimated before, and that growth companies exposed to bankruptcy regulations similar to those in Sweden should expect their indirect costs of financial distress to be higher since their management will be replaced by a bankruptcy trustee in case of bankruptcy. Moreover, our results are also highly relevant for investors evaluating and comparing different investments, and for decision makers who legislate on the design and structure of bankruptcy procedures.

2. Theory

Modigliani and Miller (1958) show that, in perfect capital markets, firm value is independent of capital structure. Such a world ignores taxation of corporate profits and the presence of corporate bankruptcy costs. Modigliani and Miller (1963) incorporate taxes and show that a firm that can meet its debt obligations with absolute certainty should have a positive linear relation between market value and the level of debt. This is true since borrowed money can be invested in value generating activities and the tax deductibility of interest payments, while at the same time not increasing the expected present value of bankruptcy costs.

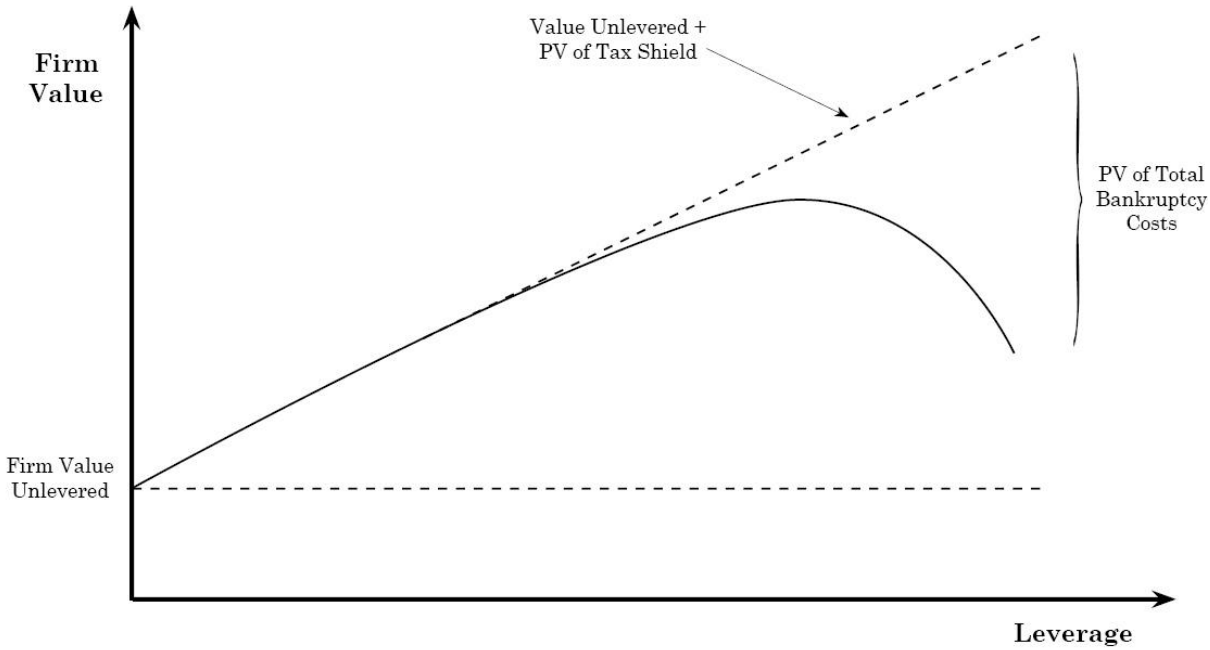
Kraus and Litzenberger (1973) formally introduce the significance of both tax advantages and bankruptcy costs in the valuation of firms. They show that the market value of a levered firm equals its unlevered value plus the corporate tax rate times the market value of the firm's debt, less the present value of expected bankruptcy costs.[1] Their findings thus imply that there should be an optimal capital structure where the

[1] The corporate tax rate times the market value of debt for a firm will throughout this paper be referred to as the present value of tax shield.

expected marginal cost of bankruptcy equals the marginal benefit of the tax shield. This relationship is graphically illustrated in figure 1. The expected cost of bankruptcy is partly determined by the probability that the firm will default on future obligations, which is very much related to the firm's expected cash flow situation. It is indeed the expected cost of bankruptcy that is relevant for firms' capital structure decisions. Assume for instance an A- rated company with an estimated probability of default of 2.5% and an estimated total bankruptcy cost of 50% of firm value before onset of financial distress. Thus, the expected total cost of bankruptcy for this company is 1.25% of firm value before onset of financial distress. Assume instead a B- rated company with an estimated risk of default of 45% with the same estimated total bankruptcy costs as in the previous example, which yields expected total bankruptcy costs of 22.5% of firm value before onset of financial distress. This simple example illustrates the importance of considering this relationship when analyzing bankruptcy costs. It also demonstrates that total costs of bankruptcy can be expected to be of significant magnitude for a value diminishing effect to exist as illustrated in figure 1.

Figure 1

The Trade-off Theory of Capital Structure



Total bankruptcy costs as described above may thus be of significant importance in the search for an optimal capital structure. Total bankruptcy costs are comprised of direct

costs of bankruptcy and indirect costs of bankruptcy. Altman (1984) refers to direct costs of bankruptcy as costs related to legal fees, accounting fees, filing fees and other administrative costs. One of Altman's major challenges was however related to finding a proxy which could be used to estimate the indirect costs of bankruptcy. Altman describes indirect costs of bankruptcy as the loss of profits a firm can expect to incur due to significant bankruptcy risk. Altman argues for the inclusion of the opportunity cost of lost managerial energies in the definition of indirect bankruptcy costs. Except from the loss of sales and loss of profits, Altman also includes higher cost of credit and the inability of an enterprise to obtain new credits through issuance of new securities. Thus, the incapability to obtain new financing results in the loss of investment opportunities for the firm.

The notion of agency costs is a factor that is not directly linked to the total cost of bankruptcy. It might however have a significant effect on firm value for a company that has entered into financial distress. The logic of agency costs in the case of financial distress comes from the fact that debt holders and equity holders have different claims on the company, and by that altered perceptions about risk. Equity investors who share in both upside potential and downside risk, may be more willing to take risk than bond investors who have limited upside potential but share downward risk (Jensen and Meckling, 1976). Agency costs may primarily show up in two ways. Creditors may firstly charge higher interest rates to reflect their perception of risk. Secondly, they might add covenants to the contracts which severely restrict the actions of equity investors in running the firm. Examples of such covenants may be conditions limiting the company to incur new debt, buying back stock and taking on positive NPV projects which would have a value increasing effect on the firm.

3. Previous Findings

Bankruptcy costs and the search for an optimal capital structure are issues that have been puzzling scholars for decades and there are multiple studies in which attempts to estimate the size of bankruptcy costs have been made. One of the earlier studies was made by Warner (1977), who estimates the size of direct costs of bankruptcy by analyzing a sample of American bankrupt railroad companies. By collecting cost data on legal fees, professional services, and filing fees, he estimates direct costs of bankruptcy to

about 1% of market value of a firm seven years prior to bankruptcy and 5.3% just prior to bankruptcy. He also finds that the ratio between direct costs of bankruptcy and the market value of the firm exhibits a negative relationship, i.e. the importance of the direct bankruptcy costs falls with firm size.

Brealy and Myers (1984) argue that indirect bankruptcy costs should be of significant importance, particularly for large firms. However, Warner does not attempt to estimate these indirect costs, something that is done by Altman (1984). Altman uses two different methods to perform his estimations on a sample of firms that later went bankrupt, and he argues that bankruptcy costs should be of significant importance in a firm's financing decision. Firstly, he uses a method that compares the unanticipated decline in revenues compared to other companies in the same industry. Secondly, he performs a measurement of the deviation between the firms' realized earnings and analyst forecasts. His first method yields values for the direct costs of bankruptcy between 4.30% and 6.20% of firm value, and an estimate of indirect bankruptcy costs of 8.10% three years prior to bankruptcy and 10.50% just prior to bankruptcy. His second method yields indirect bankruptcy costs with an average of 17.30% of firm value. He concludes that indirect bankruptcy costs are of significant importance and that his results are biased downwards, due to the estimation method he uses.

Other scholars that aim to estimate bankruptcy costs are for instance Weiss (1990), who estimates direct costs of bankruptcy to on average 3.10% of the market value of equity plus book value of debt, and Ang et al. (1982), who estimate bankruptcy costs to 7.50% of total asset liquidation value. Further, they find that bankruptcy costs might exceed 100% of asset value, especially for small firms. Bris et al. (2006) analyze 300 small private firms between 1995 and 2001, and they find that in 68% of the cases, the bankruptcy costs were higher than the total asset value of the firms.

Opler and Titman (1994) find that firms with high leverage lose more market shares compared to firms with lower leverage in industry downturns, i.e. the top-leveraged firms lose 26% more in revenues than the firms with the lowest leverage. These results support that the indirect costs should be of significant importance and positive, since customers might be unwilling to do business with firms that have a high leverage during an economic downturn. Reindl et al. (2013) estimate total bankruptcy costs with a technique that takes advantage of the market value of equity and option prices. They find large differences in the level of bankruptcy costs between industries, with 10% of firm value in utilities at the lower end, compared to 60% in the coal industry at the

higher end. On average, their estimates fall between 20-30% of firm value. Their findings also indicate that there is a positive relationship between costs of bankruptcy and the distance to default, and a negative relationship between bankruptcy costs and leverage. They conclude that bankruptcy costs are of significant importance to firms and that the costs are lower in industries with high entry-barriers and that firms that rely on stable customer relationships for their survival, such as business services, tend to have higher costs of bankruptcy. Andrade and Kaplan (1998) find costs of bankruptcy of 10-20% of firm value by analyzing a sample consisting of 31 firms that have entered financial distress either by going through a management buyout or a leveraged recapitalization.

Davydenko et al. (2012) aim to back out bankruptcy costs from market values of firms by analyzing the change in value when default is announced. They estimate bankruptcy costs to an average of 21% of firm value. Further, their results show that firms with high leverage have lower costs of bankruptcy (20.2%), which can be compared to less leveraged firms with bankruptcy costs of 28.8%. Korteweg (2010) also estimates bankruptcy costs from market values of equity and debt. For his sample, he estimates bankruptcy costs to lie between 15-30%. Glover (2011) aims to estimate bankruptcy costs by constructing a structural model consisting of macro variables whose parameters have been estimated. His results show average total bankruptcy costs of 45% of firm value.

4. Bankruptcy Procedures in Sweden and USA

The Principle of Public Access to Official Records in Sweden has enabled our estimation method of indirect costs of bankruptcy. Since much of previous work on the subject of bankruptcy costs has focused on American firms, it is for purposes of comparison relevant to shortly present the Swedish bankruptcy procedure and how it differs from the American one.

Thorburn (2000) provides a comprehensive description of the main differences between the Swedish and U.S bankruptcy system. When a Swedish firm files for bankruptcy, the incumbent management of the firm is immediately replaced by an independent bankruptcy trustee. The trustee is appointed by a court and has fiduciary responsibilities towards creditors. The trustee's task is partly to organize the sale of the

firm's assets in an open ascending English style auction, either as parts or as an ongoing concern.

The bankruptcy trustee is supervised by the provincial supervisory authority (Tillsynsmyndigheten i konkurs) which is organized as a separate department at the Swedish Enforcement Authority (Kronofogdemyndigheten). They oversee the auction and are, as has been observed when reading bankruptcy files, also responsible for ensuring that the trustee charges reasonable fees for the services he or she provides. This characteristic of the Swedish bankruptcy act contrasts how these issues are managed under U.S. regulations. In Chapter 11[2] proceedings, incumbent managers usually remain in control over the firm. A trustee will only take control of the firm in cases of mismanagement or fraud. Further, in Chapter 11, the incumbent management has exclusive rights to propose a reorganization plan during the first 120 days plus an additional 60 days to seek acceptance for the plan. The American system moreover involves a voting system in which the reorganization plan has to be accepted by members of each debt class. Additionally, "cram-down" is a scenario which refers to a situation in which the Chapter 11 bankruptcy judges force an opposing class of debt holders to accept a proposed reorganization plan. These scenarios are not part of the Swedish system since the firm is auctioned off.

Another important difference between Swedish procedures and Chapter 11 is how claims are settled. U.S. regulations accept settlements in both cash and securities including common stock, while Swedish regulation only accepts cash settlements (Thorburn, 2000).

Bankruptcy files are publicly available in Sweden against a fee that covers printing costs. These files are created after the bankruptcy has ended and contain valuable information relevant for this paper. Each such filing contains a detailed list of direct costs related to the bankruptcy as well as liquidation values of assets. Moreover, each file examined in this paper also includes an investigation conducted by the trustee who states the cause of financial distress and an estimation of when the firm entered into financial distress.

