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Liquidity Effects, Timing and Reasons
for Open-Market Share Repurchases

ACTA WASAENSIA

No. 133

Business Administration 53
Accounting and Finance

UNIVERSITAS WASAENSIS 2004

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ACKNOWLEDGEMENTS

I became especially interested in finance as a subject of study already during the first year of my studies for a Master's degree at the University of Vaasa. Since then, I have not had second thoughts as to whether I had made the right decision in choosing finance and economics. Subsequently, I got an opportunity to join Merita Corporate Finance Ltd as a summer trainee in 1997. Ever since I have combined my academic interests with the daily work of a finance professional. I have had an excellent opportunity to follow closely and take part in several corporate acquisition projects and equity capital market transactions in recent years. After completing my Master's thesis in 1998, I soon decided to continue my studies towards a doctorate supported by my thesis instructor Professor Paavo Yli-Olli.

I am especially grateful for the comments and guidance of Professor Eva Liljebloom who influenced the final focus of my dissertation. I also owe a debt of gratitude to my official pre-examiners Professor Juha-Pekka Kallunki of the University of Oulu and Professor Anders Löflund of the Swedish School of Economics and Business Administration. The final version of the dissertation has benefited a great deal from their valuable comments.

During my doctoral studies I am very pleased to have had an opportunity to participate in the nation-wide doctoral program, the Graduate School of Finance and Financial Accounting (GSFFA). I have also developed my econometric skills in the Summer School of Advanced Econometrics organised by the London School of Economics and Political Science. In addition to the faculty members, I am also grateful to all the fellow students with whom I have had an opportunity to share thoughts throughout the years. Attendance at the Annual GSFFA Research Workshops, Doctoral Research Seminars of my own department, as well as the weekly Joint Finance Research Seminars of the Helsinki School of Economics and Swedish School of Economics and Business Administration have also provided very important opportunities to receive comments on my ideas and research papers.

Despite not being a full-time researcher, I have been able to enjoy the inspiring and pleasant atmosphere of the Department of Accounting and Finance of the University of Vaasa. Professor Petri Sahlström has been extremely supportive and has made a great many comments and suggestions that have improved the dissertation. Professors Timo Salmi and Seppo Pynnönen have provided me valuable advice. I also appreciate Jaakko Tyynelä's help with the university's databases. I want to thank Virginia Mattila for language consulting and Tellervo Niemi for advising me with regard to the dissertation process. The advice and support from research colleagues such as Sami Vähämaa and Janne

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Äijö has been invaluable. My colleagues Jukka Fahlgren and Jaakko Kilpeläinen at PwC Corporate Finance Oy have also been important discussion partners on many finance related topics. My former fellow students from the Master's studies Vesa Koivuranta, Mika Metsälä and Antti Tainio have provided me valuable insights in many aspects related to this research. In addition, several other people have provided useful comments on various versions of the dissertation or supported me in the process through the years. I am very grateful to all of you.

I am also grateful for the financial support I have received from the Graduate School of Finance and Financial Accounting, Osuuspankkiryhmän tutkimussäätiö, Suomen Arvopaperimarkkinoiden Edistämissäätiö, and Vuorineuvos Tekn. ja Kauppat. Tri. H.c. Marcus Wallenbergin Liiketaloudellinen Tutkimussäätiö. I would like to thank my current and previous employers PwC Corporate Finance Oy and Merita Corporate Finance Oy, as well as Klaus Keravuori in person, for their flexibility, which has enabled me to take apart in necessary courses and seminars. Finally, I would like to thank my family for their love and support during this project and throughout my life.

Helsinki, 10 September 2004

Ilkka Tomperi

ABSTRACT

Tomperi, Ilkka Keijo Johannes (2004). Liquidity Effects, Timing and Reasons for Open-Market Share Repurchases. *Acta Wasaensia* No. 133, 176 p.

This study focuses on the liquidity effects, timing and reasons for open-market share repurchases. Share repurchases are a flexible payout alternative to cash dividends. The first part of the thesis focuses on the timing of share repurchases and studies the managerial timing ability. The second part focuses on the liquidity effects of share repurchases studying changes in bid-ask spread and trading volume around buyback trades. Finally the third part focuses on the total payout of companies in order to identify trends between cash dividends and stock repurchases. The overall data covers all stock repurchase programmes of Finnish firms traded on the Helsinki Stock Exchange in 1998–2002. This study provides empirical findings on the timing and liquidity effects of buybacks in a fully automated limit order-book market benefiting from the daily disclosure requirements. The Finnish tax regime offers a data set to study the development of total payout of companies in an environment where the double taxation of dividends is prevented in the case of a domestic shareholder. The empirical results suggest that companies do have timing ability in repurchases but not on a daily basis because of the fixed repurchase plan, according to which a stockbroker executes actual repurchases. Major share price drops increase repurchase activity giving support on the hypothesis that managers are interested in supporting their share price during periods of major changes in market valuations. On average, companies pay less for the shares acquired than a naïve accumulation strategy would result. Further, less liquid companies' repurchases have beneficial liquidity effects when measured with bid-ask spread and trading volume, supporting the market maker hypothesis of Barclay and Smith (1988). A new relative repurchase measure provides additional evidence on repurchases beneficial effects on liquidity. According to the results, foreign ownership, stock option plans, and level of free cash flow have a positive effect on the share of repurchases of total payout. The results further support that the adoption of repurchases increases the total payout of firms, a finding consistent with recent US data.

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Key words: share repurchases, dividends, liquidity, bid-ask spread

1. INTRODUCTION

Share repurchase programmes (or share buybacks) have been booming in many countries during the 1990s and a growing branch of research has emerged along with it. In the USA, the history of share repurchases is a lot longer than in many other countries. Active adoption of stock repurchases started during the 1980s in the USA and during the 1990s in Canada and the UK. In many countries, like Germany, Japan and Finland, the legislation has changed making buybacks possible only recently. In Finland, stock repurchases became possible with the reform of the Companies Act in 1997 and the active adoption of repurchase authorisations already took place in 1998. Since then, the growth has been enormous and in 2002 the number of companies with repurchase authorisations was 60, with a total value of EUR 9.5 billion at the beginning of the authorisation compared to 22 companies with buyback authorisations with a total value of EUR 617 million in 1998.

There is no single dominant motive for share repurchases, but many attempts have been made to find the key factors affecting the popularity of buybacks. In most firms, there are several simultaneous factors encouraging them to repurchase their stock. Corporate executives often explain repurchases as a method of boosting earnings per share while financial economists suggest that managers use buybacks to signal their optimism about a firm's future prospects to the market. (Grullon and Ikenberry 2000.)

There exist actually two types of signalling related to repurchases. Like regular cash dividends, repurchases can function as a signal of a company's future cash flow. Due to information asymmetries on the stock market, a share may be priced below its intrinsic value and share repurchases may convey information on managers' cash flow and earnings expectations. Thus, repurchasing firms

should experience increase in future earnings. Buybacks can also be used as a signal of market undervaluation. This is the case when managers do not attempt to convey new information to the market but are expressing their disagreement with the way the company is valued.

In addition to signalling, a common argument for repurchasing shares is to boost earnings per share (EPS). Grullon *et al.* (2000) summarise that in several surveys and company press releases managers often claim that they are repurchasing shares in order to increase EPS. EPS and other per share multiples play a key role in security analysts' reports as well as with the press, and if we assume that shares are mechanically priced based on these per share financials the share prices should also go up. Stock option programmes can cause remarkable dilution and thus repurchases are needed to cope with the increasing dilution problem. This is the case if repurchased shares are retired. In some companies, repurchased shares are reissued to stock option holders when they exercise options and thus there is no need to issue new shares. (See *e.g.* Liang and Sharpe 1999.)

Dividend substitution has been a widely suggested rationale for choosing share buybacks instead of cash dividends. This is understandable in countries like the USA, where taxation is more favourable to repurchases than to cash dividends as a means of distributing excess cash to shareholders. It should not be the case in countries with a tax system similar to the current Finnish tax scheme where shareholders are protected against double taxation of dividends. The so-called imputation credit system eliminates the economic double taxation of distributed profits and guarantees single taxation of dividends.¹ Managers may

¹ The Finnish Parliament has accepted on 30 June 2004 a proposal, submitted by the Finnish Government, to reform taxation of companies and capital. According to the accepted proposal, dividends distributed by publicly listed companies shall become taxable. The imputation

also prefer repurchases if they have stock options that are not dividend protected. Jolls (1998) showed that the increasing use of stock options is a major factor affecting the increasing use of repurchases in the 1990s. Another benefit associated with repurchases is related to their flexibility as a method of distributing excess cash to shareholders. Companies (and investors) prefer stable cash dividends and payout ratio and managers are often reluctant to increase dividends temporarily if the future cash flows are not expected to increase. Repurchases can thus be used as a flexible tool to return occasional excess cash to shareholders without changing the level of cash dividends. (Grullon and Michaely 2002.)

Other common reasons for repurchases are leverage and investment hypotheses. Leverage hypothesis refers to capital structure adjustments, *i.e.* changing the debt-to-equity ratio over time. Repurchases have the same effect on the equity and the debt-to-equity ratio as ordinary cash dividends. Overcapitalised firms might prefer to adjust their gearing and share repurchases offer a flexible tool to adjust the level of indebtedness. The effect of repurchases can come both from decreasing the equity of the company when cash is used in repurchases but also from increasing leverage if repurchases are financed with new debt. Due to the regulations and stock market considerations buybacks might not be suitable for remarkable changes in the capital structure. The investment hypothesis suggests that increase in total payout and stock repurchases is related to decreasing investment opportunities. Increasing total payout and repurchases signals that firms do not have better investment projects available and they thus return excess cash to shareholders. If, however, companies' managements have biased incentives and the increasing total

system of corporation tax (*avoir fiscal*) will be repealed and partial double taxation of dividends will be introduced. In respect of private individuals 70% of dividends distributed by publicly listed companies shall be taxable income. The new tax scheme will be applicable in 2005.

payout leads to decreased capital expenditure, it may have a negative effect on firms' long-term growth prospects and likewise on the present value of future cash flows. Alternatively, maintaining current investment level simultaneously with increasing total payout may cause firms to increase borrowing and lead to higher leverage. (See *e.g.* Grullon *et al.* 2000, Liang *et al.* 1999 and Jensen 1986.)

The free cash flow hypothesis suggests that repurchase announcements are good news because they inhibit management's ability to divert capital to uses that are not in the best interests of shareholders. The free cash flow hypothesis is related to the investment hypothesis but also to the dividend substitution hypothesis. Temporarily high free cash flow especially has been found to be associated with increased buyback activity. This is due to the flexibility of repurchases as a payout method, but companies with high free cash flow are also generally good dividend payers and active in share repurchases. (See *e.g.* Grullon *et al.* 2000 and Liang *et al.* 1999.)

Related to the signalling hypothesis presented earlier, the information content of share repurchases has been studied by focusing on the stock markets' short-term share price reactions to companies' decisions to start to buy back their own shares and to announcements of actual repurchases. Most of the empirical studies utilising the popular event study methodology have shown positive abnormal returns around stock repurchase announcements. The market reaction may also vary between companies if market participants can identify the actual reasons for repurchases. Thus repurchases have been demonstrated to be associated with dividend payments and performing partly as similar signals. (See *e.g.* Vermaelen 1981, Ikenberry, Lakonish and Vermaelen 1995, Stephens and Weisbach 1998, Guay and Hartford 2000, Ikenberry, Lakonish and Vermaelen 2000, Kahle 2002, and Karhunen 2002.)

Two fundamental and related issues regarding open market stock repurchases are whether managers use private information to time company repurchases and whether their repurchases affect the liquidity of the share (Barclay and Smith 1988, Wiggins 1994 and Brockman and Chung 2001). One of the most challenging questions to tackle with in regard to share repurchases is the insider trading nature of buyback trades. Although the general meeting of the company makes the decision on repurchase authorisation, the actual timing of repurchases is somewhat in the hands of the management of the company. Transparent reporting rules and anti-manipulation regulations play an important role in avoiding misconduct and in the process of ensuring an independent and efficient price formation process on the stock market. Price and liquidity changes associated with the announcement of repurchases and especially with the actual repurchases are one way to study the possible information asymmetries associated with repurchases. The question is whether market participants are able to detect the presence of informed trading and adjust spreads, adverse selection costs, and depths in a manner consistent with the information-asymmetry hypothesis.

Liquidity effects are closely related to stock returns, and by studying changes in liquidity, one could be able to differentiate the effect of information flows on share prices and trading activity more precisely. The effect of buybacks on share liquidity is typically measured by bid-ask spread, trading volume or depth of order book. Barclay and Smith (1988) presented two conflicting hypothesis of the market reaction to buybacks:

- (1) Market maker hypothesis predicting that liquidity will increase along with buybacks as the management of the repurchasing company has no inside information or does not utilise inside information in timing the repurchases.

- (2) Asymmetric information hypothesis predicting that liquidity will decrease along with buybacks as the management of the repurchasing company is better informed than the existing liquidity providers (*i.e.* investors or market makers).

Typically repurchases are completed over periods of subsequent repurchases, where the existence of increased activity could enhance market liquidity and decrease bid-ask spread. Alternatively, existing liquidity providers may identify the activity of a more informed market participant and this could have an opposite effect on liquidity and spread. Barclay *et al.* (1988) reported a widening spread after open market share repurchase announcements supporting the asymmetric information hypothesis. Miller and McConnell (1995) found no evidence of increasing bid-ask spread following repurchase announcements similar to Barclay *et al.* (1988). Wiggins (1994) and Franz, Rao and Tripathy (1995) have reported decreasing spreads following buyback announcements. The latter, who used NASDAQ data from the period 1983-1987, attributed this decline in spreads to a reduction in the informed trading costs associated with the repurchase announcement. Brockman and Chung (2001) have studied the timing of stock repurchases and found that managers exhibit substantial timing ability consistently with the information asymmetry hypothesis causing widening bid-ask spreads and decreasing depths during repurchase periods.