[2] In Chapter 11 managers retain control over the company's assets and operations even when the firm is in bankruptcy. Therefore managers are encouraged to choose a court supervised renegotiation in Chapter 11 instead of filing for liquidation in Chapter 7. The Swedish bankruptcy code has no effective reorganization plan (Thorburn, 2000).

5. Estimating Indirect Costs of Bankruptcy

The direct costs of bankruptcy in our case are relatively straightforward to estimate since these costs are stated in the bankruptcy files held by the Swedish Enforcement Authority. For the estimation of indirect bankruptcy costs we rely on a method suggested by Andrade and Kaplan (1998) who compare the present value of the firm after resolution to the firm value before onset of financial distress where, after controlling for direct costs of bankruptcy, the difference equals net indirect costs of financial distress. In their model, firm value is defined as the sum of the book value of debt, preferred stock and the market value of equity.

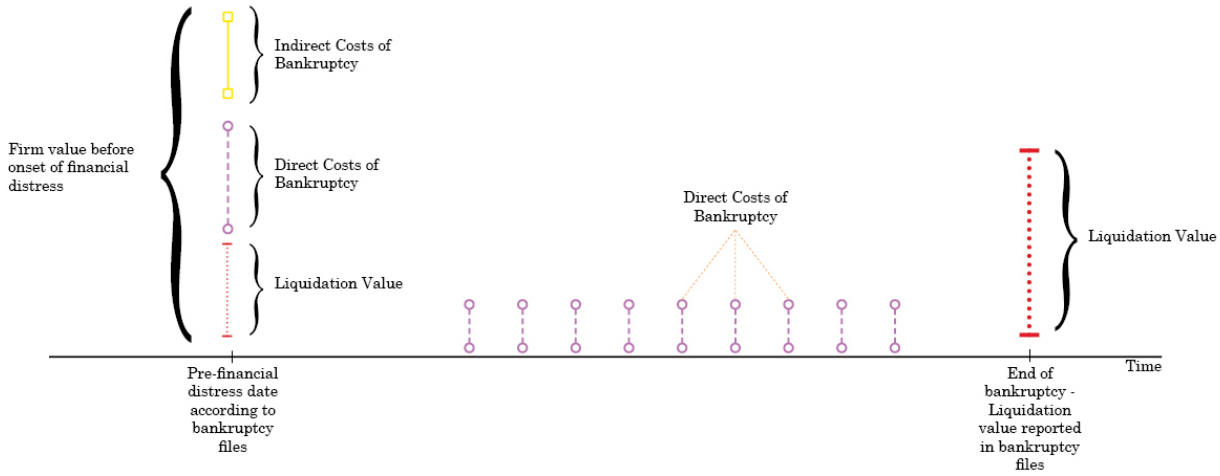
Taillard (2013) uses Andrade and Kaplan's method and a natural experiment on firms that have suffered from financial distress due to asbestos litigations. Taillard compares the pre-distress value of the firm to its resolution value after bankruptcy. He further explains how direct costs of bankruptcy and other litigation costs are controlled for in order to estimate the indirect costs of bankruptcy. Indirect costs of financial distress are thus defined as the difference between the observed pre-distress firm value and the discounted value of the firm at resolution. Discounted values are used in the model due to the long time period between the pre-distress date and the resolution date. Our approach to estimate indirect costs of bankruptcy builds on Andrade and Kaplan's proposed methodology. We use the same methodology but have access to data on actual values on direct costs of bankruptcy and actual liquidation values of assets. Moreover, our study is solely based on firms with traded equity with the date of financial distress estimated by a bankruptcy trustee with access to private corporate information. Therefore we can expect highly reliable estimations for the pre-distress firm value. Further, we assume time-value of money to be negligible due to the short period between financial distress and bankruptcy.

Figure 2 illustrates how we use information in bankruptcy files to get an estimate of investigated firms' indirect costs of bankruptcy. To receive an estimate of indirect costs of bankruptcy we must control for factors that may have caused the firm to enter financial distress in the first place. Indirect costs of bankruptcy, or financial distress, should only include value loss of profits and sales caused by the financial situation and not by any external factors that initially caused these financial struggles.

The firm liquidation value can in this model be interpreted as the value of the firm that remains after the bankruptcy. We assume that the assets that the trustee has been unable to liquidate have a value of zero. The value depreciation that takes place between the onset of financial distress and the ending date of the bankruptcy is thus interpreted as the total cost of bankruptcy.

Figure 2

Estimation Method



Since total costs of bankruptcy are comprised of direct costs of bankruptcy and indirect costs of bankruptcy, we naturally arrive at an estimate of indirect costs of bankruptcy when we deduct direct costs from total costs of bankruptcy. Firms in financial distress may also suffer from what is known as agency costs. This model does not explicitly separate agency costs from indirect costs of bankruptcy. Possible agency costs are therefore included in the definition of indirect costs.

As described, Andrade and Kaplan (1998) discuss a possible way to explain what happens to the value of a firm when it enters into financial distress. According to their explanation, the following relationship holds

$$EV_0 - L_V = B_D + B_I$$

where EV_0 is the value of the firm before onset of financial distress, L_V the value of the liquidated assets, B_D the direct costs of bankruptcy and B_I the indirect costs of bankruptcy. Our approach to estimate the indirect costs of bankruptcy is built upon this relationship. By rearranging the equation we get

$$B_I = EV_0 - L_V - B_D$$

Thus, we have an expression for the indirect costs of bankruptcy that can be used for estimation purposes. Values of the liquidated assets and the direct costs of bankruptcy can be found by investigating the bankruptcy files. Since we work with listed companies, we can use share prices of the listed firms to calculate the market capitalization of the companies and then add the book value of net debt to receive the enterprise value.

5.1 Data collection

In our study we have used data on 23 listed Swedish firms from different industries (see table 1). To find data on bankrupt firms, we used the Orbis data base delivered by Bureau van Dijk and data from the Swedish Tax Agency. Originally we had a data set consisting of 61 firms that went bankrupt in the period 1998-2013 and were traded on different Swedish stock exchanges, i.e. Nasdaq OMX Stockholm, Aktietorget, First North Stockholm and the Nordic Growth Market. The initial list was then scaled down to the final list of 23 firms due to lack of data. For instance, some firms had been listed a too short period before bankruptcy to be used in our study. Further, since our method builds on data from bankruptcy files we only wanted to study firms with completed bankruptcy processes and therefore we removed all companies that had an ongoing bankruptcy process. Some firms were removed since the bankruptcy files had been discarded by the authorities. The size of the sample is similar to previous studies where the aim has been to estimate bankruptcy costs, e.g. Warner (1977) who had a sample size of 11 firms and Altman (1984) who studied 26 firms.

Table 1. Data set

Name	Stock exchange	Industry
1,618 Strict AB	Aktietorget	Investments
Adtail AB	Aktietorget	IT
Ancora Energispar AB	First North Stockholm	Energy
Catech AB	First North Stockholm	Industrials
Catering Please i Skandinavien AB	Aktietorget	Food
Dacke Group Nordic AB	First North Stockholm	Investments
Eriksson Development and Innovation AB	Aktietorget	Technology
Gifttoday Sweden AB	Aktietorget	Retail
Global Gaming Factory X AB	Aktietorget	IT
Hebi Health Care AB	Nordic Growth Market	Pharmaceuticals
Junebud AB	Aktietorget	IT
Kindwalls Bil AB	Aktietorget	Car Dealing
Layerlab AB	Aktietorget	Life Science
Rayclinic AB	First North Stockholm	Health Care
Scirocco AB	Aktietorget	Technology
SeaNet Maritime Communications AB	First North Stockholm	Telecommunications
Sharpview AB	Nordic Growth Market	Technology
Stormfågeln AB	Aktietorget	Technology
Svithoid Tankers AB	Nasdaq OMX Stockholm	Shipping
Teligent AB	Nasdaq OMX Stockholm	Telecommunications
TMG International AB	Nordic Growth Market	Automotive
Trimera AB	Aktietorget	Construction
XRF Analytical AB	Aktietorget	Technology
Aktietorget	13	
First North Stockholm	5	
Nordic Growth Market	3	
Nasdaq OMX Stockholm	2	
Total number of firms	23	

Since we needed data on direct bankruptcy costs and firm liquidation values to estimate the indirect costs of bankruptcy, we needed access to the bankruptcy files of the companies on our list. The files are stored at the seven local offices of the Swedish Enforcement Authority in Gothenburg, Eskilstuna, Sundbyberg, Malmö, Jönköping, Umeå and Sundsvall. Some files were in physical form and other in electronical form, all in all thousands of pages. By going through the bankruptcy files we were able to identify the direct costs of bankruptcy as well as the liquidation value of the assets.

The direct bankruptcy costs, such as charges from the bankruptcy trustee, court costs and other costs that directly relate to the bankruptcy, were easily found in the files. Similarly, the liquidation values of the assets, i.e. all the cash that the bankruptcy trustee was able to bring into the company during the bankruptcy, could also be found by analyzing the files.

5.2 Firm value

To enable the estimation of the indirect costs of bankruptcy, we needed a pre-distress firm value. We have used the following approach to calculate enterprise value

$$\textit{Enterprise value} = \textit{Market capitalization} + \textit{Book value of net debt}$$

where market capitalization is the stock price multiplied by the number of shares outstanding, and where book value of net debt is the book value of debt from the latest annual report minus cash. We are aware of the fact that this value does not fully reflect the true value of a company, since the book value of debt does not necessarily equal its market value. One could argue that it would be better to use the market value of traded debt securities for the companies like Warner (1977). Our firms did not have traded debt instruments and therefore we used book values.

One issue was to determine the date the firm entered into financial distress. To determine this date, we have relied upon information that can be obtained from the bankruptcy files. In Sweden a bankruptcy trustee must investigate both the cause and the time of financial distress during a bankruptcy process. This date is often reported as a time period when the financial problems should have started. The trustee has access to all private company data that outsiders cannot access, such as bank account balances and other financial information that could be of significant importance. The date determined by the trustee should reflect reality well and therefore this date has been used as the pre-distress date in our study. We argue that this approach is preferable since the trustee's personal contact with stakeholders facilitates the identification of a financial distress date. Further, we argue that this approach works well in identifying a financial distress date strictly related to the firm itself and not to external factors pushing the firm into financial distress in the first place. This can be compared to the approach used by Andrade and Kaplan (1998) to classify firms as financially distressed, where they rely upon public information from the business data base Nexis.

Table 2. Pre-distress firm valuation

Name	Market cap	Net debt	Enterprise value
1.618 Strict AB	5,230,810	18,644,343	23,875,153
Adtail AB	4,262,401	3,206,000	7,468,401
Ancora Energispar AB	4,560,000	7,134,696	11,694,696
Catech AB	982,625	22,781,000	23,763,625
Catering Please i Skandinavien AB	7,077,784	23,817,000	30,894,784
Dacke Group AB	31,691,270	135,619,000	167,310,270
Eriksson Development and Innovation AB	3,729,320	834,000	4,563,320
Gifttoday Sweden AB	686,205	6,532,552	7,218,757
Global Gaming Factory X AB	59,155,360	19,985,000	79,140,360
Hebi Health Care AB	76,584,000	599,259,000	675,843,000
Junebud AB	2,502,340	2,629,678	5,132,018
Kindwalls Bil AB	19,760,000	87,632,541	107,392,541
Layerlab AB	3,793,965	4,578,692	8,372,657
Rayclinic AB	14,763,168	30,495,919	45,259,087
Scirocco AB	3,443,000	3,701,095	7,144,095
SeaNet Maritime Communications AB	9,765,378	42,219,668	51,985,046
Sharpview AB	10,541,190	5,346,000	15,887,190
Stormfågeln AB	21,907,600	1,754,000	23,661,600
Svithoid Tankers AB	126,485,360	901,800,000	1,028,285,360
Teligent AB	87,376,128	334,000,000	421,376,128
TMG International AB	45,817,000	422,433,000	468,250,000
Trimera AB	864,564	45,088,000	45,952,564
XRF Analytical AB	40,021,267	2,578,047	42,599,314
Average	25,260,902	118,350,836	143,611,738
Median	9,765,378	19,985,000	30,894,784
Standard deviation	32,628,398	225,835,274	254,897,382
High	126,485,360	901,800,000	1,028,285,360
Low	686,205	834,000	4,563,320

Since the pre-distress date has been determined by making use of the information obtained from the bankruptcy files, we use the share price of that date together with the number of outstanding shares for that date to calculate the market capitalization. When the market capitalization has been calculated we add the book value of debt from the previous annual report and deduct cash to arrive at an enterprise value.

Enterprise value = Share price x Number of shares outstanding + Book value of debt – Cash

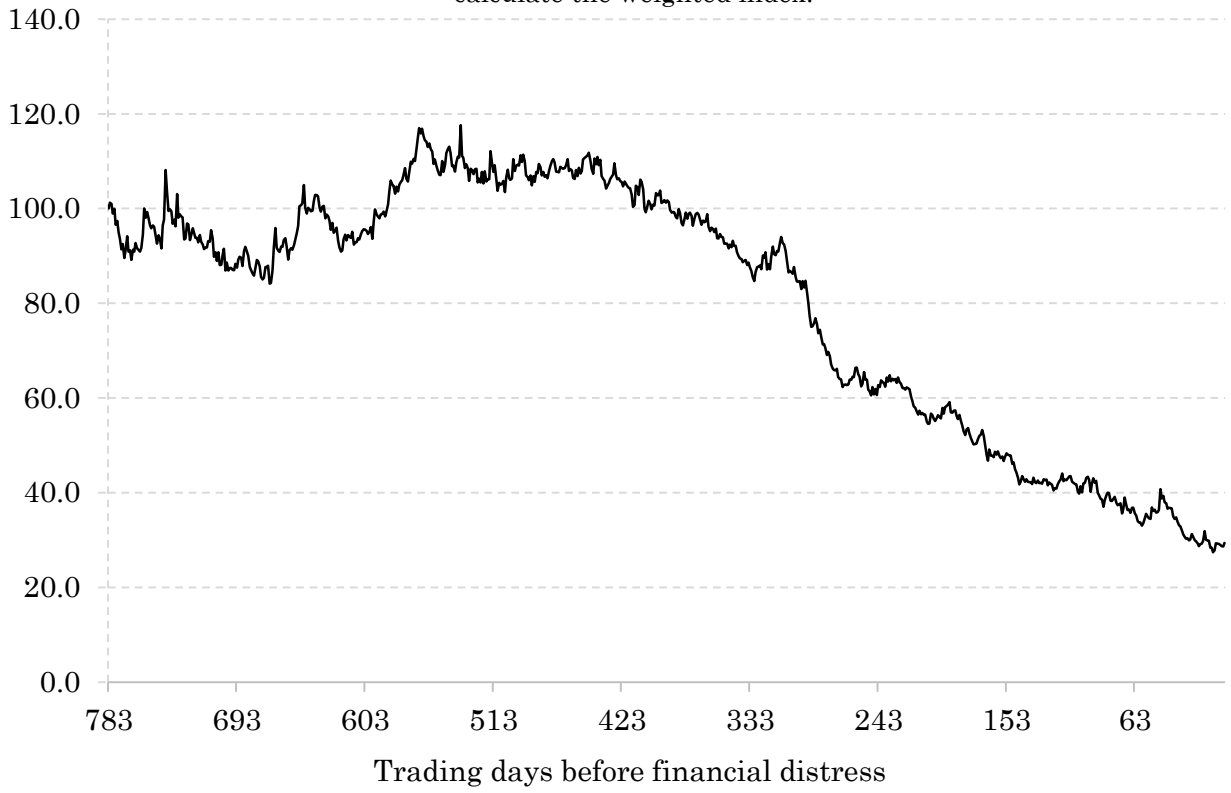
Figure 3 illustrates the indexed stock price development for the 23 companies in our sample. The index has been calculated by indexing the individual stock prices prior to financial distress, and then summing them up in an equally weighted portfolio. It is evident that the stock price on average falls as we come closer to the financial distress

date. The share price development for each firm together with the financial distress date is illustrated in graphs in the appendix. In general, one can see from the graphs that the financial distress date as indicated by the bankruptcy trustee usually comes after some type of value reduction of the stock price. The only exception is Global Gaming Factory X AB (Figure A.9). This characteristic of the data suggests that our method successfully controls for factors that push the firm into financial distress and that our estimates of indirect costs mainly include costs caused by the financial distress itself.

Figure 3

Weighted Indexed Stock Price Development

The weighted average has been calculated by first indexing the share price development for each firm and then assigning equal weights in order to calculate the weighted index.



6. Results and Analysis

We have estimated the costs of bankruptcy according to the approach outlined in previous sections. Firstly, we present the resulting indirect and direct bankruptcy costs

in monetary terms on the pre-distress date, and secondly, we present them in relation to firm size for different time periods prior to financial distress.

Table 3. Results in Monetary Terms[1]

Company name	Pre-distress EV	Direct costs	Indirect costs	Liquidation value
1.618 Strict AB	23,875,153	431,515	19,251,192	4,192,446
Adtail AB	7,468,401	32,260	7,413,797	22,344
Ancora Energispar AB	12,827,048	614,201	11,053,031	1,159,815
Catech AB	23,763,625	327,854	23,240,259	195,512
Catering Please i Skandinavien AB	30,894,784	36,386	30,858,398	-
Dacke Group AB	167,310,270	251,619	166,606,738	451,913
Eriksson Development and Innovation AB	4,563,320	100,979	4,461,648	693
Gifttoday Sweden AB	7,218,757	337,144	6,532,329	349,284
Global Gaming Factory X AB	79,140,360	95,975	79,044,198	187
Hebi Health Care AB	675,843,000	768,000	675,057,439	17,562
Junebud AB	5,132,018	243,825	4,336,193	552,000
Kindwalls Bil AB	107,392,541	57,375	107,332,275	2,891
Layerlab AB	8,372,657	441,125	7,036,240	895,292
Rayclinic AB	45,259,087	909,905	43,040,532	1,308,650
Scirocco AB	7,144,095	374,911	6,350,727	418,457
SeaNet Maritime Communications AB	51,985,046	1,914,766	43,221,561	6,848,719
Sharpview AB	15,887,190	426,128	14,721,673	739,389
Stormfågeln AB	23,661,600	156,324	23,403,953	101,323
Svithoid Tankers AB	1,028,285,360	4,246,995	1,008,857,661	15,180,704
Teligent AB	421,376,128	5,950,336	385,354,997	30,070,795
TMG International AB	468,250,000	12,573,584	424,177,425	31,498,991
Trimera AB	45,952,564	372,736	45,391,876	187,952
XRF Analytical AB	42,599,314	106,280	42,229,310	263,724
Average	162,237,254	1,485,627	156,110,457	4,641,170
Median	30,894,784	372,736	30,858,398	418,457
Standard deviation	268,340,484	2,947,131	261,576,870	9,393,588
High	1,028,285,360	12,573,584	1,008,857,661	31,498,991
Low	4,563,320	32,260	4,336,193	-

1. All values are stated in SEK.

One can see that there is fairly high variation in firm size on the pre-distress date. This is quite natural, since the companies represent different industries and have been traded on different stock exchanges. For instance, Eriksson Development and Innovation AB is the smallest firm in the sample with a pre-distress enterprise value of about 5 million SEK whose stock was traded on Aktietorget. This can be compared to the largest firm, Svithoid Tankers AB, which was traded on Nasdaq OMX Stockholm with a pre-distress enterprise value of more than 1 billion SEK. However, the average firm size in the sample amounts to approximately 160 million SEK but the average is influenced by a couple of outliers. Therefore one gets a better picture of the sample when looking at the median of about 30 million SEK.

Our results show that the direct bankruptcy costs vary between around 30 thousand SEK to over 12 million SEK, with an average of approximately 1.5 million SEK. These costs are clearly stated in the bankruptcy reports and most of them represent fees that

have been charged by the bankruptcy trustee, e.g. charges related to the divestment of company assets, accounting and administration, estate inventory and court costs. Of course, the type of costs may vary depending on industry and the number of creditors.

Liquidiation values for the sample have also been found by analyzing the bankruptcy files. The average liquidation value was 4.6 million SEK. We have counted all assets, including cash and receivables, which the trustee has been able to liquidate, as company liquidation values for the sample companies. Thus, we have assumed that the assets that the trustee has not managed to liquidate have a value of zero. As one would expect, the size of the company determines the size of the balance sheet, which in turn has an impact on the liquidation values. However, there does not seem to be any linear relationship between enterprise values and liquidation values. For example, Svithoid Tankers AB has a pre-distress enterprise value of more than 1 billion SEK and a liquidation value slightly above 15 million SEK. This could be compared to Teligent AB with an enterprise value of approximately 400 million SEK and a corresponding liquidation value of more than 30 million SEK. Hence, there does not seem to exist any linear link between size and asset resale value.

We have been able to estimate values of the indirect bankruptcy costs for the 23 firms in our sample. These values have been estimated by deducting the direct bankruptcy costs and the liquidation values from the pre-distress enterprise values. Thus, we have managed to get an estimate of the size of the indirect costs of bankruptcy that emerge when a firm enters financial distress. The resulting values for the indirect costs exhibit a variation similar to the variation that was found in enterprise values. This is no surprise due to the way the method is constructed. The estimation method we have used to estimate the indirect costs of bankruptcy starts with the estimation of a pre-distress enterprise value from which direct bankruptcy costs and liquidation values are deducted.

6.1 Direct costs of bankruptcy in relation to firm size

The direct bankruptcy costs as a percentage of firm value are reported in table 4. These estimates enable us to determine whether the bankruptcy costs are critical to firms when making their financing decision or not.

Table 4 displays the direct costs of bankruptcy as a percentage of enterprise value for different time periods. Due to lack of data some observations are missing. This could for instance be because some firms only were listed during a short time period, and therefore it is not possible to calculate a proper enterprise value for these firms in

certain time periods since there are no stock prices for those periods. When analyzing the results, one can conclude that the average direct cost as percentage of enterprise value lies between 0.81% and 5.48%, depending on which time period that is being considered. However, the median for the different time periods before financial distress seems to be much narrower with an interval between 0.66% and 1.41%. The averages might be slightly overstated due to the presence of outliers, e.g. TMG International AB 3 years before financial distress. The reason that this percentage reaches 25.56% for this firm and period is that the company had a very low market value three years before the company entered financial distress compared to the actual pre-distress date. The same goes for Rayclinic AB 3 years prior to the pre-distress date.

In total, our estimated direct costs of bankruptcy in relation to firm size seem reasonable when compared to other studies. Warner (1977) estimated direct costs of bankruptcy to lie between 1.00-5.30% of firm size on average, and Weiss (1990) estimated the direct costs to an average of 3.10% of market value of equity plus book value of debt. Altman (1984) estimated the costs to 4.30-6.20% of firm value.

6.2 Indirect bankruptcy costs in relation to firm size

Table 5 displays the share of enterprise value that is represented by the indirect costs of bankruptcy for different time periods prior to financial distress as defined by the trustee. On the financial distress date, the resulting indirect costs of bankruptcy become very high, since it is on this date the estimation takes place. Consequently, one should not put too much emphasis on the resulting indirect costs in relation to firm size at the date of financial distress, since it is the actual magnitude of the indirect costs that is of importance and that is used to estimate the ratios for the following periods. Three months before financial distress we estimate the indirect costs of bankruptcy to an average of 77.97% of enterprise value with a median of 78.82%. These numbers fall as one moves to the period six months prior to financial distress, resulting in an average of 70.61% and a median of 70.24%. These numbers continue to fall and one year prior to financial distress the estimated indirect bankruptcy cost lies between 43.41% and 93.88% with an average of 67.72% and a median of 63.19%. Both the average and the median are somewhat lower two years before financial distress, taking on values of 61.87% and 60.06%.