1.1 Purpose, relevance and hypothesis of the study

The main purpose of this study is to examine the impact of open-market share repurchases on liquidity in a limit order-book market and to analyse how adoption of repurchases has affected the total payout of companies and why. The key area of interest is to find out whether stock repurchases affect stock market liquidity and in which direction, as previous studies have yielded

contradictory conclusions. While using Finnish data, one could assume that repurchases could have a beneficial effect on liquidity as the market overall is less liquid than the stock markets in many major financial centres with the exception of one share especially, Nokia. An opposite liquidity effect might be caused because of the inefficiency of the Finnish markets and especially the informational asymmetries that often exist in thinly traded stock markets. The liquidity effects are studied using both event study methodology on repurchase announcements and on actual repurchases, and a cross-sectional time series model to study the effect of several factors including that of actual repurchases on liquidity. The timing of repurchases is analysed in order to ascertain whether companies act in a manner that provides additional liquidity during market downturns and turbulences. The timing ability of managers is analysed using a bootstrapping methodology in order to identify whether companies use private information in timing repurchases or at least to see whether they exhibit timing ability. Finally, the development of the total payout is analysed with an emphasis on the factors that affect the level of repurchases of total payout.

In my research I will follow the path that some of the recent articles focusing on stock repurchase liquidity effects and the development of firms' total payout have opened up. The study is of interest to researchers and practitioners of accounting and finance, because it provides further information on this relatively new financial phenomenon in Europe. Based on the growth of repurchases in the USA and their growing importance as a means of distributing excess cash instead of traditional cash dividends in many other countries as well, better understanding of their side-effects is needed. There has been some discussion about share repurchases and especially the dividend policy of Finnish firms since the mid-1990s, and since buybacks are a relatively new instrument in firms' corporate finance toolbox to adjust the total payout and capital structure, boost per share earnings, and to signal the future

development of the firm's cash flows or the dissatisfaction on the current share price, they are well worth studying. The results of this study provide further evidence and information regarding the liquidity effects of open-market share repurchases in a limit order-book market, the possible agency problems related to repurchase plans, the timing of repurchases, and on the effects of repurchases on total payout. The key hypotheses of this dissertation are presented below.

1. Companies repurchase their own shares in a way that is designated to support their share price. This should be the case especially in times of major market turmoil.
2. Managers exhibit timing ability in executing open-market share repurchases and thus pay less for the shares acquired than an average investor would pay. This hypothesis is partly related to the first hypothesis on the execution of repurchase trades. Purchasing of shares when share price has decreased remarkably has both signalling value but can also be an economic way to execute buybacks.
3. Market liquidity measured with higher trading volume and smaller bid-ask spread increases when companies repurchase their own shares. This hypothesis should be valid especially in Finland and for small companies, as one could argue that the market is less liquid than in many major markets of the world.
4. Foreign ownership, stock option plans, and lack of investment opportunities are associated with higher share of repurchases of total payout. The current Finnish taxation system does not support substituting repurchases for dividends, but the higher share of foreign owners could induce buyback activity. Lack of investment

opportunities has also been named as a key reason to repay excess cash to shareholders.

5. The total payout as percentage of earnings is higher in firms that repurchase their own shares from the market. Previous research has shown that firms that have started to repurchase their shares have not cut their regular cash dividend payments leading to a higher total payout. This is also associated with the investment and growth opportunities as well as capital structure and regulatory environment.

The hypotheses are based on the previous studies and the first two hypotheses on the managerial timing ability and the actual timing of repurchases are presented and tested in Chapter 5.1. The following Chapter 5.2 focuses on the third hypothesis on the liquidity effects of repurchase trades. The last two hypotheses focusing on the structure of the payout are presented more in detail and tested in Chapter 5.3.

1.2 Contribution of the study

This thesis extends the recent studies on stock repurchases in six main respects. First, the major difference is the tax regime of the source country of the data, which offers a cleaner data set to study the development of total payout of companies as the double taxation of dividends is prevented in the case of a domestic shareholder. This environment provides an opportunity to study the differences between companies with a mainly domestic shareholder base with no tax incentive to use repurchases and those that have a high share of foreign shareholders and an accompanying incentive to prefer buybacks. This is especially interesting because many previous studies have indicated lenient

taxation of share repurchases as a key factor affecting the popularity of repurchases. We can now study the effect of shareholders' taxation on payout policy. This is also of current interest since in the USA the Bush administration has been planning to eliminate the double taxation of dividends as a part of its economic stimulus plan while *e.g.* in Finland the development is going in the opposite direction along with EU practice. Thus this study further sheds light on the recent findings of *e.g.* Fama and French (2001) and Grullon and Michaely (2002).

The second contribution of this study is especially related to liquidity. A new measure is constructed capturing the effect of major repurchases, namely the daily repurchase volume of the total daily volume. This brings the model used by Brocman and Chung (2001) a step forward. The adoption of event study methodology in studying the changes in volume and bid-ask spread around repurchases is an addition to the previous repurchase related event studies, focusing mainly on the abnormal returns associated with buybacks. This is the first study on repurchase related liquidity issues utilising event study methodology. Additionally, the Finnish stock market provides an opportunity to study the liquidity effects of buybacks on infrequently traded stocks as the sample also includes thinly traded stocks.

Third, the present study benefits from the reporting rules applicable in Finland providing more accurate information on actual repurchases than is available in most of the other marketplaces. In that sense, the Finnish daily data on actual repurchases provides valuable information on the effect of buybacks on liquidity utilising daily stock price and bid-ask spread data. In the USA, the rules are more flexible while only the adoption or intention to repurchase a firm's own shares needs to be published. The most problematic reporting gap in the US market relates to the disclosure of actual repurchases. Companies have

no obligation to disclose any details of actual repurchases although this is recommendable and some companies do this. Grullon *et al.* (2000) compare the lack of reporting with the strict reporting rules on insider trading as buybacks have several similarities with insider trading activities. The reporting rules *e.g.* in Canada and Hong Kong are stricter and more in line with those in Finland. In Finland, companies initially announce their intention to repurchase their shares when they call the shareholders' meeting to make the decision. Thereafter, most of the companies have published the board's decision to start a buyback of their shares and finally the regulation requires the companies to publish their actual repurchases on a daily basis. The announcement includes the number and value of shares bought, the average, highest and lowest price paid, as well as the number of own shares held by the company. This reporting rule enables us to study the effects of actual repurchases using daily data.

Fourth, this study expands the knowledge of the timing of repurchase trades and managerial timing ability. This study extends the bootstrapping methodology study by Brockman *et al.* (2001) by implementing an event study methodology to identify the timing issues of buybacks. We first compare the bootstrapping results of Brockman *et al.* (2001) from the period of 1992–1999 on the Hong Kong Stock Exchange to the Finnish data set over the years 1998–2002 and then apply event study methodology to study repurchase activity around major market turmoil and identify the tactical timing of share repurchases. Both stock markets have experienced strong bull market followed by bear market during the sample period thus providing similar types of background to study the timing of repurchases.

Fifth, in contrast to market maker driven stock exchanges, which most of the previous studies have addressed, a data set from the Helsinki Stock Exchange utilising a fully automated and more transparent limit order-book system is

used. The limit order-book market offers high level of transparency on price levels and bid and ask depths to all market participants. The market structure may also have an effect on the liquidity effects of repurchases.

Sixth, the use of Finnish data allows a comparison to be made with the earlier US findings on the development and structure of total payout (*e.g.* Fama *et al.* 2001). In addition to the differences in dividend taxation the evidence is also interesting due to the different ownership structure of companies in Finland. In the USA and the UK companies typically have a spread ownership base with no dominant shareholders while in Europe and Finland the ownership is often more concentrated. Pension funds have a more dominant role in the USA and they are more active owners than in Europe. In Finland, many blocks are held by investors who prefer a constant dividend flow and thus companies must focus on paying stable ordinary cash dividends and repurchases are more an ingredient in the payout mixture. This is also the first study on the development of the total payout in Finland since the adoption of buyback schemes.

1.3 Outline and main results of the study

In addition to providing additional evidence of the effects of share repurchases on liquidity and the development of total payout, my aim is to give a comprehensive overview of the existing literature on repurchases and related issues. I will pay attention to the effect of stock repurchases on liquidity and the timing of buybacks, but dividend policy related decisions and issues are also comprehensively covered. My literature review in Chapters 2 and 3 after the introduction will also merge the existing literature from several perspectives including finance-oriented research on dividend policy and firm value, market microstructure and agency theory.

Chapter 1 provides an introduction to this study summarising the background and hypothesis of the study as well as describing the purpose and relevance of the present thesis covering timing and liquidity effects of stock repurchases and the development of total payout in Finland since the adoption of buybacks in 1998.

Stock repurchases are covered in Chapter 2. Common structures of repurchases, both tender offers and open market repurchases, are presented as well as prior research on the rationale to repurchase own shares instead of paying cash dividends. Market reactions to repurchase announcements are also covered. Chapter 2 gives an overview on the capital structure and payout policy related research and discussion and an introduction to the relationship between repurchases and stock market liquidity.

Chapter 3 describes the theoretical background of stock market liquidity and efficiency. The concept of liquidity is discussed and popular measures of liquidity are introduced. Information asymmetry and the principal-agent problem are also discussed as they are closely related to stock market efficiency and signalling. Helsinki Stock Exchange and the functioning of the stock market are presented with descriptive data in order to present the market structure from which the data originated. The marketplace is compared to some of the world's major stock markets in order to identify the necessary similarities and differences.

Chapter 4 presents the hypothesis and an outline of the empirical investigation and introduces the data used in the study. The empirical analysis of this study is based on a sample of Finnish companies listed on the Helsinki Stock Exchange that have announced and implemented actual stock repurchase

programmes during 1998-2002. The main hypothesis of this study is that repurchases have a beneficial effect on stock market liquidity and that management exhibits timing ability in the execution of buyback transaction. Previous evidence from other countries also indicates that changes in dividend policy and the total payout of firms after buyback programmes have arisen as an alternative method to cash dividends.

Chapter 5 comprises the empirical studies, which are grouped under three themes. Starting from testing managerial timing ability in the execution of buybacks the focus moves on to study whether companies buy back their own shares in a manner that supports their share price during market downturns. The main theme in the empirical part, however, is the analysis of the liquidity effects of buybacks, analysing changes in bid-ask spread and volume around repurchase announcements and actual repurchases. The third area of interest is the development of the total payout of the companies and factors affecting the relative amount of repurchases of the total payout in Finnish companies. The models and data sets of individual studies are presented together with findings and conclusions for each area.

Finally, Chapter 6 of this thesis summarises and concludes the study. The key findings of the study are presented together with some suggestions for further research. The empirical results suggest that companies do have timing ability in repurchases but not on a daily basis because of the fixed repurchase plan according to which a stockbroker executes actual repurchases. Less liquid companies' repurchases have beneficial liquidity effects when measured by bid-ask spread and trading volume, supporting the market maker hypothesis of Barclay and Smith (1988). According to the results, foreign ownership, stock option plans, and free cash flow increase the share of repurchases of total payout.

2. SHARE REPURCHASES AND ISSUES RELATED TO PAYOUT POLICY

The purpose of this chapter is to give an overview of share repurchases and related areas of research including dividends and capital structure decisions. First in Chapter 2.1, a comprehensive presentation of repurchases, alternative repurchase methods and reasons for buybacks is presented. Thereafter empirical evidence of market reactions to share repurchase announcements and actual repurchases is presented. After presenting studies on the abnormal returns associated with repurchases, previous studies on the effect of share repurchases on stock market liquidity are discussed. Finally, the regulatory environment is presented.

Chapter 2.2 focuses on payout policy. Firms' capital structure decisions are discussed and the implications of capital structure on a firm's value are presented. The payout policy is discussed and recent findings in the development of firms' payout policies and total payout are presented. Finally, the related issues from capital expenditures and growth opportunities to information asymmetry and principal-agent problem are covered in necessary depth.

2.1 Share repurchases

A share repurchase programme or stock buyback means distributing a company's funds to its shareholders and is by nature similar to dividends. The basic concept is that a company repurchases its shares from the market through open-market share repurchase or a tender offer, while the shareholders receive cash and the number of shares outstanding decreases. In a tender offer, a firm

offers to acquire its own shares at a certain fixed price and the shareholders may decide whether to sell or not. The offer is valid for a limited time period and the offer price normally considerably exceeds the market price. An alternative and currently preferred way is to make open-market repurchases, where a firm announces that it will repurchase its own shares from the market, the price being the market price. According to Ho, Liu and Ramanan (1997) and Grullon *et al.* (2000) the latter method has been the most popular one recently. The third, but least used option is a Dutch auction repurchase, which is also a fixed price method. In a Dutch auction, the final price is set based on investors' offers and all investors who have tendered at prices above the clearing price are excluded from the deal.

A summary presented in Grullon *et al.* (2000) shows that in 1999 there were 1,212 open-market share repurchase plans in the USA worth USD 137,015 million compared with 21 tender offers worth USD 1,790 million and 19 Dutch auctions worth USD 3,817 million. Open-market type of buybacks were clearly dominant throughout the 1980s and 1990s.

In Finland, share repurchases became possible along with the new Companies Act of 1997 and the first buybacks took place in Finland in 1998. Since then the growth has been remarkable and in 2002 the number of companies with share repurchase authorisation was 60, with a total value of about EUR 9.5 billion compared to 22 companies with authorisations with a total value of EUR 617 million in 1998. Of the 149 companies listed on the Helsinki Stock Exchange at the end of 2002, a total of 60 companies or 40.3% had a repurchase authorisation in 2002.