Table 4. Direct Costs of Bankruptcy as Percentage of Enterprise Value Before Financial Distress

Company name	Pre-distress date	3 months before	6 months before	1 year before	2 years before	3 years before	4 years before
1.618 Strict AB	1.81%	1.63%	1.38%	1.42%	5.26%	2.83%	-
Adtail AB	0.43%	0.34%	0.43%	0.50%	-	-	-
Ancora Energispar AB	5.25%	4.95%	3.50%	-	-	-	-
Catech AB	1.38%	1.04%	1.03%	1.03%	0.96%	0.81%	1.45%
Catering Please i Skandinavien AB	0.12%	0.10%	0.10%	0.08%	0.22%	-	-
Dacke Group AB	0.15%	0.14%	0.10%	0.07%	0.18%	-	-
Eriksson Development and Innovation AB	2.21%	5.70%	5.13%	3.13%	-	-	-
Gifttoday Sweden AB	4.67%	3.47%	2.61%	2.26%	2.65%	-	-
Global Gaming Factory X AB	0.12%	0.16%	0.25%	0.19%	0.11%	0.36%	-
Hebi Health Care AB	0.11%	0.12%	0.15%	0.14%	0.14%	0.11%	0.14%
Junebud AB	4.75%	3.61%	4.14%	4.81%	6.63%	-	-
Kindwalls Bil AB	0.05%	0.05%	0.05%	0.05%	0.04%	0.04%	0.04%
Layerlab AB	5.27%	3.73%	3.13%	12.66%	-	-	-
Rayclinic AB	2.01%	1.23%	1.26%	0.94%	2.61%	12.18%	-
Scirocco AB	5.25%	5.46%	7.02%	5.22%	8.45%	3.39%	2.12%
SeaNet Maritime Communications AB	3.68%	2.74%	2.67%	2.63%	4.55%	8.49%	-
Sharpview AB	2.68%	1.91%	2.40%	4.38%	-	-	-
Stormfågeln AB	0.66%	0.90%	0.73%	1.02%	0.26%	0.11%	0.20%
Svithoid Tankers AB	0.41%	0.66%	0.66%	0.64%	2.25%	15.54%	-
Teligent AB	1.41%	1.39%	1.07%	0.93%	0.93%	0.96%	1.02%
TMG International AB	2.69%	2.50%	2.19%	1.83%	1.02%	25.56%	-
Trimera AB	0.81%	0.81%	0.80%	0.77%	0.74%	0.86%	0.66%
XRF Analytical AB	0.25%	0.35%	0.18%	0.23%	0.10%	-	-
Average	2.01%	1.87%	1.78%	2.04%	2.06%	5.48%	0.81%
Median	1.41%	1.23%	1.07%	0.98%	0.94%	0.96%	0.66%
Standard deviation	1.87%	1.77%	1.79%	2.78%	2.47%	7.58%	0.72%
High	5.27%	5.70%	7.02%	12.66%	8.45%	25.56%	2.12%
Low	0.05%	0.05%	0.05%	0.05%	0.04%	0.04%	0.04%

Table 5. Indirect Costs of Bankruptcy as Percentage of Enterprise Value Before Financial Distress

Company name	Pre-distress date	3 months before	6 months before	1 year before	2 years before	3 years before	4 years before
1.618 Strict AB	80.63%	72.67%	61.71%	63.19%	*	*	-
Adtail AB	99.27%	78.82%	98.61%	*	-	-	-
Ancora Energispar AB	84.83%	79.96%	56.57%	-	-	-	-
Catech AB	97.80%	73.49%	73.16%	72.98%	67.72%	57.77%	*
Catering Please i Skandinavien AB	99.88%	87.16%	87.78%	70.59%	*	-	-
Dacke Group AB	99.58%	94.73%	63.35%	43.41%	*	-	-
Eriksson Development and Innovation AB	97.77%	*	*	*	-	-	-
Gifttoday Sweden AB	90.49%	67.22%	50.62%	43.85%	51.27%	-	-
Global Gaming Factory X AB	99.88%	*	*	*	92.86%	*	-
Hebi Health Care AB	99.88%	*	*	*	*	93.60%	*
Junebud AB	84.49%	64.16%	73.71%	85.51%	*	-	-
Kindwalls Bil AB	99.94%	95.55%	*	*	82.18%	81.84%	75.15%
Layerlab AB	84.04%	59.42%	49.95%	*	-	-	-
Rayclinic AB	95.10%	58.15%	59.75%	44.63%	*	*	-
Scirocco AB	88.89%	92.42%	*	88.36%	*	57.44%	35.95%
SeaNet Maritime Communications AB	83.14%	61.81%	60.32%	59.44%	*	*	-
Sharpview AB	92.66%	66.03%	82.95%	*	-	-	-
Stormfågeln AB	98.91%	*	*	*	39.19%	17.20%	30.60%
Svithoid Tankers AB	98.11%	*	*	*	*	*	-
Teligent AB	91.45%	90.28%	69.30%	60.11%	60.06%	62.29%	66.29%
TMG International AB	90.59%	84.39%	73.77%	61.79%	34.46%	*	-
Trimera AB	98.78%	99.17%	97.11%	93.88%	89.98%	*	80.79%
XRF Analytical AB	99.13%	*	71.17%	92.69%	39.13%	-	-
Average	93.71%	77.97%	70.61%	67.72%	61.87%	61.69%	57.76%
Median	97.77%	78.82%	70.24%	63.19%	60.06%	60.03%	66.29%
Standard deviation	6.41%	13.34%	14.45%	17.46%	21.33%	23.94%	20.58%
High	99.94%	99.17%	98.61%	93.88%	92.86%	93.60%	80.79%
Low	80.63%	58.15%	49.95%	43.41%	34.46%	17.20%	30.60%

* Observations have been excluded since they exceed 100%.

Further, the results three years prior to financial distress lie more or less on exactly the same level with the difference that the lowest observation takes on a value of 17.20% instead of 34.46%. Finally, the average four years prior to financial distress is 57.76% and the median 66.29%. Taking the results altogether, one can conclude that the average and median indirect costs of bankruptcy have been estimated to lie between 58% and 79%, depending on what time period that is considered.

Our results seem to be higher compared to earlier studies, but one has to bear in mind that firm characteristics might have an effect on the results and that our sample is relatively heterogeneous. For example, Altman (1984) estimates the indirect costs of bankruptcy to an average of 17.30% of firm value, which is close to our observation that takes on the lowest value (17.20%). This could be compared to Reindl et al. (2013) who conclude that bankruptcy costs vary a lot depending on industry and firm size, and they find bankruptcy costs between 10-60%. Thus, their high-end estimations are in line with our results 1-4 years prior to financial distress. Further, Glover (2011) estimates total bankruptcy costs to an average of 45% of firm value. Finally, Andrade and Kaplan (1998) estimate total bankruptcy costs of 10-20% of firm value. All in all, one can conclude that there is a relatively high diversity in the results and that our results are higher than previous findings.

Since many of the firms in our sample were growth companies, the number of observations declines as we move further back in time from the pre-distress date. That is why we have more observations 3 and 6 months prior to financial distress than we have for the other time periods. Nevertheless, the results for the periods with fewer observations still have a similar median and average which strengthens the trustworthiness of our results. Some observations where the indirect costs of bankruptcy exceed 100% of enterprise value have been excluded from the sample. The reason why the percentages go above 100% in some cases is simply because the model assumes that the company is worth less on the pre-distress date compared to when the company is healthy. Since many of our companies are young growth companies, some of them have not been able to reach a steady state yet which makes it difficult to compare the indirect costs of bankruptcy to firm size for some periods.

6.3 Alternative measures

Except for the indirect and direct bankruptcy costs in relation to firm size, we have also analyzed other relationships. For instance, we have investigated the relationship between leverage and direct bankruptcy costs as well as total bankruptcy costs. We also analyzed the relationship between both direct and indirect costs, and firm size. However, we did not find statistical significant results for any of these relationships.

7. Concluding discussion

In this paper, we empirically estimate direct and indirect bankruptcy costs for 23 Swedish firms using a methodology inspired by the work of Andrade and Kaplan (1998). What differentiates our study from previous research is our unique access to data on liquidation values of assets and that the pre-distress dates used in our study are based on expert opinions provided by bankruptcy trustees with access to private company data. Direct costs of bankruptcy are estimated to on average 0.81-5.48% of enterprise value before onset of financial distress. These results are coherent with previous findings by Warner (1977), who estimates direct bankruptcy costs to 1.00-5.30% of firm value. Our estimations are also similar to those made by Weiss (1990), who estimates direct bankruptcy costs to on average 3.10% of market value of a firm, and Altman (1984), who estimates them to 4.30-6.20%. Thus, our findings confirm that direct costs of bankruptcy are small in relation to firm size, and that they themselves should be of trivial importance in a firm's financing decision.

Moreover, we estimate indirect costs of bankruptcy to on average 58% to 79% of enterprise value prior to financial distress, which is substantially higher than most previous findings. There might be several explanations to why we find so high estimates of indirect bankruptcy costs for firms in our sample. As previously mentioned, we do in fact incorporate agency costs in the definition of indirect bankruptcy costs. Since most other studies do this too we do not believe that it is the inclusion of agency costs that explains our high estimates of indirect bankruptcy costs. Rather, we believe the primary explanation to descend from a combination of the Swedish bankruptcy legislation and the growth characteristics of the firms in our sample. A company that enters into financial distress might be severely affected when stakeholders start to question managers' ability to run the firm and as a consequence increase borrowing costs. Due to

the extent that growth companies rely on the specific knowledge of the incumbent management, it is reasonable that growth companies should have higher indirect costs of bankruptcy and thereby include less debt in their financing mix compared to mature firms.

In contrast to U.S regulations, the Swedish bankruptcy procedure appoints a bankruptcy trustee to run the firm and to sell off assets of the firm when the firm files for bankruptcy. In U.S Chapter 11 proceedings however, the incumbent management usually remains in control over the firm and is only replaced by a trustee in cases of fraud or mismanagement. It becomes obvious how this may in fact have serious effects on growth firms, as much of their value descends from managers' ability to capitalize on business opportunities and thereby creating value in the firm. Immediately when the management is replaced by a bankruptcy trustee, who obviously does not have either the same incentives or the same capability to realize the full potential of the firm, one can expect the value of the firm to drop substantially. These effects on firm value might be higher than what has previously been known and thereby highly relevant for both decision makers who legislate on these issues and for investors evaluating the risks of investing in firms with growth characteristics like those in our sample.

We conclude that total bankruptcy costs should be of significant importance in firm valuations and in managers' choice of capital structure, as can be expected by theory. Further, we argue that growth firms are more affected by indirect bankruptcy costs than mature firms and that the Swedish bankruptcy procedure further augments these costs since it replaces the incumbent management when the firm files for bankruptcy, and therefore immediately reducing the value of the already distressed firm. We do however propose more research on this issue which could provide our argument with further support.

Except from the implications mentioned above for legislators and investors, our findings have implications for managers, banks and researchers. Firstly, our results have implications for future research since our data with actual liquidation values and the financial distress date estimated by the bankruptcy trustee, show that indirect bankruptcy costs might be higher than what previously has been estimated and especially so for growth firms exposed to bankruptcy regulations similar to those in Sweden. Secondly, as we have showed, the indirect costs of bankruptcy are of significant size and may have severe implications for leveraged firms in times of financial distress. It is thus important for managers to consider these potential costs when choosing

between debt and equity. Finally, banks should consider the size of bankruptcy costs in the credit analysis of potential borrowers in order to reduce credit risks and possible societal effects of a general economic downturn that would push many firms into financial distress simultaneously.

We are well aware of the potential drawbacks of using a small data set in empirical studies, and that more observations could yield more robust results. Currently, data on bankruptcy costs in Sweden is stored physically at several locations at the Swedish Enforcement Authority, is difficult to access and the bankruptcy files are even discarded after some time. Easier access to data on liquidation values and direct bankruptcy costs would facilitate future research on this topic. More transparent data together with future research would increase the knowledge about the risks of indebtedness, which in turn could lead to more accurate firm valuations and better assessments of company risk. Improved understanding of these issues, would possibly lead to less friction on credit markets and more efficient allocation of capital, while at the same time enabling future research that could possibly confirm our findings regarding growth firms and the effect that the Swedish bankruptcy regulations have on indirect bankruptcy costs.