Why do companies buy back their own shares from the market? It is evident by now that no single dominant rationale for repurchases can be named. As shown

in the introduction, the two most often cited reasons include boosting earnings per share by decreasing the number of shares outstanding and signalling optimism about the firm's prospects to other market participants. These types of signals may be motivated either by the fact that the management is keen to tell the market about its expectations of future increases in the firm's cash flow and earnings or then that the management wishes to express its disagreement with the way the market is pricing the company and its performance. (Grullon *et al.* 2000)

As described in the study by Liang *et al.* (1999), share repurchases can be incorporated into the analysis of stock valuation in two ways. Firstly, repurchase related cash outflow is classified as dividends or secondly, incorporating the effect of repurchases into growth in per share earnings and dividends. The effects of repurchases on share price and the number of shares outstanding are offsetting, thus the firm's total market value is unaffected.

Asquith and Mullins (1986) wrote an article on dividends, stock repurchases and equity issues, in which they summarised previous research and results related to dividend payout and stock market reactions. They pointed out that increase in dividends and stock repurchases are positive signals and decreasing dividends and equity issues are negative signals. The corporate financial puzzle was summarised as shown in Figure 1.

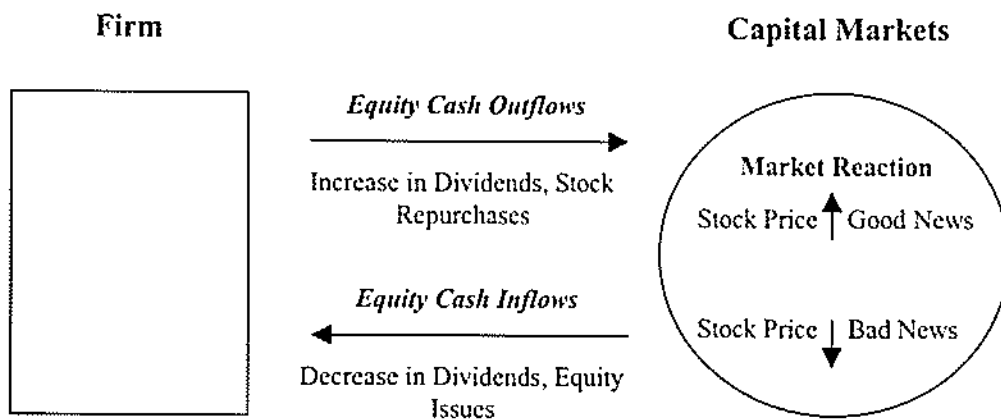


Figure 1. Capital market reaction to equity cash flow decisions (Asquith *et al.* 1986).

As shown in Figure 1, a model of a firm could be based upon the superior information possessed by managers *vis-à-vis* outside investors. This is consistent with the view that a firm is a 'black box', where unanticipated equity cash flows communicate information to investors. The information imbalances in this model arise because of the separation of ownership and management. According to Asquith *et al.* (1986), the separation of management and investors endows managers with superior information concerning a firm's current performance and future prospects. Thus, equity cash flows serve as signals that communicate managerial information to investors.

Wansley, Lane and Sarkar (1989) used survey methods to obtain evidence about managerial attitudes towards the possible reasons underlying repurchase decisions and factors influencing premiums in tender offers. The reasons for repurchases were grouped under six hypotheses:

1. The dividend substitution hypothesis, which suggests repurchases as an alternative to cash dividends because of historically favourable tax treatment, but tax laws have changed and differ in many countries

2. The leverage hypothesis, suggesting that repurchases are used to change capital structure toward a more desirable one
3. The reissue hypothesis, which suggests that repurchases may be undertaken to provide shares for stock options, bonuses, *etc.*
4. The investment hypothesis, suggesting that companies repurchase their own shares because of lack of attractive investment opportunities
5. The information signalling hypothesis, which suggests that repurchases may be due to management possessing favourable information not known to the market, and thus represents management's signal that the firm is undervalued
6. The wealth transfer hypothesis, suggesting that a repurchase when shares are undervalued would transfer wealth from participating (selling) shareholders to non-participating shareholders or from bondholders to non-participating shareholders.

Repurchases differ from dividends as a form of payout because of the greater flexibility associated with buybacks. Changes in a firm's dividend policy are traditionally viewed as containing some kind of signal for the future cash flows and future payout ratio. Thus, companies are not very eager to increase dividends temporarily since they are penalised when they decrease dividends. Buybacks are a lot more flexible by nature and may serve as a suitable tool to pay out excess cash to shareholders, without changing the long-term dividend policy. In 1998, US corporations distributed more cash to investors through buybacks than through regular cash dividends (Grullon and Michaely 2002).

Another topical reason for increasing the number of repurchases instead of dividends is the growing use of executive and employee stock option plans, because the value of options, which are not normally dividend-protected, is reduced when dividends are paid. Lambert, Larcker and Larcker (1989) found that firms that have adopted stock options as a form of compensation have subsequently reduced dividend payments. Based on Liang *et al.* (1999) some other studies have documented that dividends are negatively associated with

employee stock option plans, while buybacks are positively associated with executive stock option plans. Karhunen (2002) with Finnish data also found a positive and statistically significant correlation between stock option plans and repurchase activity with Finnish data.

The research papers have different kinds of approaches to repurchases. Most of the papers evince possible reasons for buybacks, *i.e.* why companies repurchase their own shares and what makes companies change their payout policy. Another research branch has analysed the positive price reaction after announcing or adopting a repurchase programme and found it statistically significant. A third branch has analysed the effect of different factors on the positive share price development. And finally, some of the studies have focused on the liquidity effects of repurchases. All of these areas have been of interest since the early 1980's. The research has covered both open-market purchases and tender offers. A short summary of the most important papers in chronological order will follow.

2.1.1 Reasons for share repurchases

As briefly discussed in the introduction, many reasons for repurchases have been evinced. The first papers by Dann (1981) and Vermaelen (1981) hypothesised that changing capital structure, defending against a take over, funding acquisitions, and distributing profits could be motivations for share repurchases. If there are no good investment opportunities available companies can distribute funds to shareholders through a repurchase programme without breaking long-term dividend policy (Wansley *et al.* 1989). One of the most salient recent suggestions has been the signalling hypothesis. Because management should have a better view of the future prospects of a company,

they can use repurchases to signal that a company's share price is lower than the expectations would suggest.

In addition to Liang *et al.* (1999), Weisbenner (2000), Klassen and Sivakumar (2001), and Kahle (2002) have recently written articles about the relationship between stock option plans and stock repurchase programmes. Weisbenner (2000) investigates in his study how the growth of stock option plans has affected corporate payout policy and companies' hesitance to repurchase their own shares to avoid dilution of earnings per share (EPS) resulting from past stock option grants. He finds some positive signs in the relationship between stock options and repurchases. Klassen *et al.* (2001) explore repurchase activity and employee and executive stock option activity for the period 1995–1999 and report that the value of options outstanding is a strong predictor of repurchase activity. This is similar to the findings of Kahle (2002), that the stock market reacts less positively to stock repurchases announced by firms with high level non-managerial options.

Karhunen (2002) studied factors conveying firms to buy their own shares in open market programmes and investigated why firms adopt repurchase programmes and how the stock market values such decision. Karhunen reports that the average repurchase programme completion rate is about 26% in Finland and that buybacks tend to be executed following poor stock price performance and during periods of high trading volume. Depending on the size of the companies this can, of course, be *vice versa*, *i.e.* the high trading volume during buyback periods is caused by repurchase trades. This may be a more relevant assumption considering small-cap companies, as shown later in the empirical part of this study. A repurchase announcement may also have a positive effect on trading activity through its signalling nature. The empirical evidence documents positive abnormal returns at the initial announcement of

the repurchase programme and additionally at the announcement of actual repurchases.

Grullon and Michaely (2002) show that repurchases have not only become an important method for payouts for US firms but also that companies would otherwise have increased their cash dividends. Their findings show that established firms distribute more of their cash flows through buybacks and less through cash dividends. As a reference to former dividend signalling research, Grullon and Michaely (2002) show that the market reaction to dividend cuts in firms that buy back their own shares is not significantly different from zero, while the market reaction is significantly negative for firms that cut dividends but do not repurchase. They also show that one reason behind the popularity and growth of repurchases in the USA during the mid-1980s was the introduction of the Rule 10b-18, a safe haven for repurchasing firms to avoid stock price manipulation claims. The paper also suggests that a more appropriate valuation tool might be the total payout instead of dividend payout in the modern world of buybacks.

2.1.2 Stock market reactions to share repurchases

One of the first papers in this field was that by Dann in 1981, who examined the effects of a common share purchase of the tender offer type on the values of the common stock, debt, and preferred stock. Significant increases in firm values were reported. Common stock holders are the beneficiaries of all of the value increments, but no class of securities declines in value as a result of the repurchase. Overall, the results were consistent with the hypothesis that repurchase tender offer announcements constitute a revelation by management of favourable new information about the value of the firm's future prospects. In

his unpublished PhD dissertation of 1980, Dann analysed the price impacts of open market repurchases, but the problem was that the repurchase dates and prices were infrequently reported. Vermaelen (1981) examined the pricing behaviour of securities of firms which repurchase their own shares. Repurchases *via* tender offer were found to be followed by positive abnormal returns supporting the information hypothesis. When firms signal the information, they generally offer to repurchase at a price above the value of information per share, *i.e.* for example to avoid lawsuits from the shareholders who tendered their shares. For open-market purchases, the results were less conclusive but they were consistent with the information hypothesis if repurchases can be perceived as an indirect form of insider buying *via* executive stock compensation plans.

Asquith and Mullins (1986) wrote an article five years later on dividends, stock repurchases and equity issues, where they summarised previous research and results. They pointed out that increase in dividends and stock repurchases are positive signals and decreasing dividends and equity issues are negative signals. The model presented in their article could be based upon the superior information possessed by managers *vis-à-vis* outside investors. This is consistent with the view that a firm is a 'black box', where unanticipated equity cash flows communicate information to investors. The information imbalances in this model arise because of the separation of ownership and management. According to Asquith *et al.* (1986), the separation of management and investors endows managers with superior information concerning a firm's current performance and future prospects. Thus, equity cash flows serve as signals that communicate managerial information to investors.

Netter and Mitchell (1989) analysed the repurchases announced after the 1987 crash. The results suggest that the motivation to announce a repurchase

programme immediately after the crash was abnormal negative stock price performance prior to the announcement. The insiders of companies were found to buy when stocks were underpriced and after they had sold shares the stock prices underperformed on the market or declined. Both of these results support the hypothesis that managers recognise mispricing, one of the leading motivations behind repurchase programmes as Wansley *et al.* (1989) showed in their study. In the same study that described the six hypotheses behind buybacks Wansley *et al.* (1989) grouped the determinants of tender offer premiums under the following factors:

1. The dividend substitution hypothesis (the premium paid in a tender offer should reflect the tax advantage of the lower effective tax rate)
2. The leverage hypothesis (premiums should reflect the value of leverage-related gains)
3. The price pressure hypothesis (the larger the repurchase, the larger the premium should be, consistently with block trades)
4. The anti-takeover hypothesis (repurchases employed defensively in hostile takeovers, a competitive bid strategy)
5. The information signalling hypothesis (the greater the deviation of market price from the management's perceived price, the greater the value of management's information).

According to Wansley *et al.* (1989) managers do use repurchase to signal their confidence in the firm (undervaluation) and they found only weak support for repurchases to increase leverage. The signalling hypothesis as a factor affecting the tender offer premium is consistent with the findings described in the paper by Leland and Pyle (1977), who showed that by increasing insider ownership a repurchase signals a greater value of a firm. Vermaelen (1984) finds evidence of tender offer repurchases as a signal of insider information, but disagrees that insider holdings are related to the premium.

Dann, Masulis and Mayers (1991) examined announcements of stock repurchase tender offers as a source of information about companies' future earnings prospects and market risk levels. They found positive earnings surprises and equity systematic risk reduction following tender offers. Stock price reactions to quarterly earnings announcements were found to be more strongly correlated with time-series based earnings surprises in the year prior to the tender offer than during the subsequent year, consistent with the assumption that tender offer announcements convey earnings information. Bartov (1991) conducted an additional study based on the ideas of Dann *et al.* (1991). He analysed open-market stock repurchases and compared the results to the tender offer study by Dann *et al.* (1991). The results showed that the reactions are smaller in open-market type of purchases. Bartov found that analysts revise earnings forecasts positively after repurchase announcements. Betas of the firms were decreased and there was a positive correlation between returns and earnings changes and negative with risk changes.

Hertzel and Jain (1991) provide additional evidence that tender offer announcements convey information about the level and uncertainty of future earnings. Their study shows that analysts revise their earnings estimates upward following announcements. This was also found in a study by Bartov (1991). Stock price reactions are found to be positively correlated with revisions in short-term forecasts. The information is about transitory changes in earnings. Equity betas were found to decline after repurchases due to decreases in the underlying uncertainty of the firm's assets.

In the same year, Vermaelen and Cools (1991) reported the causes and consequences of the first repurchase tender offer in the UK. Insiders tendered their shares and the price increase was not permanent. The paper illustrates the

relevance of insider behaviour in assessing the truthfulness of signalling through repurchase tender offers.

Ikenberry *et al.* (1995) have examined long-run performance following open-market repurchase announcements. The initial returns were found to be so low that the undervaluation motivation is not fully supported but when the returns for a longer period are analysed the argument is motivated. Using data for a period from 1980 to 1990 they found that the average abnormal four-year buy-and-hold return measured after the initial announcement was about 12%. After combining the announcement and long-run returns, the magnitude of the total undervaluation was about 15%. According to Ikenberry *et al.* (1995), undervaluation is an important reason motivating share repurchases, but other reasons may also exist. Undervaluation is more likely to drive repurchases by high book-to-market companies, while other reasons may motivate repurchases announced by companies with low ratios. This paper shows that the market reaction to news is not always completed over short time periods, an assumption made in many event studies, but can take several years.

The effect of insider trading activities on stock returns during a period of six months before open-market stock repurchase announcements was examined in a study by Raad and Wu (1995). The results indicate that insider-trading activity during the month immediately preceding the announcement has a significant effect on stock returns. Insider net selling relates to positive excess returns and insider net buying relates to even larger and more significant excess returns. Further, the percentage of common shares outstanding authorised for repurchase and the extent of managerial ownership positively affect stock returns.

Ikenberry and Vermaelen (1996) provide an alternative approach to open-market repurchases. They see open-market repurchases as managerial (exchange) options in which the market price of the stock is exchanged for the true value of the stock. The evidence is partly consistent with the signalling literature, but this model is more suitable because so many firms have established repurchase plans. According to this model companies may wish to authorise open-market programmes in advance of any perceived mispricing. Together with preparing for acquisitions, this could also be the case in Finland.

Ratner, Szewczyk and Tsetsekos (1996) studied the informational value of repurchase announcements from the perspective of institutional ownership in the announcing firm. They found that larger announcement period abnormal returns are associated with firms having low institutional ownership and that firms announcing repurchase tender offers are found to have low institutional ownership relative to a control sample of non-tendering firms. Ho *et al.* (1997) did another recent signalling theory based study. They examined the market reactions to open-market repurchase announcements and pointed out that the reaction is significantly associated with the firm's sales growth and accounting profitability in prior periods, *i.e.* the announcement functions as a signal to the market and the accounting information is re-evaluated based on the positive signal. The reaction was found to be the greater the smaller the firm is and the fewer analysts are following the firm. This is consistent with the information asymmetry theory.

Liang *et al.* (1999) analysed the effects of share repurchases and employee stock option exercises on net share retirements for large S&P 500 companies. Although gross repurchases are 2% of the shares outstanding, annually about half of the shares were actually retired due to employee stock option grants. If companies proceed with the recent pace of employee stock option plans, and

assuming that equities continue to be priced at about 30 times earnings, Liang *et al.*'s (1999) study suggests that the pace of net share retirements will fall below the pace of the last few years, unless corporations use nearly all their earnings to fund shareholder payouts. By making an assumption that corporations need to retain 40-50% of their earnings to invest and grow at historical rates, the long-run average pace of net share retirements is likely to fall to 0.5% or less. The hypotheticals made by Liang *et al.* (1999) demonstrate that a modest decline in the expected pace of share retirements can have a large effect on stock prices.

The latest studies concerning share price reactions related to open-market share repurchases include Isagawa (2002), who re-examined corporate open-market repurchase strategy and stock price behaviour when there exists both informational asymmetry and market inefficiency. His model predicts positive long-run stock return performance and positive announcement effects following open-market repurchase announcements. Gu and Schinski (2003) have studied the timing and motives to repurchase shares around the unique situation caused by the 11 September 2001 terrorist attack in the USA. They focus on companies' repurchase activity around 11 September 2001, when patriotism became a significant motive for companies to make stock buyback announcements. Their study shows that announcements made during the two weeks following the attacks had a positive effect on a firm's share price. It was also found that the earlier the announcement was made after the attacks the more positive was the market response, which they called a "patriotism effect". Patriotic investors rewarded the most patriotic firms.

2.1.3 Effect of share repurchases on stock market liquidity

Studying the effect of stock repurchases on stock returns, or specifically on liquidity, merges corporate finance related issues with market microstructure. Market microstructure studies the process by which investors' potential demands are converted into prices and volumes (Madhavan 2000). As most of the previous studies on repurchases presented in Chapters 2.1.1 and 2.1.2 concentrate on identifying the reasons for companies to buy back their own shares, as well as the effect of buybacks on stock prices by measuring abnormal returns around repurchase announcement, another related issue, namely liquidity effects, have not been studied very comprehensively and even fewer studies are available on the limit order-book (LOB) environment. Because liquidity and bid-ask spread are dependent on market structure, this study provides additional information on the effect of open-market stock repurchases on liquidity in a fully automated LOB environment.

One of the key rationales for repurchases has been signalling the true value of the share to the market. Other market participants may react to the presence of repurchases in two ways as suggested by the two hypotheses of Barclay *et al.* (1988). The first of the two hypotheses, the market maker hypothesis predicts that liquidity will increase along with buybacks as the management of the repurchasing company has no inside information or does not utilise inside information in the timing of repurchases. The second and contending hypothesis, namely the asymmetric information hypothesis, predicts that liquidity will decrease along with buybacks as the management of the repurchasing company is better informed than the existing liquidity providers. To empirically test which of the two hypotheses is supported, one needs to go further in analysing repurchases and, in addition to studying abnormal returns,

one should also analyse the possible changes in liquidity around repurchase announcements.

Demsetz (1968) presented a theory of equilibrium prices in the presence of transaction costs in his seminal paper, which prepared the ground for further research on liquidity, bid-ask spread, and market maker's spread and its decomposition. If there was no asymmetric information, a multilateral trading environment would have advantages over a bilateral trading process. The LOB environment of HESE is such a multilateral environment in which the order flow is consolidated, but in reality, the operational efficiency is counterbalanced by the asymmetric information cost of trading.

Although it is generally accepted that markets are not fully efficient, the prices of stocks reflect all or most of the information obtainable and also the reactions to that information. The efficiency is driven by competition between investors and brokers as well as by more sophisticated information systems. Certain important news may have a major effect on stock prices while other news of seemingly equal importance causes no change. The explanation could then be the principle of discounted versus non-discounted news. Events like stock splits, changes in dividends, and earnings announcements are usually well forecast in advance and thus most or even all of the information content of the actual announcement can already be discounted to stock prices (Teweles and Bradley 1998). Stock repurchase announcements are, however, less obvious and the announcement could thus have a stronger effect on returns behaviour and liquidity.

Liquidity is one of the key characteristics of securities markets that investors observe while making investment decisions and analysing securities. In economics, liquidity refers to the degree to which an asset can be quickly and

cheaply turned into money, which - by definition - is completely liquid (Bannock, Baxter and Davis 1992). On the stock market, liquidity is more specifically defined as the ability to buy or sell significant quantities, anonymously, and with a relatively small price impact (Campbell, Lo and MacKinlay 1997). The most commonly used measures of liquidity are bid-ask spread, trading volume, the number of trades and trade sizes. In the LOB environment depth, breadth, and resiliency of order book can also be used to measure liquidity (Hansson 1999). Depth refers to the existence of several price levels on both bid and ask sides of the order book while breadth refers to the sufficient volume on different price levels. The ability of orders to respond quickly to price changes caused by temporary order-flow imbalances is measured by resiliency. High trading volume and frequent trades are usually associated with high liquidity and the spreads of the stocks are usually smaller than the more thinly traded stocks' spreads. Higher spread in actively traded stocks may signal greater uncertainty about the true value of the stock and also be associated with higher volatility (see *e.g.* Hedvall 1994). There is a lot of evidence on the behaviour of spreads around earnings announcements, takeover bids, and other events that include major changes in market information.

Barclay *et al.* (1988) made one of the first studies on how distributing cash through stock repurchases can affect companies' stock market liquidity. They argued that personal taxes are not the only cost to shareholders when companies distribute cash (see *e.g.* Talmor and Titman 1990). They pointed out that distributing cash through open-market stock repurchases rather than cash dividends may affect stocks' liquidity and hence also the required rate of return (see *e.g.* Amihud and Mendelson 1986 and Jacoby, Fowler and Gottesman 2000). Their two contending hypotheses were, as presented earlier, the market maker hypothesis (liquidity will increase) and the asymmetric information hypothesis

(liquidity will decrease). Their study covered 153 open market repurchase programme announcements in the period 1970–1978. They found that bid-ask spreads were higher in the year following the announcement than in the year preceding the announcement. Their conclusion thus was that bid-ask spreads widen when companies announce repurchase programmes, supporting the asymmetric information hypothesis.

A complementary study was done by Wiggins (1994). Wiggins utilised daily data around announcements instead of yearly data, as was done in the previous study. He also included bid-ask depths in the analysis and as his data covered 195 announcements in the years 1988–1990, the study was also done under a changed and more valid regulatory environment. The Security and Exchange Commission (SEC) established Rule 10b-18 in 1982 to give guidelines under which a buyback is not considered to be manipulative². Wiggins did not find evidence that spreads increase following announcements of open market repurchase programmes, which is contrary to the findings of Barclay *et al.* (1988). Nor did he find evidence that bid or ask depths were affected by these announcements. Wiggins performed a separate analysis for a subgroup of companies where he identified actual repurchases taking place by analysing the number of shares outstanding, but the results corresponded to the whole sample. He concludes his findings suggesting that firms need not be concerned about an adverse change in liquidity following the announcement of a repurchase programme. The US data limits the possibilities to precisely identify when and to what extent companies complete the repurchase authorisations. In this sense the Finnish data used in this study are more accurate.

² In response to the terrorist attacks on 11 September 2001, the Securities and Exchange Commission permitted public companies to repurchase their own securities without meeting the timing and volume restrictions of Rule 10b-18 to provide liquidity during times of market volatility for a limited period of time.

Franz *et al.* (1995) examine dealers' spread behaviour around companies' open market repurchases in the NASDAQ, revealing a decline in spreads after controlling for dealers' inventory holding and order-processing costs. Decline is applied to a reduction in informed trading risk and costs. Their sample comprises 157 open-market repurchase announcements during the period 1983-1987. The sample is categorised in two sub-samples in which the first group of announcements is motivated by undervaluation and the second group by other reasons. Their *a priori* expectation that informed trading risk reduction would be greater for repurchases motivated by undervaluation was not supported by the empirical evidence.

One of the latest articles on the effect of share repurchases on liquidity is that by Brockman *et al.* (2001). They investigate the timing of open market stock repurchases and the resultant impact on liquidity. Contrary to previous studies, they use data from the Hong Kong Stock Exchange, which has more detailed disclosure rules than in the USA. Their data covers 103 repurchasing firms, 1,526 repurchases, and 27 months (from May 1996 to September 1997 and from November 1998 to August 1999). They excluded the abnormal repurchase period following the stock market crash that followed the Asian crisis in 1997-1998. Their study shows that managers exhibit substantial timing ability in buybacks and consistently with the information asymmetry hypothesis they find that bid-ask spreads widen and depths narrow during repurchase periods.

Because managerial wealth is often tied to the value of the firm *e.g.* through stock option plans, managers seem to use their private information in timing buybacks to their own advantage, as well as to the advantage of buy-and-hold shareholders. Karhunen's (2002) study with Finnish data also shows a statistically significant positive correlation between managerial stock options and repurchase activity. Brockman *et al.* (2001) provide empirical evidence that

market participants can detect the presence of informed trading and that secondary market investors adjust spreads, adverse selection costs, and depths in a manner consistent with the information-asymmetry hypothesis. The bid-ask spread and depth measures generally return to benchmark levels shortly after the managers disclose that they are the source of the informed trading.

The latest study that focuses both on the timing and on the liquidity effects of open-market share repurchases is one by Cook, Krigman and Leach (2004). They highlight the fact that only a few studies have focused on the timing and execution of open-market share repurchases because US firms are under no obligation to disclose their actual buyback deals and they generally report only quarterly changes in shares outstanding. Cook *et al.*'s (2004) study utilise a survey data covering 64 firm's supplementally disclosed repurchase data covering 1993-1994. They provide data on the variety of execution strategies adopted by firms ranging from immediate intense repurchasing to delayed and smoothed repurchasing. They do not find evidence that repurchases are timed to coincide with, precede, or follow, days on which information is released. They also benchmark the costs and value of repurchase programs against naïve accumulation strategies and find that NYSE firms on average beat their benchmark costs whereas NASDAQ firms do not. Finally they document the liquidity impact of repurchases finding that repurchasing contributes to market liquidity by narrowing bid-ask spreads. Cook *et al.*'s (2004) study is closely related to both Brockman *et al.* (2001) and this study. Their results concerning the market timing ability partly support the previous findings and their evidence on the liquidity effects are opposite to Brockman *et al.* (2001).

Further research on share repurchases liquidity effects is needed due to the limited evidence. Brockman *et al.* (2001) focuses on the Hong Kong market and Cook *et al.*'s (2004) study is made using data gathered using survey methods

and covers only relatively old material from 1993–1994. The earlier studies have focused on liquidity around the announcement date, not actual repurchase trades. The insider trading nature of buyback trades highlights the importance of a better understanding of all the effects of repurchases. Repurchases can also be executed in a manner that is hard to differentiate from price manipulation. Different market environment may also have its effect on the behaviour of bid-ask spread.

2.1.4 Regulatory environment

Share repurchases are usually strictly regulated due to their insider trading nature and even prohibited in some countries like Austria, Norway, and Israel (Grullon and Michaely 2002). Instead of trading with their private funds, corporate executives trade with corporate funds and there is a clear possibility that the trades could be affected by information not yet disclosed to the market. Assuming that capital markets are not information efficient, the asymmetric information assumption and signalling theory suggest that some deeper than average knowledge might affect buybacks and their timing. On the US market, the Security and Exchange Commission (SEC) established Rule 10b-18 in 1982 to give guidelines under which a buyback is not considered to be manipulative. Before that, there were no guidelines for repurchases and this may have prevented many companies from establishing buyback programmes (Grullon *et al.* 2000). The four trading limits (on any given day) based on Rule 10b-18 that should not be violated are as follows:

- The company's transactions are made only through one broker or dealer.
- The transactions are not executed at the opening or during the last half hour of trading.

- The transactions are not done at a price exceeding the highest current independent bid price or the last independent sale price, whichever is higher.
- The total repurchase volume should not exceed 25% of average daily trading volume calculated over the preceding four calendar weeks.

The US market, however, differs from many other markets, like those in Canada, Sweden, and Finland, in other regulatory structure. Although a repurchase plan must be accepted by the shareholders' meeting and published, other guidelines and especially reporting rules on actual repurchases are less comprehensive in the USA than in many other countries. In Finland, the Companies Act and Securities Market Act give the overall ruling on repurchases covering issues like the requirement for decision-in-principle on the authorisation by the shareholders' meeting followed by a board decision to start to repurchase the company's own shares. The decision by the shareholders' meeting is valid for one year and is at the most for 5% of the shares of a company³. The EU legislation suggests a 10% limit which is used e.g. in Sweden.