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APPENDIX

Figure A.1

1,618 Strict AB

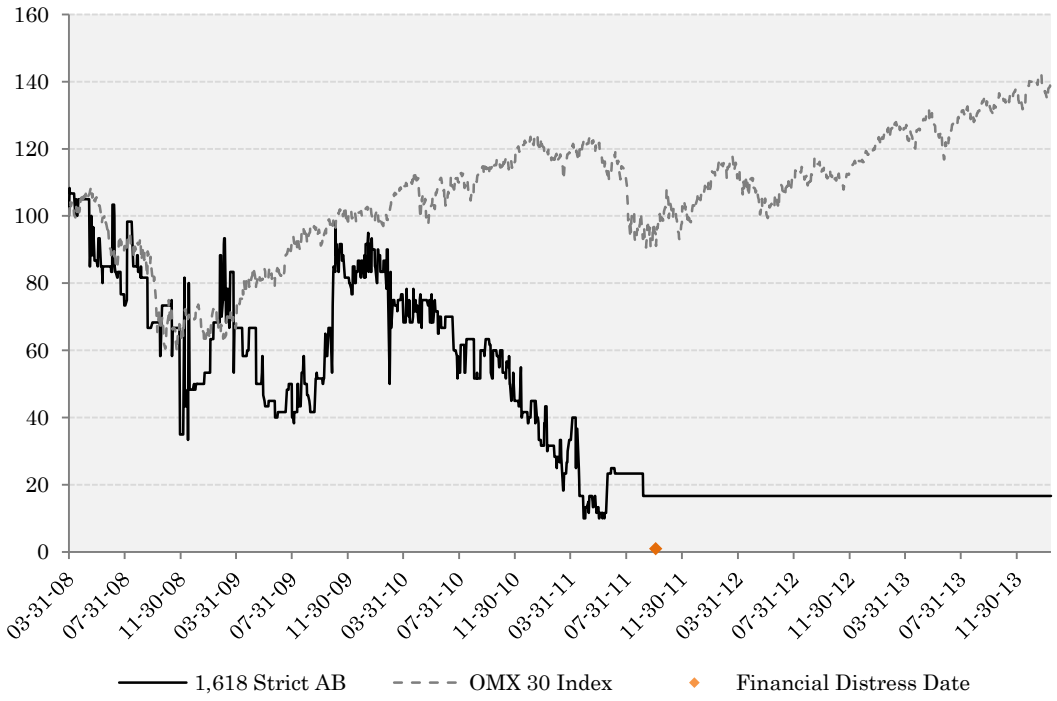

Figure A.2

Adtail AB

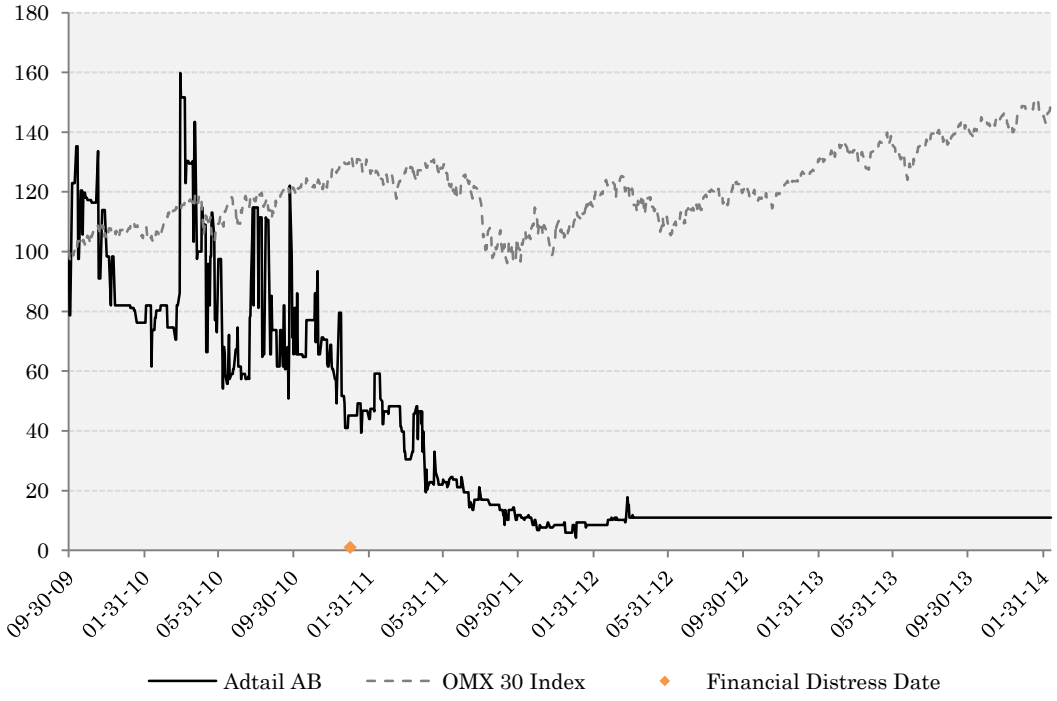

Figure A.3

Ancora Energispar AB

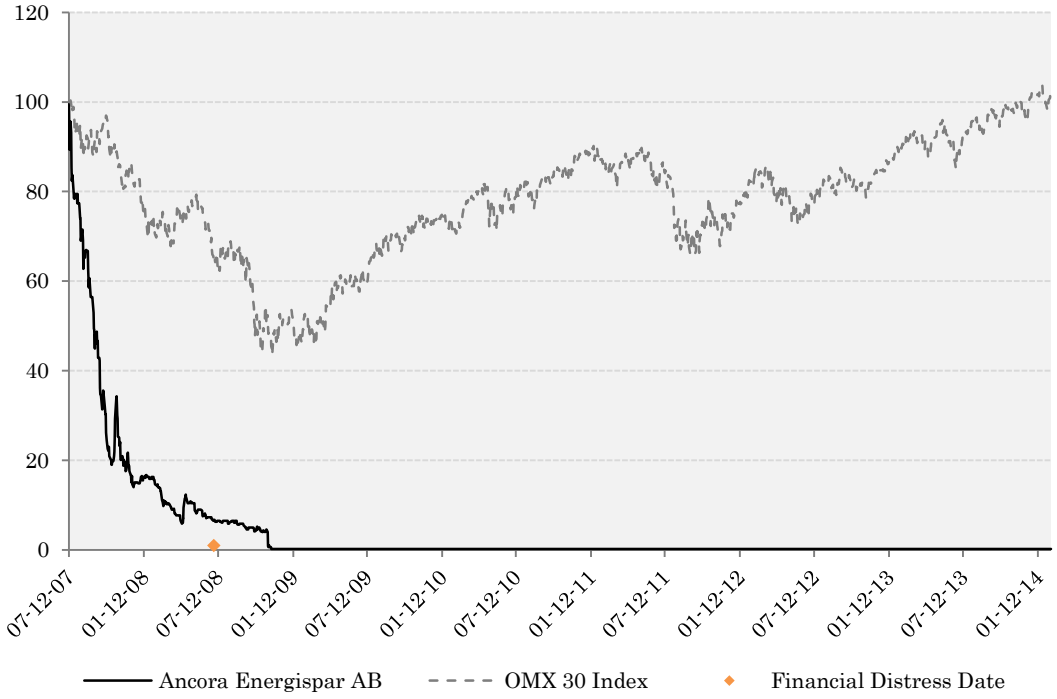

Figure A.4

Catech AB

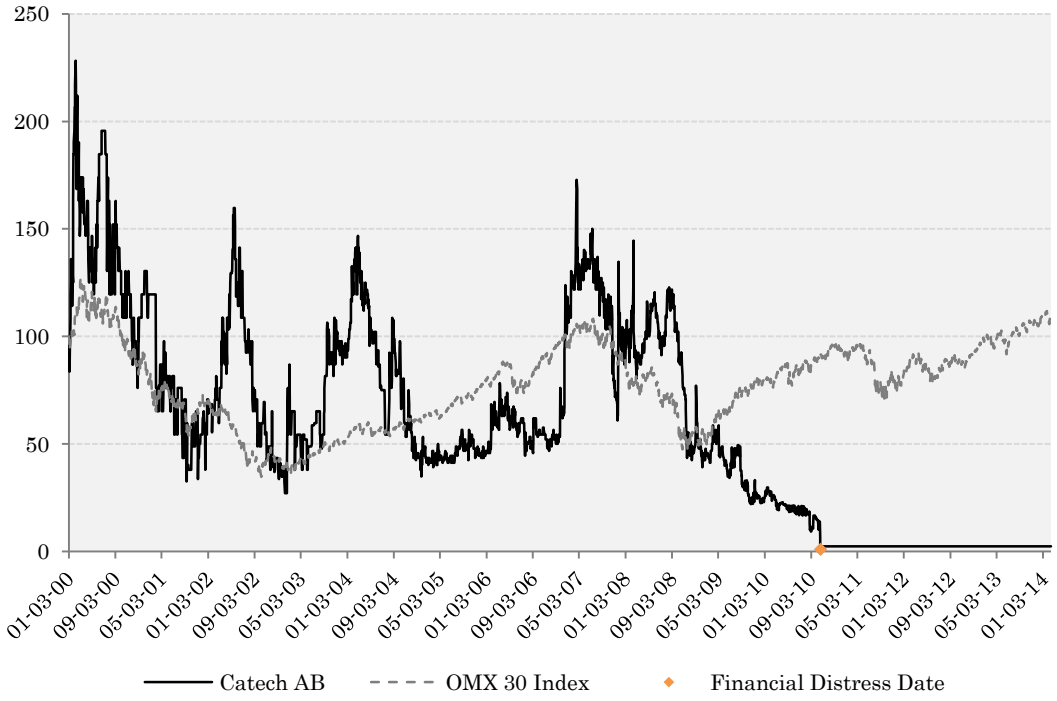

Figure A.5

Catering Please i Skandinavien AB

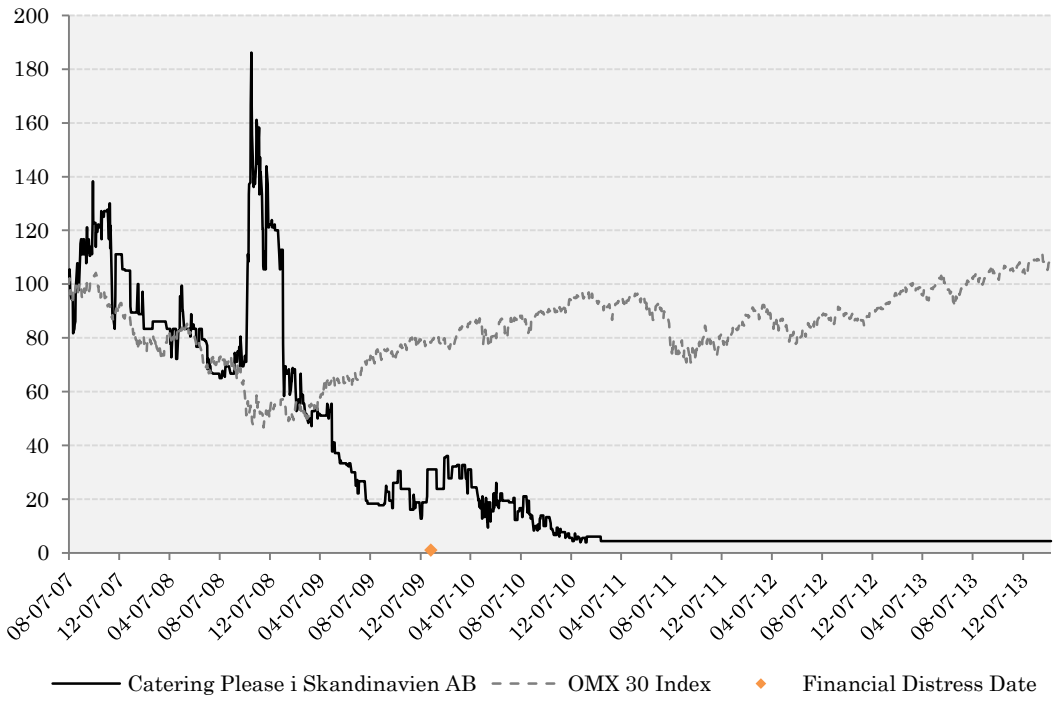

Figure A.6

Dacke Group Nordic AB

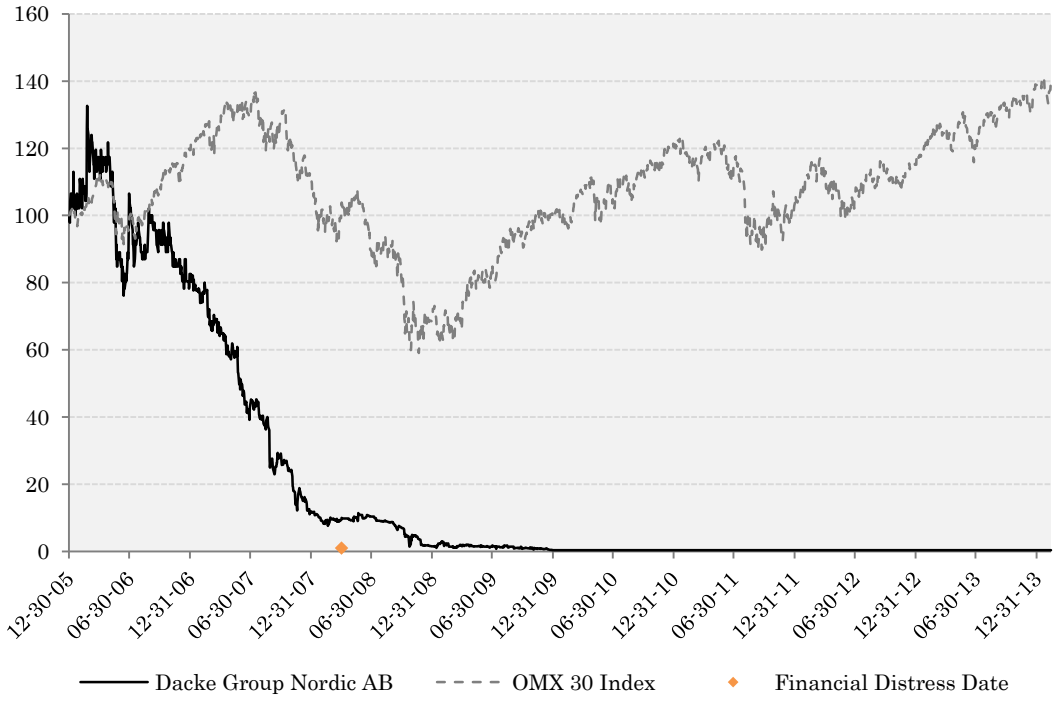

Figure A.7

Eriksson Development and Innovation AB

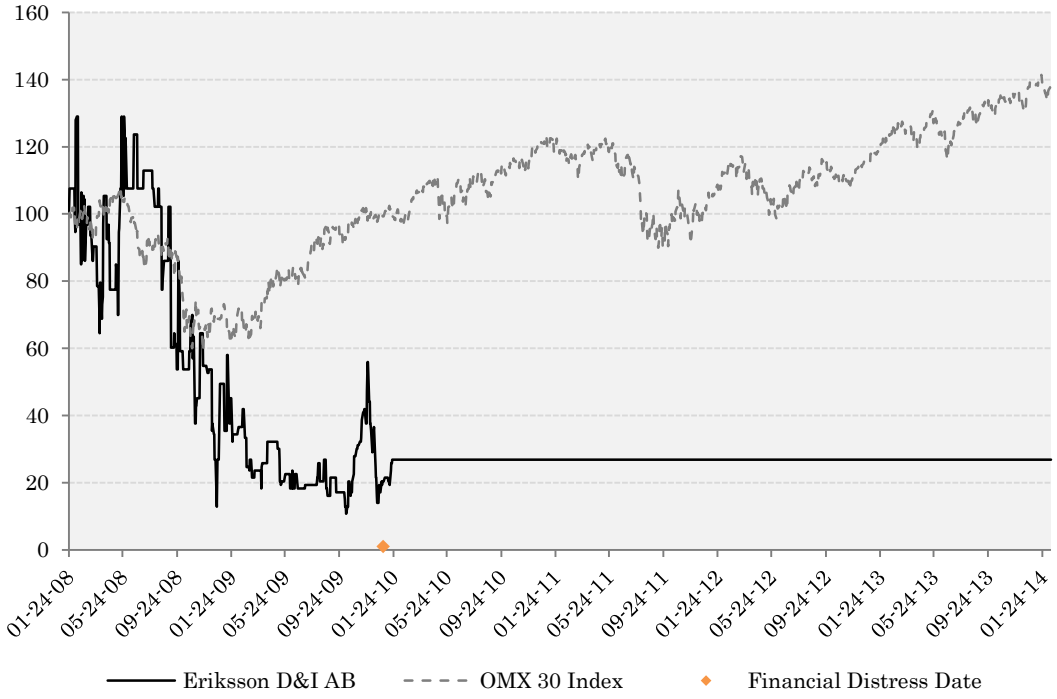

Figure A.8

Gifttoday Sweden AB

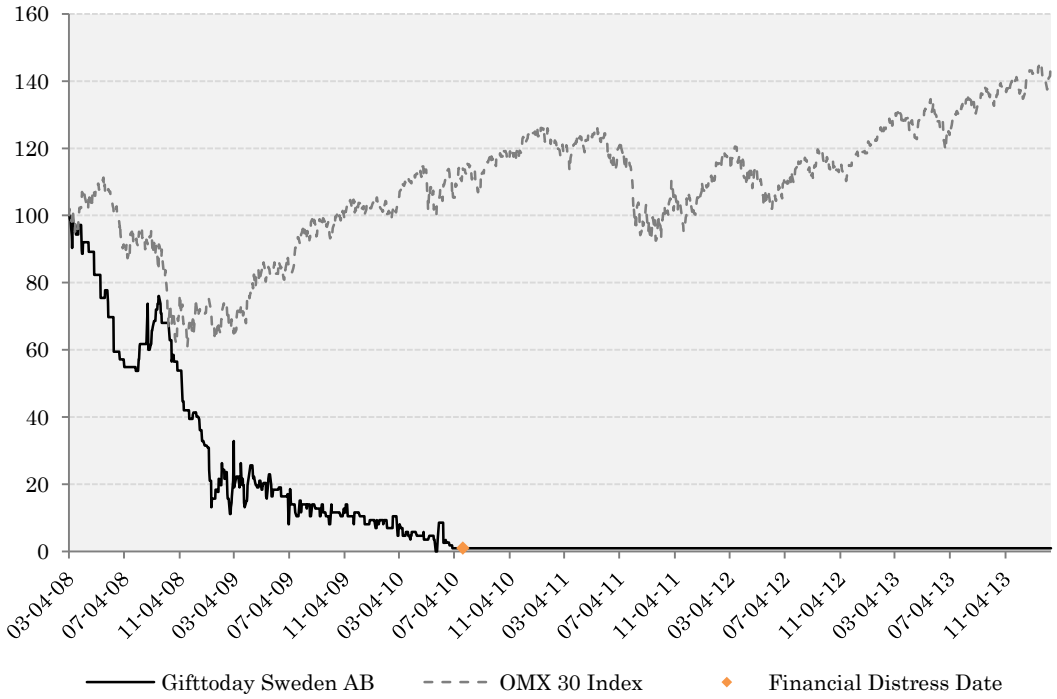

Figure A.9

Global Gaming Factory X AB

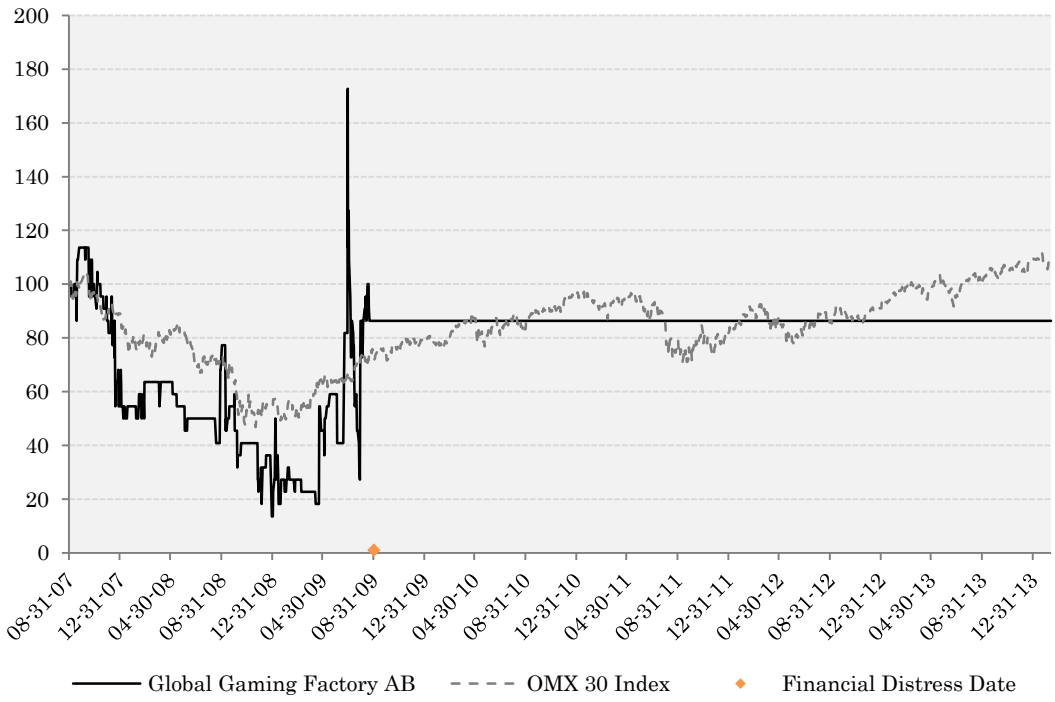

Figure A.10

Hebi Health Care AB

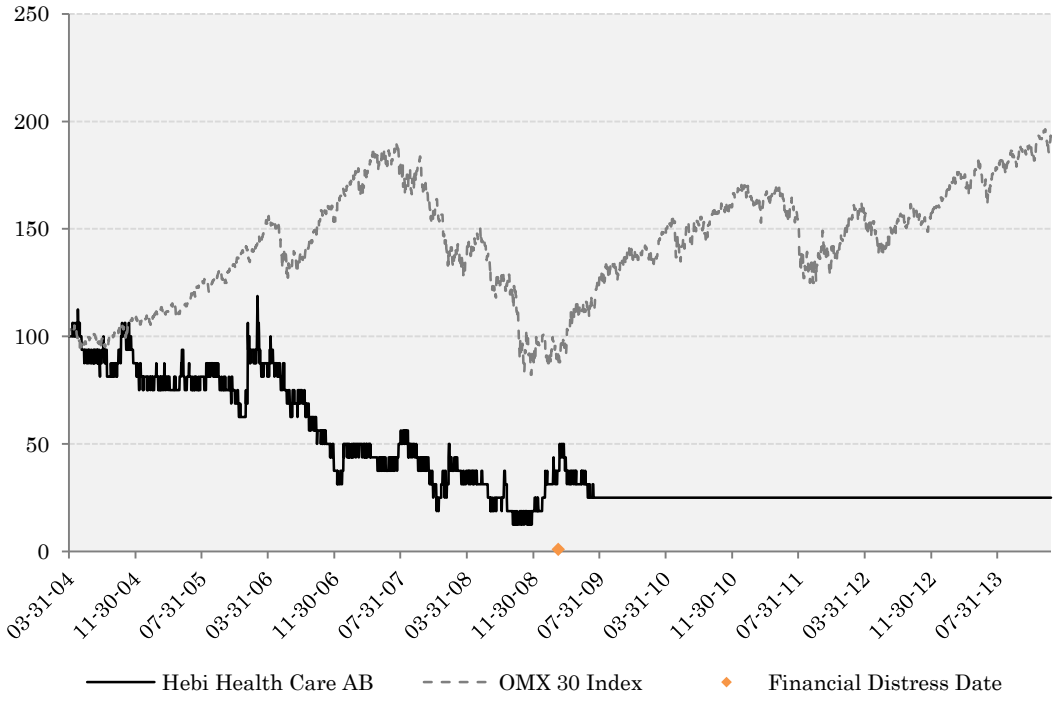

Figure A.11

Junebud AB