More detailed guidelines on repurchases are given by HESE in the rules of the securities exchange under Own Shares of a Listed Company and in the Rules of the Helsinki Stock Exchange. According to the guidelines "*...the acquisition of own shares shall be effected so that no exceptional market movements result from the trading of the company and the equal treatment of the shareholders is taken into consideration...*". More specifically, the general principles state that (extracts from Helsinki Stock Exchange: Own Shares of a Listed Company as of 2 April 2002):

³ There are ongoing discussions on increasing the maximum amount of own shares held by Finnish companies to 10% in the forthcoming version of the Companies Act or even prior to that.

- 3.1.2.1 The acquisition of own shares shall be implemented so that the company does not give exceptionally large commissions with regard to the activeness of trading in its share and the volume of transactions.
- 3.1.2.2 The acquisition of own shares shall be implemented during a sufficiently long period (the investors shall have the possibility of trading for a minimum of one trading day).
- 3.1.2.3 The acquisition of own shares shall be implemented in continuous trading in automated matching.
- 3.1.2.4 An intermediary implementing the acquisition of own shares shall continuously have valid offer for at least one round lot in continuous trading (in the relevant phase of continuous trading).

Further provisions include the following rules:

- 3.2.1 The volume of the acquisition of own shares at each trading day shall be no more than half of the average daily trading volume of the last 4 weeks preceding the acquisition.
- 3.2.2 In the event that trading volume on a certain trading day significantly exceeds the volume referred to in the Clause 3.2.1 above, the volume of the acquisition at that particular trading day shall, notwithstanding Clause 3.2.1 above, be no more than half of the trading volume of that trading day.
- 3.2.3 When acquisition of own shares is effected in the evening trading, the provisions of Clauses 3.2.1-3.2.2 above shall be applied separately to each phase of the continuous trading to the extent appropriate.

- 3.2.4 Own shares shall not be acquired during the last 5 minutes prior to the time when the official closing prices are confirmed.
- 3.2.5 The listed company may deviate from the procedures referred to in Clauses 3.2.1-3.2.2 above for a special reason. Such deviation requires that the deviation and reasons thereto shall be published as a Stock Exchange release in advance. The deviation shall not lead to deviation from the general principles.

The reporting rules require companies to notify the Stock Exchange immediately after a buyback transaction has been effected and, at the latest, before the beginning of the next trading day. Typically companies authorise their stockbrokers who take care of the repurchase programme to prepare and send these releases. The notification must include in addition to the company name the transaction date, stock class, quantity of shares, price per share, total transaction price, and date of the notification. If several trades have taken place in one trading day, the notification must instead of the price per share contain information on the volume weighted average price and separately the highest and lowest prices paid.

The guidelines also cover insider regulation and give principles which, if followed, let a company avoid suspicion of misuse of insider information. The company should give a binding written commission when it is not in possession of insider information. The commission should not be given during the 14-day period immediately preceding the announcement of the financial statement bulletin or the interim report. The commission should also contain the date of the acquisition as well as the volume and price of the shares to be acquired or a formula of these terms so that the stockbroker is able to execute the repurchase plan independently. Changes to the plan are deemed to be a new commission and must be given in writing like the original commission.

The Financial Supervision Authority has the right to request to be given the order.

The Finnish reporting and insider rules are among the strictest in the world, making companies' repurchase transactions relatively safe regarding price manipulation. Problems may arise when less liquid firms buy back their own shares. When the daily repurchase volumes maintain a reasonable level and offers are priced reflecting recent transactions preceding buyback acquisitions, the trading behaviour can be considered as liquidity providing instead of manipulative.

In Sweden, where the legislation is quite similar to that of Finland, repurchases became possible in 2000. The local recommendations by the Swedish Industry and Commerce Stock Exchange Committee are fairly similar to those in Finland with few minor exceptions. *E.g.* only one stockbroker should be commissioned as in Finland while the daily repurchase volume is limited to 25% of the daily trading volume of the preceding four weeks as in the USA instead of 50% as in Finland. The latter difference may be due to the general trading activity and market size and one could consider the 50% more reasonable for less frequently traded shares. Buyback transactions are prohibited during the last 30 minutes before the marketplace is closed. Similarly, repurchase transactions are prohibited during a 30-day period preceding the publication of the financial statement bulletin or interim report. The reporting rules to the stock exchange are similar to those in Finland. Contrary to HESE, the Stockholmsbörsen (Stockholm Stock Exchange) has a special Internet service on repurchases where they publish company specific repurchase data on a daily basis. This is an excellent service to investors and analysts, because following the daily stock exchange releases of single firms is much more time consuming. Some Finnish firms have, however, started to publish and regularly update information on

monthly repurchase volumes on their own web pages in addition to the compulsory daily repurchase announcements.

An interesting discrepancy exists in countries like the USA, where repurchases of own shares are covered with more lax rules than regular insider trading despite the inevitably similar nature. In Finland, one of the first buyback related insider cases regarding share buybacks of Talentum Oyj in 1999 did not lead to any sentence being imposed⁴. The State Prosecutor decided that although the board members of Talentum Oyj had undisclosed (insider) information on a joint-venture plan with Sonera Corporation at the time of the repurchase transactions, the acquisitions of own shares were based on a preceding decision and a plan independently executed by a stockbroker. Thus, following the rules given by HESE provides a safe-haven similar to Rule 10b-18 in the USA. This decision with its justification establishes a precedent that is a useful practical example of how insider trading and buyback transactions are seen from a legal point of view in Finland.

2.2 Payout policy

The reasons and motivation for payout and the choice between the alternative methods are discussed in this chapter. The role of asymmetric information, investment and growth options (or lack of them) as well as the role of the tax system will be presented and discussed. The owners, boards and managers of firms face several payout related questions. First of all, the amount to be paid must be decided, after which the form of payment can be chosen. The factors affecting these are multiple, likewise the decisions on payout policy are

⁴ Decision by the State Prosecutor Pekka Koponen on 15 January 2003 (R 02/5, 02/6, and 02/34).

multidimensional. Dividends can be used as signals of a firm's future prospects as well as to change the capital structure of the company.

While presenting the literature on payout policy it is hard to avoid starting with the Miller-Modigliani dividend irrelevance proposition dating back to 1961 before going forward to a more practical and real-world like setting of assumptions. Dividend irrelevance asserts that dividend policy has no effect on either the price of the firm or its cost of capital. The assumption excludes personal and corporate taxes as well as any links to investments. As soon as personal taxes are brought into play, dividends matter. Another seminal paper is that by Gordon (1959), where he introduced a theory later known as the "bird in the hand", suggesting that investors consider a capital gain riskier than a dividend payment. Miller and Modigliani suggested that most investors would anyhow reinvest their dividends in the same or similar firm and that the long term risk levels are determined by asset cash flows not dividend policy. Whatever the conclusion, taxes play a crucial role in deciding the method of dividend payment, but they are not the only factor affecting the payout decision and the selection of the method. Companies have different owners and their taxation may also differ, thus dividend policy is often tailored to meet the needs of the clientele. Thus, according to Damodaran (2003):

- (a) if there are no tax disadvantages associated with dividends, companies can issue stock at no cost, and to raise equity whenever needed *dividends do not matter, and dividend policy does not affect value,*
- (b) if dividends have a tax disadvantage, *dividends are bad, and increasing dividends will reduce value,*
- (c) if shareholders like dividends, and increasing dividends, or dividends as such, operate as a signal of future prospects, *dividends are good, and increasing dividends will increase value.*

The *balanced viewpoint* states that if a company has excess cash, and few good projects (net present value > 0), returning money to shareholders (dividends or repurchases) is good, but if a company does not have excess cash or has several good projects, returning money to shareholders is bad (Damodaran 2003).

Allen and Michaely (2002) identified the following six issues that play a crucial role in the discussion of payout policies in their working paper published in the working paper series of the Wharton Financial Institutions Center:

1. Large and established corporations typically pay out a significant percentage of their earnings in the form of cash dividends and repurchases.
2. Historically, dividends have been the predominant form of payment but since the mid-1980s buybacks' role has increased remarkably.
3. The proportion of dividend-paying firms has been declining among publicly traded US firms and at the same time the payout structure has changed in favour of buybacks.
4. Individuals in high tax brackets receive large amounts of cash dividends and pay substantial amounts of taxes on these dividends in many countries⁵.
5. Corporations smooth dividends relative to earnings and thus dividends are less volatile than earnings and repurchases more volatile than cash dividends due to their flexible nature.
6. The market reacts positively to repurchase and dividend increase announcements and negatively to decreases in cash dividends, although market has started to learn and companies that also buy back their own shares do not have as negative market reactions to cut dividends than those that do not repurchase their own shares.

Payout policy or dividend policy is often reported to shareholders in annual reports or company presentations. Almost as often as companies publish their payout policy they do not elaborate the policy more than just stating the target

⁵ The current Finnish dividend tax regime with *avoir fiscal* differs from this.

payout of earnings or a level of dividends per share. A reliable long-term payout policy is also beneficial for a company. Because the value of a business is based on its capability to produce profit and distribute excess capital to shareholders, the owners have more precise tools to control management's behaviour and success if they can compare the actual outcome to an official dividend policy. This prevents management from taking harmful actions like unwise investments or empire building. Thus every public company should have an official, clearly explained payout policy.

Dividend decisions are related to other financing and investment decisions. Low dividends or no dividends at all may be a consequence of high investment needs or low profitability. If a company pays low dividends in order to prepare for future expansion the dividend decision is affected by the firm's capital budgeting decision. If a company is financing its investments by borrowing, it is still able to pay dividends simultaneously and the payout decision is a by-product of the borrowing decision. Thus the dividend policy is defined as a trade-off between retaining earnings on the one hand and paying out cash and issuing new shares on the other. (Brealey and Myers 1996.)

Most dividends are paid in cash and they are called regular cash dividends. In Finland, cash dividends are paid once a year after the financial results of a year are available. In some countries, like the USA, dividends are paid quarterly. The board proposes a dividend and the decision is made by the annual general meeting. If companies have great amounts of excess cash and no investment opportunities or if they have received some extra cash *e.g.* through divestitures, they may consider paying extra or special dividends. Another form of dividend is stock dividend, which is similar to a stock split. Additionally, companies may take a decision to acquire their own shares *i.e.* make share repurchases and return excess cash to shareholders through the stock market. Repurchases could

be a substitute for cash dividends, but they are typically additional to regular cash dividends.

According to the literature, dividends are determined by several factors. First and possibly the most important consideration is the companies' wish for a stable long-term dividend payout ratio. This is typically reflected into the dividend policy statement as phrases like *"the company strives to pay stable dividends linked to the long-term performance"* and that *"the dividend payout would be one half of net profits over a business cycle"*. Second, managers focus more on dividend changes than on absolute levels of dividends. Third, dividend changes follow shifts in long-term sustainable earnings. This is often referred to as dividend smoothing, *i.e.* companies try to pay stable dividends over the years although earnings were more volatile. And finally, managers are reluctant to make dividend changes that might have to be reversed. Companies are very reluctant to cut regular dividends and thus extra dividends and repurchases provide flexible tools for paying out excess cash without deviating from the long-term regular cash dividend pattern. (Lintner 1956, Marsh and Merton 1987, Brealey *et al.* 1996 and Allen and Michaely 2002.)

What affects the dividend level? Previous research has shown that current year's dividends are mainly dependent on a firm's current year's earnings and partly on the previous year's dividends, which in turn depends on that year's earnings and the previous year's dividends (Lintner 1956, Fama and Babiak 1968). As suggested earlier, both cash dividends and repurchases are also signals. The signalling content of these two payout methods may differ. Since dividends anticipate future earnings, increased dividends are typically taken as good news and dividend cuts as bad news. Healy and Palepu (1988) have shown that dividend initiations result in an abnormal rise of four percent in the stock price after controlling for market-wide movements. Similarly, an

announcement to stop paying dividends caused the stock price to decline by an abnormal 9.5% on the announcement. This causes dividends to be sticky, firms are more reluctant to cut dividends than to increase them.

2.2.1 Valuation of a firm and role of dividends

The intrinsic value of a firm is defined as the present value of a firm's expected future net cash flows discounted by the required rate of return. This model, commonly known as the discounted free cash flow (DCF) model, uses the weighted average cost of capital or WACC as the discount rate. WACC is based on the cost of debt, calculated by adding a risk premium to the risk free rate and adjusting the result by the tax rate (tax shield) for debt, and cost of equity that is based on the capital asset pricing model (CAPM). The shareholders of a company receive cash from the company in the form of dividends and thus the present value of a share corresponds to the present value of the expected future dividends (Brealey *et al.* 1996):

$$(1) \quad PV(\text{stock}) = PV(\text{expected future dividends})$$

A classic formula, the dividend discount model (DDM), explains the value of a share by discounting the future dividends. DDM is a method to value the common stock of a company based on the present value of the expected future dividends. It is worth noting that in the DDM the present value of a share (a company) is the discounted present value of its future dividends, not profits. Profits have value only if they are paid out to shareholders. Thus, the market usually reacts positively to announcements of increases in dividends and negatively to announcements of dividend decreases. (See *e.g.* Pettit 1972, Miller and Rock 1985 and Ikenberry *et al.* 1995.)

The greatest problems of this model are related to the uncertainty of the dividend stream and the appropriate discount rate (r) to be applied. A practical simplification of the DDM is a dividend growth model or Gordon's model. Because the dividend stream can be assumed to be infinite, the model developed by Gordon and Shapiro (1956) somewhat simplifies the calculation of the present value of future dividends assuming a constant growth rate of dividend payments (g). The present value of the dividends (DIV), *i.e.* the value of a share (P), is thus:

$$(2) \quad P_0 = \frac{DIV_1}{r - g}$$

This model can be used only when the discount rate r is higher than the anticipated growth rate g . Other popular valuation methods include multiples combining the market value and some accounting figures like the well-known price-to-earnings or P/E ratio, which divides share price by earnings per share (EPS). It can also be calculated on a historical basis, but typically the earnings applied are estimated current or next year's earnings. Other popular ratios include dividend yield (per share dividend divided by the share price) and price-to-book (P/B) ratios comparing the market value of the shares of a company to the book value of its assets, a measure typically used to make the distinction between growth companies and value companies.

2.2.2 Capital structure and other factors affecting dividend policy decisions

The early studies by Modigliani and Miller (1958 and 1966) started the discussion whether the value of a firm can be maximised by changing capital structure, *i.e.* to find out an optimal combination of debt and equity. Based on

the assumption of perfect capital markets, they showed that the value of a firm does not depend on the capital structure. In a later study, they introduced corporate taxes and showed that the value of a firm increases while leverage increases. That is because debt reduces the tax liability due to the tax deductibility of interest payments. Subsequently many attempts have been made to analyse the effect of different market imperfections on optimal capital structure. In addition to corporate taxes these include personal taxes, bankruptcy costs, and agency costs. (See *e.g.* LÖyttyniemi 1991.)

Share repurchases can be connected as a part of the corporate financial puzzle, equity inflows and outflows. Firms are supposed to distribute a certain amount of their profits to shareholders and spend a required amount on capital expenditure and, if required, get additional funds from the markets. Dividends are one way to distribute profits to shareholders but an alternative and increasingly popular method is to repurchase own stock. Dividend policy can be defined as the trade-off between retaining earnings on the one hand and paying out cash and issuing new shares on the other. Dividend payments increase the debt-to-equity ratio. Therefore debt contracts may include restrictions on dividend payments. Most of the hypotheses on dividends are based on the asymmetric information between the management of a firm and its shareholders. Payout ratios are often higher for slowly growing companies than for companies at a high growth stage, because growing companies normally have a higher number of investment opportunities.

Share price increases associated with buybacks are due to the method of funding them with foregone dividend payments and because the repurchased shares are retired. In recent years, the issue of shares to satisfy executive stock option exercises has been counterbalancing the effect of repurchases of shares outstanding or *vice versa*. And although firms sell the new shares to employees,

it is not enough to fund repurchases because these shares are often sold with a considerable discount compared to the current market price. In this case, a wealth transfer to employees occurs and the old shareholders' stakes are diluted. Rather than causing an increase in shares, a dilution effect, the option exercises together with the repurchases results in a larger cash outflow from the firm. Liang *et al.* (1999) point out that if dividends are not cut enough to offset decreasing resources due to buybacks, then the net cost of reducing shares is reflected in the firm's balance sheet as an increasing debt-to-equity ratio. Executive stock options drive a wedge between the rate of share retirements and the net cash outflows from repurchases. Thus, the combined effects of stock option plans and share repurchases are measured through their effects on both share count and net cash outflows in the study by Liang *et al.* (1999).

One of the first dividend policy papers written in Finland was that by Yli-Olli (1982). In his study the dividend policy and information content of dividends are discussed and analysed with behavioural and information content models using data from large Japanese, Swedish and Finnish firms. According to the results, every firm has its own individual features in its dividend policy. In Finnish firms the past dividends also determine the future dividends most decisively. The results of the information content showed that the dividends also told something about the future earnings of the firm.

Large and established companies typically pay more dividends than small and relatively new companies or companies with growth prospects and investment needs. Even significant stock repurchases, when executed at times when wide discrepancies exist between price and value, can be very encouraging and rewarding from the shareholders' point of view according to American investor Warren Buffett (Cunnigham 2000). First, major repurchases at low prices, *i.e.* prices below per share intrinsic business value, immediately increase that value.

When companies purchase their own stock, they can often achieve a value of one Euro for less than one Euro. Acquisitions are less likely to be so successful. The other benefit, albeit less easy to precisely measure, is related to investments or actually the lack of investments. By repurchasing their own shares at prices below the value of the business, companies and their management demonstrate that they prefer actions that enhance shareholder wealth instead of expanding the management's domain or making unbeneficial investments. Seeing this, shareholders and potential investors upgrade their estimates for future earnings and this upward revision in turn increases market prices towards the intrinsic business value.

Damodaran (2003) has classified the determinants of dividend policy under six titles. First, investment opportunities affect the dividend policy. All other things being equal a firm with more investment opportunities will pay a lower fraction of its earnings as dividends than an average firm. Second, firms with stable earnings will pay out a higher fraction of their earnings as dividends than firms with variable earnings. Third, firms with alternative sources of capital, *i.e.* firms that can issue new stock or bonds at low cost, are more likely to have high dividend payout ratio. Fourth, firms with financial constraints pay lower dividends than an average firm. Firms that have borrowed heavily typically have several constraints on their dividend policy. Fifth, firms that are undervalued may use dividend increases or share buybacks as signals to the market. And finally sixth, shareholder characteristics may affect dividend policy. Firms that have acquired a reputation as high dividend yield firms also attract investors who prefer high dividends, and thus this kind of company cannot suddenly shift its dividend policy.

2.2.3 Decision between cash dividends and share repurchases

Why then choose repurchases instead of cash dividends in the absence of investment opportunities? Extraordinary cash dividends can also be used to return excess capital to shareholders, but, as mentioned earlier, repurchases also serve as signals from management to investors. Companies also tend to smooth regular cash dividends. By repurchasing their own shares, companies can signal their dissatisfaction with the market price. Repurchases work in the same manner as increased dividends, but are more flexible. Smaller companies with ample growth prospects do not typically return capital back to shareholders in dividends or repurchases. This is because the money is needed for investments intended to support the growth. Many high-growth companies have never paid dividends, but investors rely on the future growth, increasing market value, and future dividends in their valuation and dividend payments are not necessary. The increase in the popularity of repurchases has not decreased cash dividend payments as much as buybacks have grown, leading many US companies to pay out a greater share of their earnings than before. Liang *et al.* (1999) have raised the question of future growth and financing of necessary investments as a possible problem arising with the increasing payout. If companies, possibly due to extensive stock option plans, are forced to buy back their own shares in order to cope with the evident dilution problem and simultaneously continue to pay cash dividends equal to the dividends before the adoption of buybacks, the companies' total payout will increase. This could lead to increasing indebtedness if earnings are not sufficient to finance both increasing payout and investments.

Brennan and Thakor (1990) argue that the method of cash payout chosen by the firm is determined by the majority vote of the shareholders. If the uninformed have more votes than the informed, firms will use dividends, but if informed

voters predominate, firms will choose repurchases. An exactly opposite view is presented by Allen, Bernanco and Welch (2000), whose model suggests that large shareholders prefer dividends. The model presented by Brennan *et al.* (1990) supports the idea of dividend smoothing. This would be one reason why companies in countries where taxation on capital gains is lower than on dividends still choose to pay cash dividends as well. If there is a tax disadvantage to dividends and an adverse selection cost to buybacks and managers are better informed than (other) shareholders, payout policy depends on whether managers think the firm is over- or undervalued relative to current market valuation (see *e.g.* Chowdhry and Nanda 1994 and Lucas and McDonald 1998).

When more accurate measures of repurchases were found in the USA, where the reporting rules on repurchases are less comprehensive than *e.g.* in Hong Kong, Sweden and Finland, researchers like Grullon and Michaely (2002) were able to examine the relation and interaction between buybacks and cash dividends. Their evidence shows that dividend-paying firms have been replacing dividends with share repurchases, but that the rate of substitution has not been one, *i.e.* they are not perfect substitutes.

Some previous research has focused on analysing what kind of firms decide to use repurchases instead of dividends. First, several studies have highlighted the relation between stock option programmes and payout policy. Incentive compensation may increase the total payout and stock options (especially if not dividend protected) additionally enhance the use of repurchases instead of cash dividends. Fenn and Liang (2001) have reported a negative relation between stock option plans and dividends. Jolls (1998) found a positive relation between repurchases and the magnitude of the executive stock option plan. Weisbenner (2000) continued these studies and found that if mainly non-executive

employees hold stock options, the dividend protection is less of a factor, dilution is of importance and companies have increased buyback activity but no reduction in dividends. If executives hold stock options, then both reduction in cash dividends and increase in repurchases should be expected. Jagannathan, Stephens and Weisbach (1999) found that dividends were more likely to be paid out of permanent earnings and repurchases were more likely to be used as a method to distribute temporary cash flows. Repurchasing firms have typically higher variability in their operating income than firms that only increase dividends. This suggestion is in line with Lintner's model (1956). Lie (2001) also pointed out that tender offer type repurchases occur more often when companies have excess cash on their balance sheets.

In Finland, Karhunen (2002) studied factors affecting the use of repurchase authorisation, the programme completion rate and the number of days from programme announcement to first actual repurchases. He found that an existing stock option programme has a highly significant positive effect on the utilisation and decreases the time elapsing between the programme announcement and first actual repurchases. Foreign ownership and market-to-book ratio affected the completion rate positively at the 5% significance level, while *e.g.* cash to assets had a positive effect on utilisation ratio. Karhunen did not include investments in his study. Capital expenditures play an important role in the estimation of the proportion of repurchases of total payout. Capital expenditures are a key part of the capital structure decision in addition to payout policy and debt and equity issue (Allen *et al.* 2002).

Dividend smoothing is typical behaviour in many companies. Companies, as well as investors, prefer stable a dividend stream. Thus dividend payments tend to be less volatile than earnings and dividend payout measured as percentage of earnings can change a lot from year to year. Repurchasing firms

have been shown to have more volatile operating earnings than firms that prefer dividends, indicating that dividends are paid out of permanent earnings and repurchases are more likely used to distribute temporary cash flows (Jagannathan *et al.* 1999). Dividend increases are positive signals and typically followed by increasing share price, while dividend cuts have a negative effect on share price. In addition to extraordinary dividends, repurchases are preferred by many companies as a method to return excess capital to shareholders. Taxation of dividends and capital gains may also have an effect on this choice.

The European Union (EU) since 1974 has allowed companies in Member States to buy back up to 10% of their shares since 1974. EU rules impose no uniformity on whether repurchases should be taxed as dividends or capital gains (The Economist 1998a). In the USA, the popularity of share repurchases is that for investors in the highest tax bracket, capital gains are taxed at more lenient rates than dividends. Large dividend payment may leave some shareholders with unwanted tax bills while repurchases allow companies to return capital to shareholders and let individual shareholders hold on to their shares and avoid undesired tax consequences (The Economist 1998b). Even elsewhere, taxation is evidently one key factor affecting the choice between dividends and buybacks, but it is not the only issue. Capital markets should be efficient to allocate money where it is most beneficial and companies need flexibility to return and raise capital whenever advisable. Buybacks offer a flexible tool to return capital to shareholders and repurchases can also have other benefits than flexibility or pure tax savings. As this study shows, buybacks can have a beneficial effect on liquidity, especially for companies with small market capitalisation. Repurchases are also a reliable signalling tool and provide companies with an opportunity to cope with the increasing dilution caused by stock options, a topic not as straightforward as one might think.

Why then are governments in some European countries against buybacks or at least unwilling to share the view that buybacks could be a good idea for many companies? Some politicians claim that allowing repurchases or making them more attractive would encourage companies to hollow out their capital base while instead they should use capital in expansion and invest in creating new job opportunities. Share repurchases, or cash dividends, do not deter investment but recycle it, allowing individual shareholders to move their capital from sectors with too much of it to sectors with more promising prospects and scarce resources. (The Economist 1998b.)

Management stock option plans can affect companies' dividend policy decisions and direct companies from cash dividends to share buybacks. Jolls (1998) has calculated that if US companies had paid dividends instead of buying back their own shares the managements' stock options would have been worth a lot less, all other things being equal. Stock options are an often cited factor increasing companies' willingness to choose buybacks instead of cash dividends. Although the innocent idea behind this is the prevention of dilution caused by share issue to fulfil the subscription of shares based on the options. Jolls (1998) points out the positive stock market reaction to buyback announcements and also to actual repurchases being another rationale for this behaviour. It is, of course, hard to prohibit this kind of behaviour as long as investors also gain from buybacks and a change in this behaviour is unlikely.

What is important in order to minimise the so-called agency costs is well-structured and organised corporate governance. The need for corporate governance has grown along with the increasing separation of ownership and other interest groups from management. At the minimum, corporate governance refers to the monitoring of corporate management, it defines the status and responsibilities of the chief executive officer (CEO), the board and

other key managers and their relationship to the owners (see *e.g.* Brealey *et al.* 1996 and Timonen 2000). The World Bank Group (1998) has defined corporate governance as follows:

“Corporate Governance refers to the rules and incentives by which management of a company is directed and controlled so as to maximize the profitability and long-term value of the firm for shareholders while taking into account the interests of other legitimate stakeholders.”

In addition to shareholders, there are other parties interested in monitoring management's action, such as lenders and outside management teams. It is in the interest of lenders that management does not risk repayment of loan *e.g.* through increasing the leverage of the firm unnecessarily through returning too much capital to shareholders or by making unnecessary investments. One of the common ways lenders can monitor and restrict management's behaviour is covenants that may at the maximum give the lender the right to instant repayment if the covenant rules are violated. These covenants may include target equity ratios or limitations on dividend payments. Outside management team refers to competitors or private equity backed teams that could acquire the business and replace the current management team. This form of monitoring is called the market for corporate control as presented in the article by Jensen and Ruback (1983).

Jensen (1986) researched the agency theory in accordance with corporate finance decisions, especially free cash flow and take-overs. Internal financing is motivated because of less monitoring caused by the market compared *e.g.* to equity funding. Thus, managers may have incentives to invest in less profitable projects. The problem is how to motivate managers to disgorge the cash rather than investing it below the cost of capital. Debt motivates organisational efficiency, many acquirers have good performance prior to acquisition and targets have done poorly or have a large free cash flow. Equity is also preferred

by growing companies and generally younger companies, leading to lower dividends, as shown by Gul (1999).