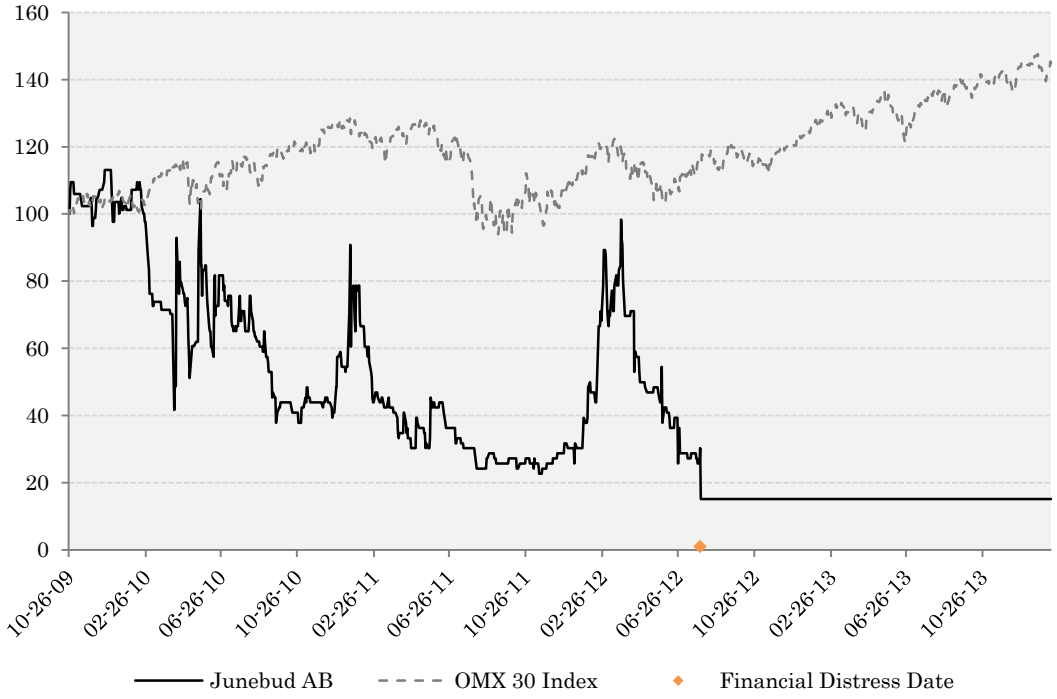

Figure A.12

Kindwalls Bil AB

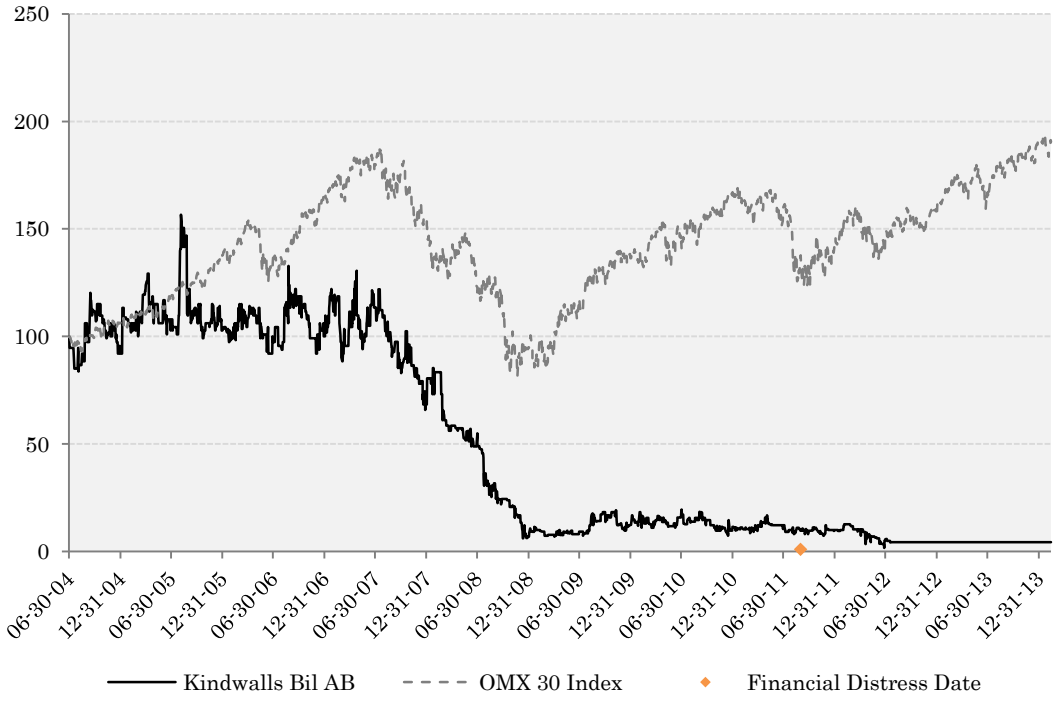

Figure A.13

Layerlab AB

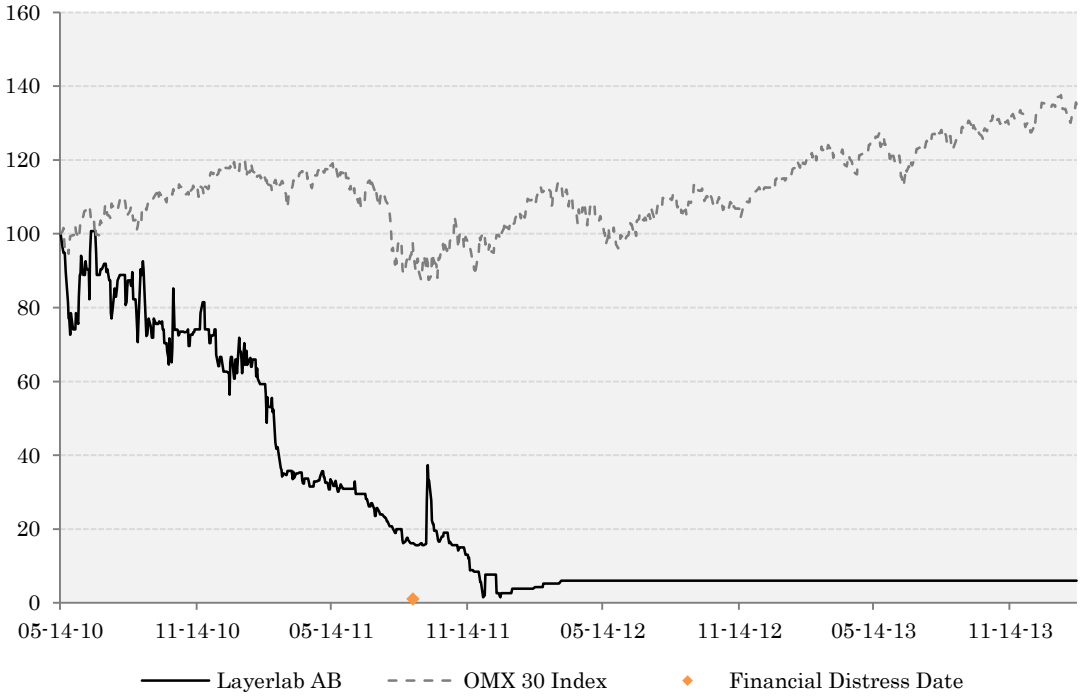

Figure A.14

Rayclinic AB

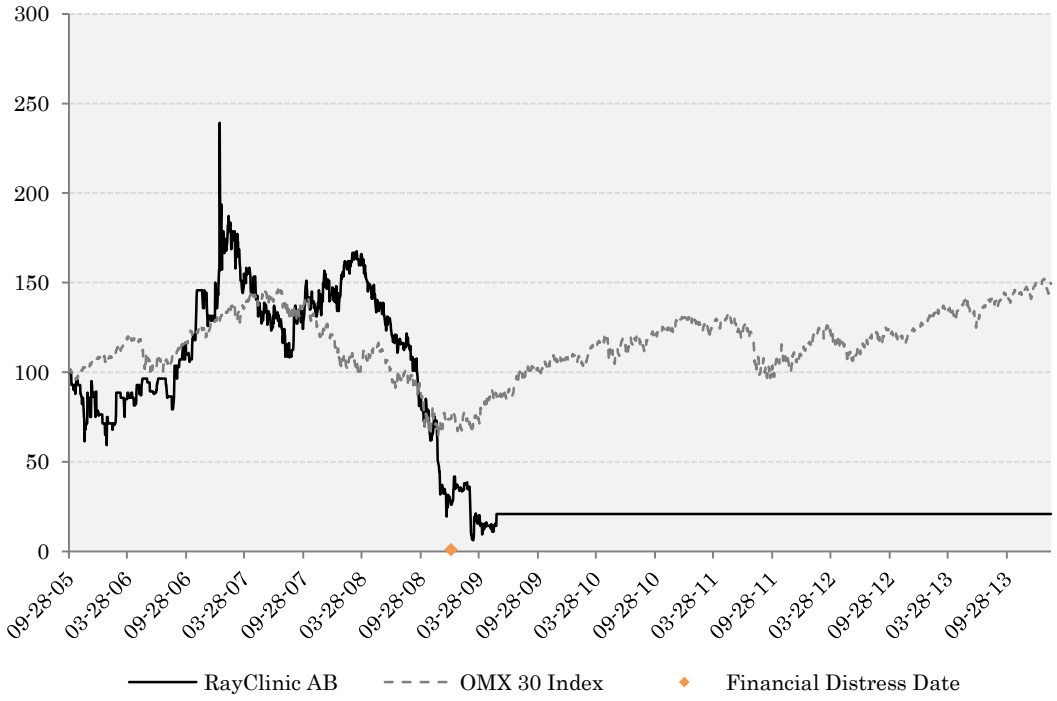

Figure A.15

Scirocco AB

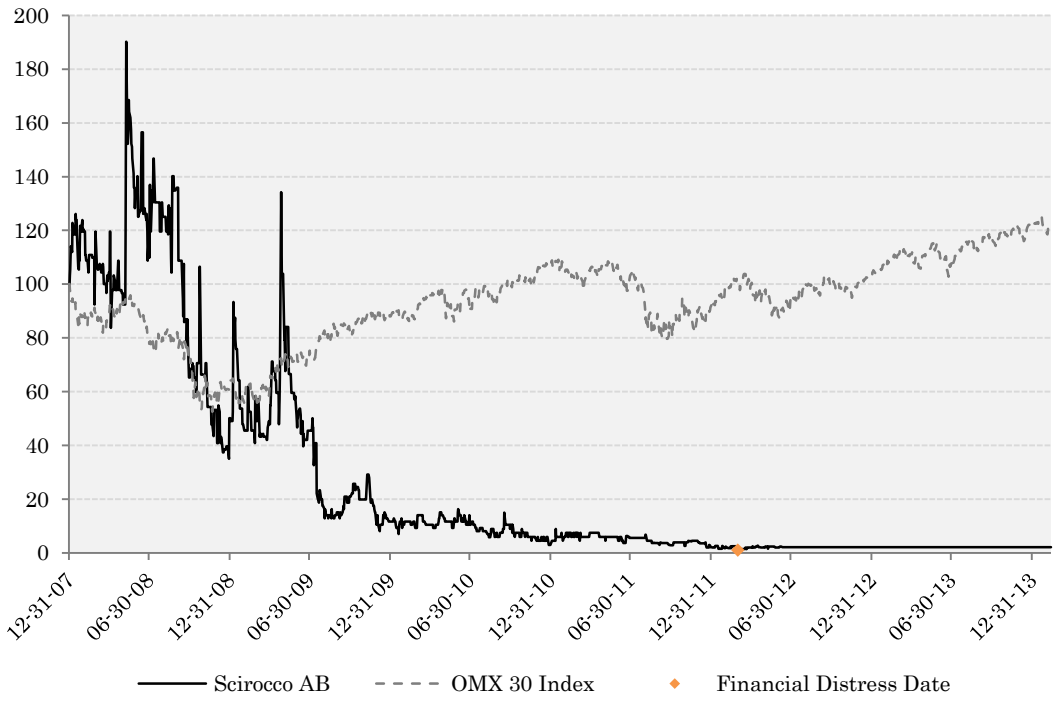

Figure A.16

Sea Net Maritime Communications AB

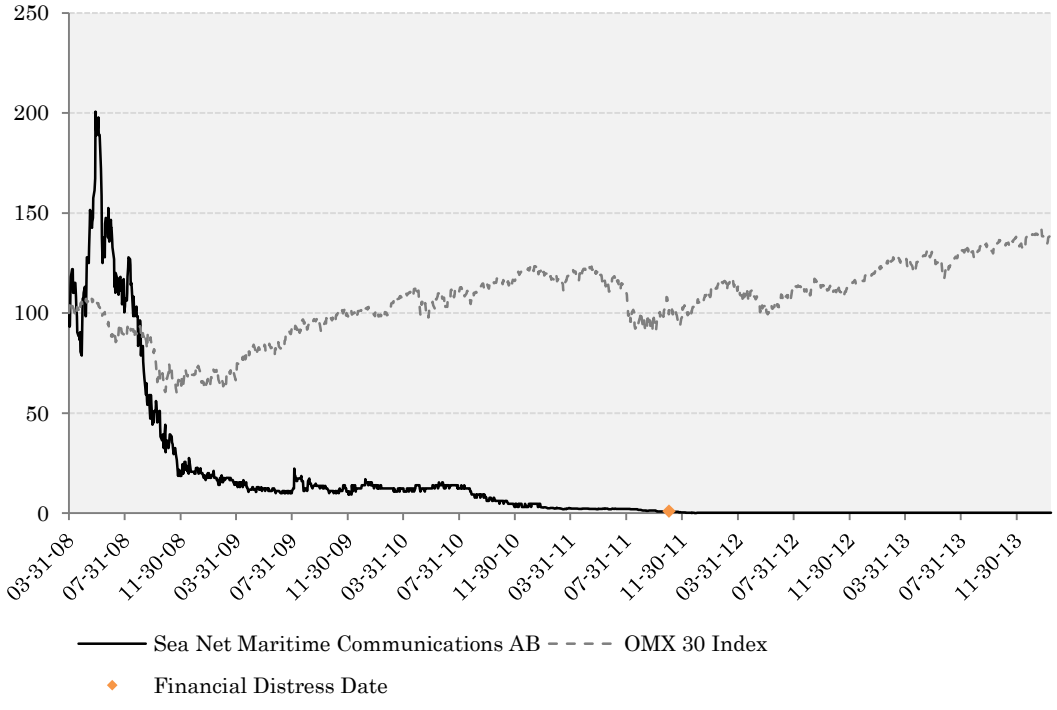

Figure A.17

Sharpview AB