Loughran and Vjih (1997) found a relationship between the post-acquisition returns and the mode of acquisition and form of payment (stock *vs.* cash). Firms that complete stock mergers earn negative excess returns and firms that complete cash tender offers earn positive excess returns. The article shows that target shareholders' gain diminishes over time while holding the acquirer's shares received as payment. Due to the high valuation of many technology companies, it is highly preferable, according to many practitioners, to use these highly valued stocks as payment in acquiring other technology companies.

Gul (1999) provides additional evidence for contracting theory arguments for the relationship between growth opportunities, capital structure and dividend policies. Both cross-sectional time-series analysis and time-series analysis with a one-year lag for the dependent variables are used. The lagged version has proven very useful. According to the results the dividend yield is significantly related to growth opportunities, which is consistent with the findings of Liang *et al.* (1999).

Grullon, Michaely and Swaminathan (2002) found that firms that increase dividends experience a significant decrease in their systematic risk. Dividend increasing firms also experience a decline in profitability in the years after the dividend change. They suggest that the announcement period's positive market reaction to dividend increase is significantly related to the subsequent decline in systematic risk. Grullon and Michaely (2002) also show that firms finance their repurchases with funds that would otherwise have been used to increase dividends. They also suggest that the regulatory changes in the USA in 1983 enhanced the growth of repurchases.

3. STOCK MARKET EFFICIENCY AND LIQUIDITY

After a relatively comprehensive discussion on repurchases and their role in the payout policy and capital structure issues we now focus on stock market efficiency and liquidity, *i.e.* the issues related to the focus of this study. In Chapter 3.1 the Helsinki Stock Exchange from which the data for this study was gathered is presented. The history and development of the marketplace are described and the functioning of the market and descriptive statistics is presented.

Chapter 3.2 focuses on stock market efficiency and the information flows and asymmetries in a marketplace. This is necessary to support the range of factors affecting dividend policy in a world with no perfect markets available. Chapter 3.3 finally discusses stock market liquidity, how liquidity is defined and how it can be measured and what the benefits of liquidity are. The latter part of the third subchapter finally discusses companies as liquidity providers through share repurchases. The question is whether companies can increase the liquidity of their share in a beneficial way during market turmoil or in the absence of liquidity by other market participants or whether this has a negative effect on actual liquidity.

3.1 Helsinki Stock Exchange

A need for organised securities trading became urgent in Finland during the first decade of the 20th century. On Monday 7 October 1912, the first trading session took place and the Stock Exchange saw its next major changes during the 1980s with increasing trading activity and a changing regulatory environment. During the years 1987–1989 the electrical quotation board was

replaced by an electronic trading system. Helsinki Stock Exchange Automated Trading and Information System (HETI) was adopted on 1 April 1990 when brokers started to trade on-line from their offices and floor trading ceased.

The market value of the shares traded on the Helsinki Stock Exchange (HESE) increased from EUR 66 billion in 1997 to EUR 151 billion in 2002 and the value of share turnover almost sextupled from EUR 32 billion to EUR 189 billion during the same period. Most of this growth is due to the growth in market value of a handful of technology companies, and especially that of Nokia Corporation. During the same period, the relative share of foreign shareholders of the market capitalisation of the HESE grew from less than 40% in 1997 to 63% in 2002 (Suomen Pörssisäätiö 2001⁶, HEX 2002).

The average trade size on the HESE was EUR 53,746 in 2002 and the number of trades during the whole year totalled to 3.5 million. The daily average of trades was 14,098 in 2002 and the daily average of securities traded was EUR 757.7 million. The number of trading members (stock brokerage firms) increased from 23 in 1997 to 43 in 2002. Most of this growth came from the increase in remote operating foreign banks (from 2 in 1997 to 26 in 2002). During the early 1990s there were about 100 companies listed on the HESE but with the IPO boom starting in 1997 the number of listed companies on the HESE increased to 149 with 169 share series at year-end 2002. The development of the HESE from 1997 to 2002 is presented in Figure 2.

⁶ Suomen Pörssisäätiö = The Finnish Foundation for Share Promotion.

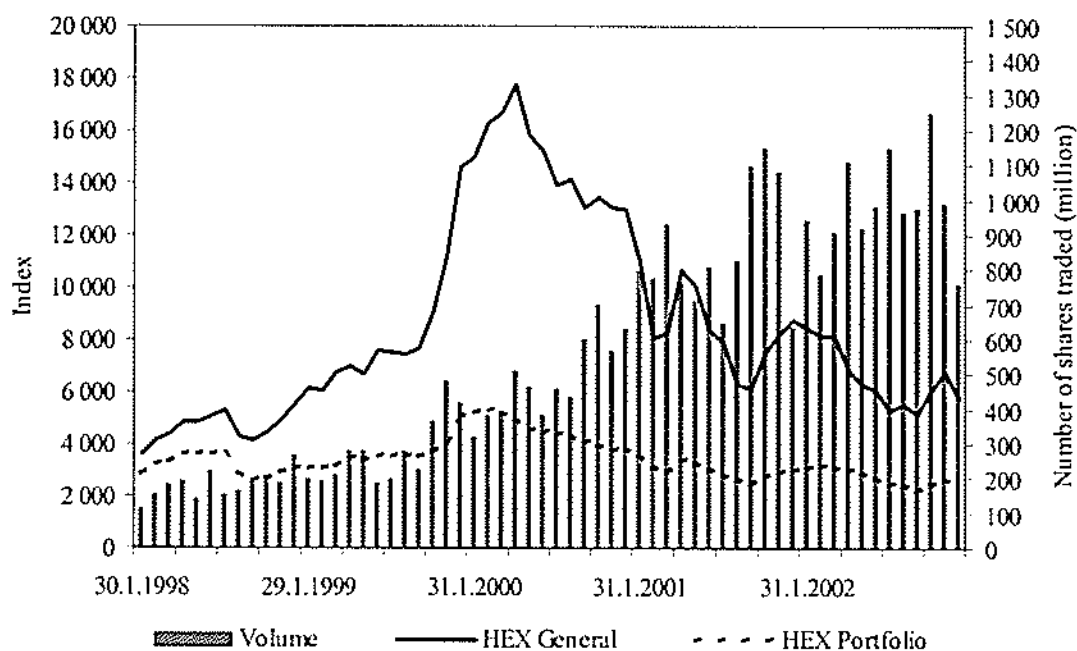


Figure 2. Development of HEX All-Share (General) Index and Portfolio Index and monthly number of shares traded on the Helsinki Stock Exchange 1998-2002.

Helsinki Stock Exchange is a limit order-book (LOB) market and its HETI trading system is very similar to other automated LOB markets like the Toronto Stock Exchange Computer Assisted Trading System (CATS) and the Paris Bourse *Cotation Assistée en Continu* (CAC) system, which was modelled on the CATS system and taken into use in 1989. These systems provide a good transparency by distributing information on limit orders away from the best quotes, a feature not available on many major markets, including the New York Stock Exchange (NYSE).

A trading day in HESE includes the determination of the quotation and price level for trading (pre-trading), trading at varying prices (continuous trading) as well as trading at the price level of the day (after market trading). The purpose of pre-trading is to determine the quotation and price level from each listed security for continuous trading. Continuous trading includes simultaneously

trading in round and odd lots, and the contract transaction phase. Odd lots are matched in real time at the price level determined on the basis of the latest transactions in round lots. During contract transaction phase and after-market trading the buyer is required to record and the seller confirm the transactions concluded at prices determined in the continuous trading. The size of a lot is confirmed by the Stock Exchange for each series of shares and the minimum tick size is EUR 0.01. The official closing price for each series of shares and the closing values of HEX indices are confirmed at the end of the Continuous Trading Session I at 6.00 pm⁷.

Bids and offers are matched by the HETI system with equal price terms into transactions in the recording order. The HETI system displays every limit order and the identification of its submitters individually on the trading screen. This high degree of *ex ante* transparency may provide additional information on market and in some cases knowing the submitters of orders may decrease the information asymmetry somewhat. Contrary to many exchanges, the liquidity is provided by bids and offers recorded in LOB and not by market makers, *i.e.* the HESE is an auction or order-driven market instead of being a dealer or quote-driven market like the NYSE. Brokers on the HESE can also act as broker-dealers and take positions of their own in securities. The fact that only limit orders are available during the continuous trading session and the rules prohibiting both market orders and marketable limit orders that could simultaneously match orders on several price levels of the order book distinguishes the HETI system from its closest counterparts like CATS. (see *e.g.* Hedvall 1994)

⁷ Opening of Trading Session 9.00-9.40 am, Continuous Trading I 10.00 am-6.00 pm, After Market Trading I 6.03-6.30 pm, Continuous Trading II (evening trading) 6.03-7.30 pm, and After Market Trading II 8.30-9.00 am on the following trading day.

3.2 Stock market efficiency

Organised stock markets are arranged in order to provide companies with a source of equity financing and to enable investors to invest their money efficiently, comfortably, and at low cost. Another advantage of public trading of a company's shares is the availability of information guaranteed to investors by law and regulation. Efficient market refers primarily to information efficiency. On an efficient market, information is widely available and at reasonably low costs to all market participants and investors and all price sensitive information has been reflected in share prices, *i.e.* the price of a security always equals the real value of the security (Brealey *et al.* 1996). Market efficiency guarantees that no one has an opportunity to benefit from historical information, financial information, or any other type of information to gain abnormal returns (Levy and Sarnat 1994).

3.2.1 Forms of efficiency

Despite the fact that many researchers believe that markets are at least fairly efficient, a large group of investors believe in methods like technical analysis primarily based on historical share price data. Actual market efficiency lies probably somewhere between efficient markets and perfectly functioning technical analysis (Levy *et al.* 1994). Roberts (1959) and Fama (1965) introduced the concept of efficiency and Fama (1970) presented the three levels of market efficiency based on the information available, *i.e.* strong, semi-strong and weak form of efficiency.

According to the weak form of efficiency all historical information and especially all historical return information is reflected in share prices (Schwartz

1988, Virtanen and Yli-Olli 1987). The semi-strong form of efficiency is based on the assumption that all public information is already reflected in share price. The semi-strong form of efficiency prohibits market participants from making abnormal returns based on rumours because all such information is already incorporated in share prices (Levy *et al.* 1994, Virtanen *et al.* 1987). In order to fulfil the requirements of a strong form of efficiency all public and private information must be reflected in share prices and the trading and information costs must equal zero (Grossman and Stiglitz 1980, Schwartz 1988). When market efficiency is of strong form, no abnormal returns are available for investors *e.g.* by utilising inside information considering the future profitability of a company (Levy *et al.* 1994).

In a newer review article, Fama (1991) redefined the definitions of efficient markets and classified market efficiency according to several empirical studies. The new classification is based on the information incorporated into share prices as follows:

1. tests for return predictability,
2. event studies, and
3. tests for private information.

The first level focuses on long-term return predictability using time-series models on share prices and other variables such as dividend yield. Additionally this level also includes cross-sectional models on return predictability. The second level consists of event studies focusing on evidence on the way and speed how market incorporates new information. Finally the third level consists of tests for private information focusing on insider trading and whether insiders are able to beat the market, security analysts and whether analyst do provide

some information, as well as professional portfolio managers and whether people would be able to beat the market on average. (Fama 1991.)

3.2.2 Information asymmetry and signalling

There are many different parties on stock markets with a different level of information. Regarding companies and their future prospects and development, the management of the company should be most aware of this. Not all company specific information is public to other market participants and thus there exists informational asymmetry. Information asymmetry and agency problem theories are based on George Akerlof's 1970 paper "The Market for Lemons". His original example had to do with used cars. Why does the seller want to get rid of the car? The buyer and seller have asymmetric information and the buyer will demand a large discount on the car because of the possibility it is a *lemon*. Subsequent dividend signalling models were developed by Miller and Modigliani (1961), Miller and Rock (1985) as well as by Bhattacharya (1979) and John and Williams (1985).

Information asymmetry and related signalling theory are widely used theories explaining the underpricing of initial public offerings (IPO), a common phenomenon across countries and markets (Jenkinson and Ljungqvist 1996). In order to cope with the problem of asymmetric information, good companies are believed to signal their quality to other market participants. Similarly to asymmetric information, the company and its executives are believed to have the best information of the future prospects of a company and it has to signal its quality to the investor community. Signalling theory was first developed and presented by Spence (1973, 1974), who presented signalling theory on the labour market in 1973. Studies that have used Spence's signalling theory to

explain IPO underpricing include Allen and Faulhaber (1989), Grinblatt and Hwang (1989), and Welch (1989, 1996).

Asymmetric information theory is based on the view that because capital markets are imperfect and not fully informational, efficient insiders are better informed about the firm's cash flows, and dividends may convey information about the firm's future prospects. Dividends (or repurchases) may convey information that is not previously known to the market or they may be used as signals to change market perceptions concerning future earnings prospects (Allen *et al.* 2002). In the event of asymmetric information the better-informed party has an opportunity signal its quality to the less-informed parties. Because acts are more efficient than words, the signalling party has to act in order to be noticed. The receiver of the signal makes contact with the signalling party based on the content of the signal. In order to be efficient, a signal may not be free. This is a prerequisite for efficient signalling in order to make a distinction between good and bad signallers because anybody could afford to make free signals.

Positive dividend announcements, like to repurchase announcements, typically lead to positive stock price reactions. This interpretation of dividend announcements dates back to the seminal papers by Miller *et al.* (1961) and Miller *et al.* (1985). The first signalling models were not developed until the late 1970s and early 1980s by Battacharya (1979), Miller *et al.* (1985), and John *et al.* (1985). Signalling has been one of the key factors enhancing companies stock repurchase activity. In some studies like that by Bhattacharya (1979), repurchases and cash dividends are considered to be perfect substitutes. Due to the dissatisfaction with the early models, a number of alternative models were developed by *e.g.* Miller *et al.* (1985). Their model assumed that firms cut money spent on capital expenditure to make dividends higher and to signal high

earnings. Similarly to previous models, the Miller and Rock model did not include taxes and it assumed that buybacks and dividends are perfect substitutes. Finally, John *et al.* (1985) presented a model with taxes where the link between dividends and repurchases is cut. In addition to these, a wide range of studies has analysed the information content of dividends as well as the choice between alternative payout methods. The most important prediction of all these studies and models is that dividends convey good news about the firm's future cash flows. (Allen *et al.* 2002.)