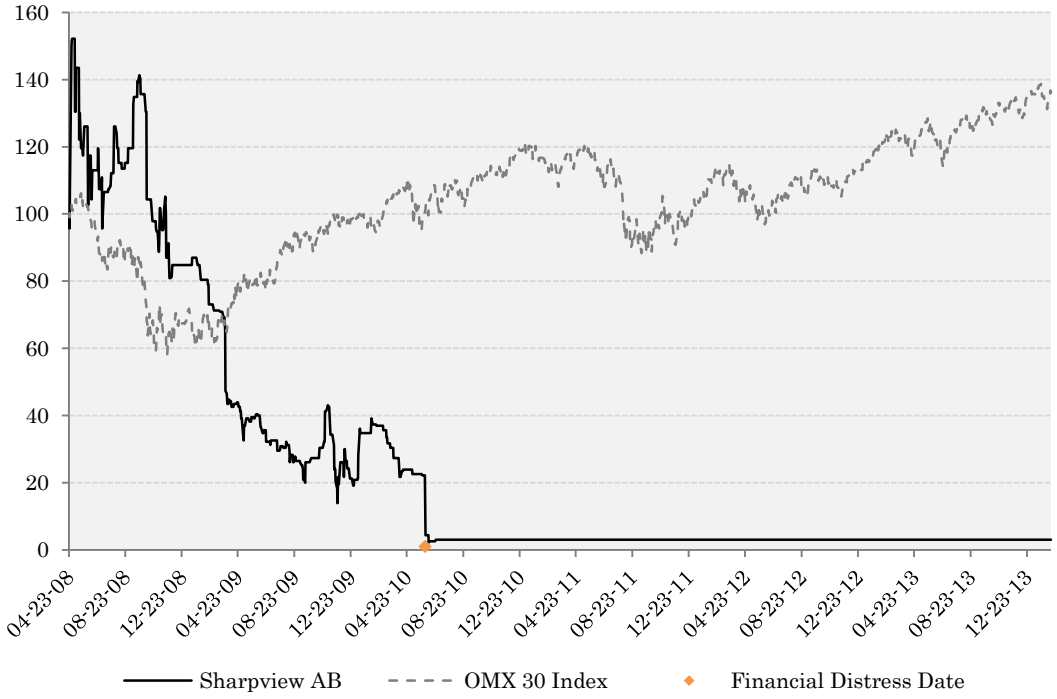

Figure A.18

Stormfågeln AB

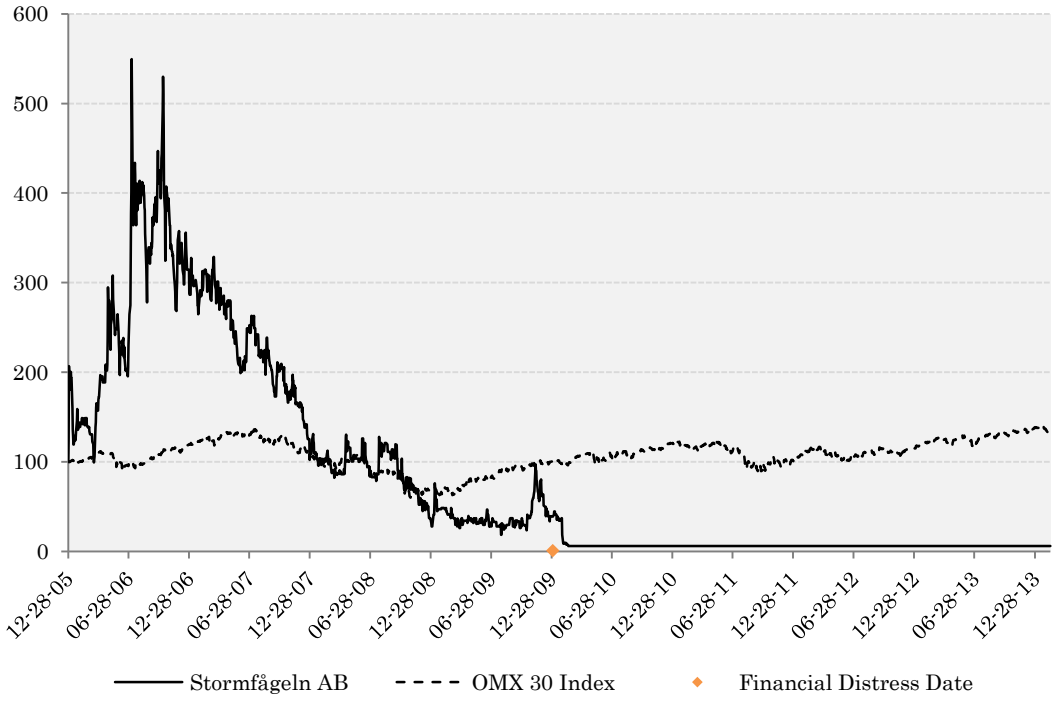

Figure A.19

Svithoid Tankers AB

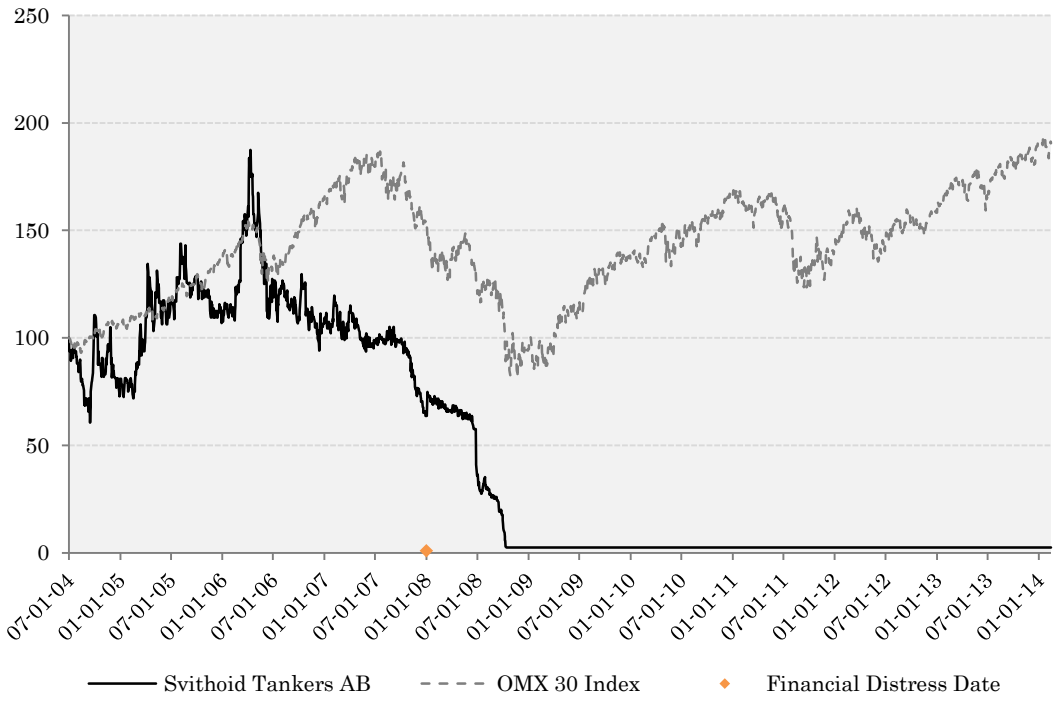

Figure A.20

Teligent AB

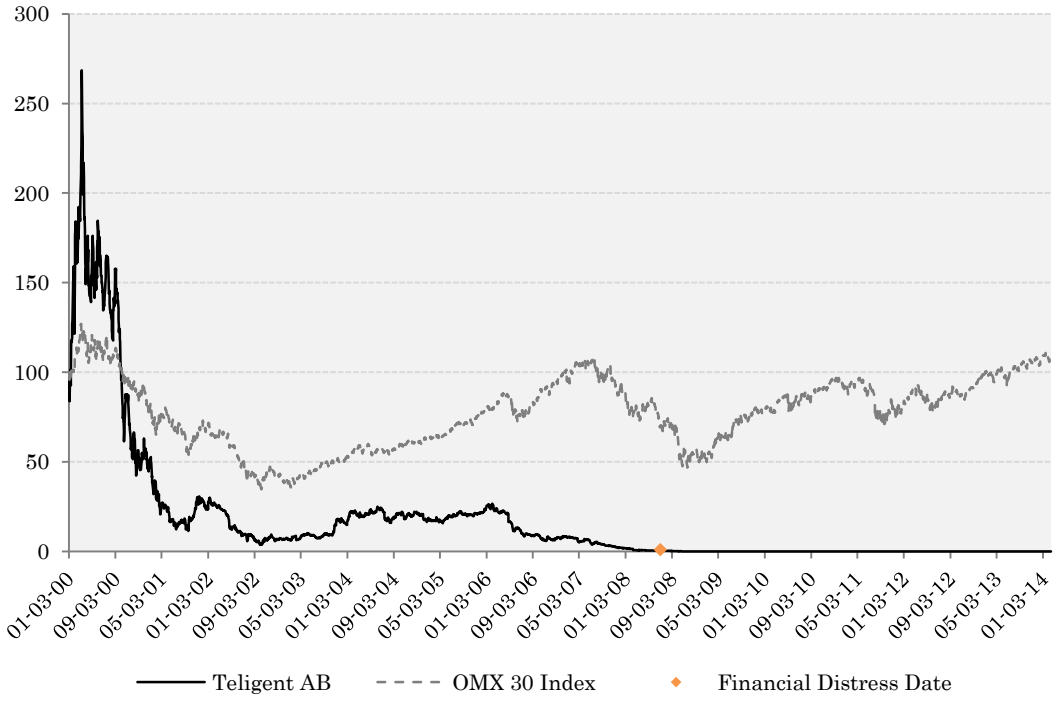

Figure A.21

TMG International AB

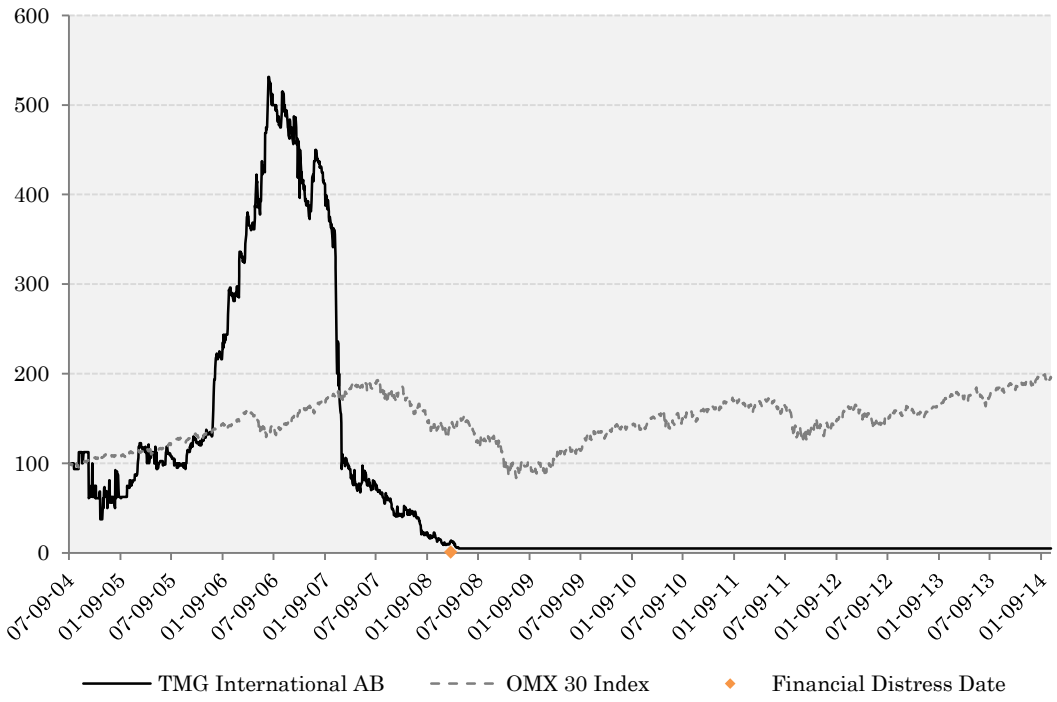

Figure A.22

Trimera AB

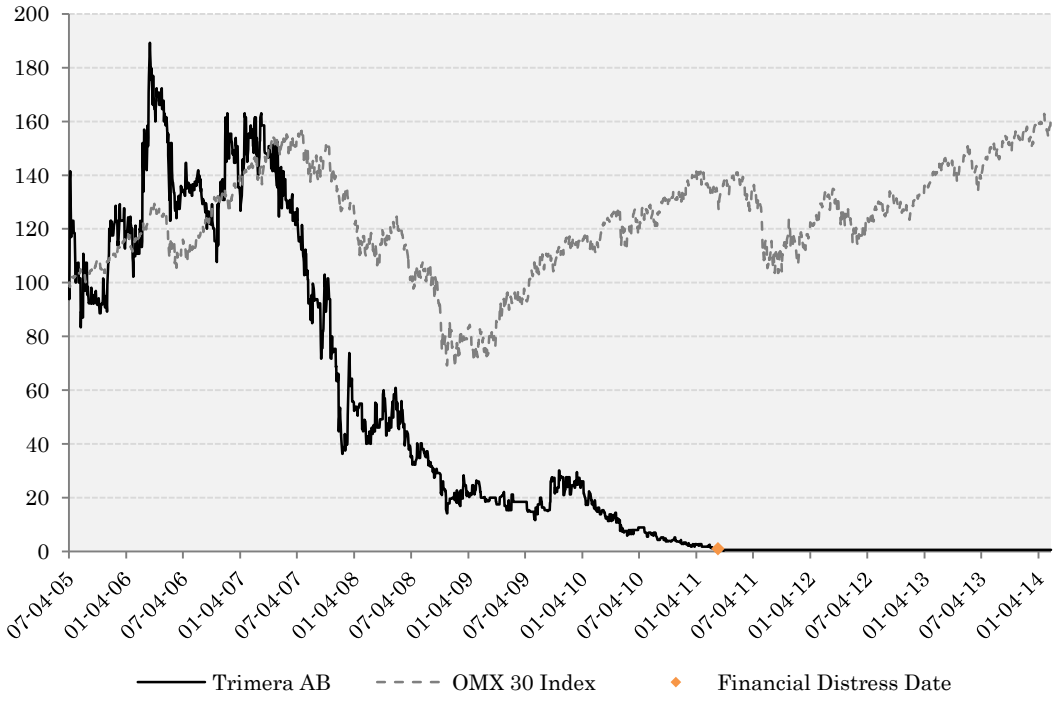

Figure A.23

XRF Analytical AB