Signalling is one of the frequent explanations for repurchases among researchers (Grullon *et al.* 2000). Grullon *et al.* (2000) suggest that there are two different versions of signalling explanations for repurchases. Either repurchases are intended to convey management's expectation of future increases in the firm's earnings and cash flow or managers are expressing their disagreement with how the market is pricing their current performance. Whatever the reason, the management considers the firm's share price to be undervalued. In the first alternative, it is the company's inability to communicate its future prospects convincingly to the market without buyback transactions and in the latter alternative it is the market's failure to reflect publicly available information in the share price, something that could be referred to as market inefficiency.

Ofer and Thakor (1987) have presented a model in which firms could signal their value through two alternative mechanisms: paying dividends or repurchasing their shares. In some countries, the legislation does not allow repurchases or makes repurchases an impractical tool for distributing cash. In most countries, institutional constraints cannot be the entire story behind the method selection decision. Ofer *et al.* (1987) identify two types of costs that are associated with these signals. First, by paying out cash firms expose themselves to the possibility of having to resort to outside financing. Second, repurchases

reduce managers' risk. If the manager owns shares and if the firm pays dividends, which are typically paid *pro rata* to all shareholders, the manager has a portion of his wealth in cash. In the case of repurchases, her portfolio is riskier as she typically does not tender her shares. Thus, if the future prospects of a firm are much higher than perceived by the market, the managers will use repurchases but if the discrepancy is not that remarkable, cash dividends are a preferred method of payout, *i.e.* stock repurchases are a stronger signal.

An alternative view is presented by Barclay *et al.* (1988) and Brennan *et al.* (1990). They suggest that due to information asymmetries, the cost to uninformed investors of adverse selection increases when companies announce a repurchase programme. When some shareholders are better informed than others about the future prospects of the firm, they will be able to take advantage of this information. When money is paid out in the form of cash dividends, the informed and uninformed shareholders receive a *pro rata* amount and no adverse selection exists. (Allen *et al.* 2002.)

3.3 Stock market liquidity

In this chapter, the concept of liquidity is defined together with suggested measures of liquidity. The latter part of this chapter summarises theories and literature on companies as liquidity providers. Because liquidity and bid-ask spread are dependent on market structure this study provides additional information on the effect of open-market stock repurchases on liquidity in a fully automated LOB environment.

3.3.1 Liquidity and liquidity measures

Liquidity is one of the key characteristics of securities markets that investors watch while making investment decisions and analysing securities. In economics, liquidity refers to the degree to which an asset can be quickly and cheaply turned into money, which – by definition – is completely liquid (Baxter and Davis 1992). On a stock market, liquidity is more specifically defined as the ability to buy or sell significant quantities, anonymously, and with relatively small price impact (Campbell, Lo and MacKinlay 1997). The most commonly used measures of liquidity are bid-ask spread trading volume, the number of trades, and trade sizes. In the LOB environment also depth, breadth, and resiliency of order book can also be used to measure liquidity (Hansson 1999). Depth refers to the existence of several price levels on both bid and ask sides of the order book while breadth refers to sufficient volume on different price levels. The ability of orders to respond quickly to price changes caused by temporary order-flow imbalances is measured by resiliency. High trading volume and frequent trades are usually associated with high liquidity and the spreads of the stocks are usually smaller than those of the less frequently traded stocks. Higher spread in actively traded stocks may signal greater uncertainty about the true value of the stock and higher volatility (see *e.g.* Hedvall 1994). There is a lot of evidence on the behaviour of spreads around earnings announcements, takeover bids, and other events that include remarkable changes in market information.

On many markets, like the NYSE, market makers hold inventories of securities and stand ready to buy or sell a certain security to provide liquidity. They are compensated for their task by granting them monopoly rights to post different prices for purchases and sales. The difference between the bid price and ask price, the bid-ask spread, is their compensation for providing liquidity. There

are no market makers in order-driven markets like the HESE, and the liquidity is provided by the bid and ask orders submitted to the LOB. In the LOB environment, the spread is the cost paid by the more impatient trader. The assumption is based on the idea that the true value of a stock is between the best bid and best ask. One can assume that the more patient trader submits *e.g.* a sale order (ask) that is close to the best ask in the order book and the more impatient trader wanting to buy stocks submits a bid that matches the lowest ask available leading to immediate execution.

Much emphasis has been placed on analysing which type of market is the most efficient one, however, so far no clear evidence is available to show that one single type of market is the best one. The increasing trading volumes mainly drive the growth of automated trading systems, but this development does not necessarily mean a total end for market making activity in certain markets. (See *e.g.* Glosten 1994, Biais, Foucault and Salanié 1998, and Viswanathan and Wang 2002.)

According to the literature there are three primary sources for the bid-ask spread namely; order processing costs, inventory costs and adverse-selection costs. The earlier research concentrated on the first two sources that consist of the basic operating costs of trading and the compensation for undesired inventory. The recent research has paid most attention to adverse-selection costs, arising due to information asymmetry in the market. In a market maker driven environment this compensates the market maker for trading with better-informed investors. (See *e.g.* Glosten 1987, Glosten 1989, Glosten and Harris 1988 and Stoll 1989.)

Bid-ask spreads are typically measured as percentage spreads instead of absolute spreads. One of the first papers to do so was the Roll's (1984) study. He

estimated the effective spreads of the NYSE and the AMEX stocks year by year with daily returns data in the period 1963–1982 and found the average spread for NYSE stocks to be 0.298% and 1.74% for AMEX stocks. Effective spreads on the US market have been affected by the minimum tick size, which used to be 1/8 of a dollar but has recently been decimalised. Different estimation methods (specifications for the dynamics of the spread) as well as time periods have led to a wide range of estimation results in studies where the components of the bid-ask spread have been estimated. Glosten and Milgrom (1985) have studied spreads and information on the market. Their approach was based on the idea that bid-ask spread can be a purely informational phenomenon and exist even when all other transaction related costs are nonexistent. Campbell, Lo and MacKinlay (1997) have chosen Huang and Stoll (1997) as an example of a more general model. Their results suggest that adverse-selection costs account for 21%, inventory-holding costs for 14%, and order-processing costs for 65% of the bid-ask spread using a set of 19 stocks of the 20 stocks in the Major Market Index in 1992.

Stock price volatility, average trade size, trading turnover, trading volume and a coefficient reflecting the tick sizes were found to be significant variables in explaining the bid-ask spread in the HESE in a study by Hansson (1999). Further, the results indicate that the coefficients exhibit variation depending on the volume period. A comparison with results from dealer markets such as the NASDAQ indicates that trade sizes, volume and turnover have a greater effect on the HESE, whereas volatility generally has a smaller effect.

3.3.2 Companies as liquidity providers

One of the key rationales for repurchases has been signalling the true value of the share to the market. Other market participants may react to the presence of repurchases by two ways as suggested by the two hypotheses of Barclay *et al.* (1988). The first of the two hypotheses, the market maker hypothesis, predicts that liquidity will increase apace with buybacks as the management of the repurchasing company has no inside information or does not utilise inside information in timing the repurchases. The second and contending hypothesis, namely the asymmetric information hypothesis, predicts that liquidity will decrease apace with buyback activity as the management of the repurchasing company is better informed than the existing liquidity providers. To empirically test which of the two hypothesis is supported one needs to go further in analysing repurchases and in addition to study abnormal returns one should also analyse the possible changes in liquidity around repurchase announcements.

Demsetz (1968) presented a theory of equilibrium prices in the presence of transaction costs in his seminal paper, which laid the foundation for further research on liquidity, bid-ask spread, and market maker's spread and its decomposition. If there were no asymmetric information, a multilateral trading environment would have advantages over a bilateral trading process. The LOB environment of the HESE is such a multilateral environment in which the order flow is consolidated, but in reality, the operational efficiency is counterbalanced by the asymmetric information cost of trading.

Although it is generally accepted that markets are not fully efficient, the prices of stocks reflect all or most of the information obtainable and also the reactions to that information. Efficiency is driven by competition between investors and

brokers as well as by more sophisticated information systems. Certain important news may have a major effect on stock prices while other news of seemingly equal importance causes no change. The explanation could then be the principle of discounted versus non-discounted news. Events like stock splits, changes in dividends, and earnings announcements are usually well forecast in advance and thus most or even all of the information content of the actual announcement can already be discounted to stock prices (Teweles *et al.* 1998). Stock repurchase announcements, however, are less evident and the announcement could thus have a stronger effect on returns behaviour and liquidity.

One of the first studies on how distributing cash through stock repurchases can affect the liquidity of companies' stocks was made by Barclay and Smith (1988). They argued that personal taxes are not the only cost to shareholders when companies distribute cash (see *e.g.* Talmor *et al.* 1990). They pointed out that distributing cash through open market stock repurchases rather than cash dividends can affect stock liquidity and so also the required rate of return (see *e.g.* Amihud *et al.* 1986 and Jacoby *et al.* 2000). Their two contending hypothesis were, as presented earlier, the market maker hypothesis (liquidity will increase) and the asymmetric information hypothesis (liquidity will decrease). Their study covered 153 open market repurchase programme announcements in 1970-1978. They found that bid-ask spreads were higher in the year following the announcement than in the year preceding the announcement. Their conclusion thus was that bid-ask spreads widen when companies announce repurchase programmes, supporting the asymmetric information hypothesis.

A complementary study was conducted by Wiggins (1994). Wiggins utilised daily data around announcements instead of yearly data, as in the previous study. He also included bid-ask depths in the analysis and as his data covered

195 announcements in the years 1988–1990, the study was also conducted under a changed and more valid regulatory environment. The Security and Exchange Commission (SEC) established Rule 10b–18 in 1982 to give guidelines under which a buyback is not considered to be manipulative⁸. Wiggins did not find evidence that spreads increased following announcements of open market repurchase programmes, contrary to the findings of Barclay *et al.* (1988). Nor did he find evidence that bid or ask depths were affected by these announcements. Wiggins performed a separate analysis for a subgroup of companies where he identified actual repurchases to have taken place by analysing the number of shares outstanding, but the results were equal to the whole sample. He concludes his findings suggesting that firms need not be concerned about an adverse change in liquidity following the announcement of a repurchase programme. The US data limits the possibilities to precisely identify when and in what size companies complete the repurchase authorisations. In this sense the Finnish data used in this study is more accurate.

Franz *et al.* (1995) examine dealers' spread behaviour around companies' open market repurchases in the NASDAQ, revealing a decline in spreads after controlling for dealers' inventory holding and order-processing costs. Decline is applied to a reduction in informed trading risk and costs. Their sample comprises 157 open-market repurchase announcements during 1983–1987. The sample is categorised in two sub-samples in which the first group of announcements are motivated by undervaluation and the second group by other reasons. Their *a priori* expectation that informed trading risk reduction

⁸ In response to the terrorist attacks on 11 September 2001, the Securities and Exchange Commission permitted public companies to repurchase their own securities without meeting the timing and volume restrictions of Rule 10b–18 to provide liquidity during times of high market volatility for a limited period of time.

would be greater for repurchases motivated by undervaluation was not supported by the empirical evidence.

One of the most recent articles on the effect of share repurchases on liquidity is that by Brockman *et al.* (2001). They investigate the timing of open market stock repurchases and the resultant impact on liquidity. Contrary to previous studies they use data from the Hong Kong Stock Exchange with more detailed disclosure rules than in the US markets. Their data covers 103 repurchasing firms, 1,526 repurchases, and 27 months (from May 1996 to September 1997 and from November 1998 to August 1999). They have excluded the abnormal repurchase period following the stock market crash that followed the Asian crisis in autumn 1997. Their study shows that managers exhibit substantial timing ability in buybacks and consistently with the information-asymmetry hypothesis they find that the bid-ask spreads widen and depths narrow during repurchase periods. As managerial wealth is often tied to the value of the firm *e.g.* through stock option plans, managers seem to use their private information in timing buybacks to their own advantage, as well as to the advantage of buy-and-hold shareholders.

Brockman *et al.* (2001) provide empirical evidence that market participants can detect the presence of informed trading and that secondary market investors adjust spreads, adverse selection costs, and depths in a manner consistent with the information-asymmetry hypothesis. The bid-ask spread and depth measures generally return to benchmark levels shortly after the managers disclose that they are the source of the informed trading. In Finland, such an effect should not exist or it should not last more than one day due to the daily reporting requirements on actual repurchase transactions. The evidence by Brockman *et al.* (2001) is supported *e.g.* by a study of Heilmann, Laeger and Oehler (2001) on the liquidity effects of insider trading. They found that insider

trading does not improve informational efficiency on a statistically significant level but depresses market liquidity seriously. They interpreted that market participants counteract insiders by widening the spread. A recent study by Cook *et al.* (2004) utilises daily data gathered through survey methods from NYSE and NASDAQ firms. Their evidence suggests that liquidity measured with bid-ask spread improves following repurchases compared to preceding and following non-repurchase dates.

4. RESEARCH HYPOTHESIS, DATA AND OUTLINE OF THE EMPIRICAL INVESTIGATION

Chapter 4 summarises the research hypothesis and describes the data used in this study. Finally an outline of the empirical investigation is given. The purpose of the outline is to bind together the different studies and show their interrelations before going more in detail into the empirical part itself.

4.1 Hypothesis

The main purpose of this thesis is to study the timing of actual repurchases and the effect of Finnish stock repurchases on liquidity and to analyse how repurchases have affected the total payout of companies and why. The five main research hypothesis covered in the empirical part of this study are:

1. Companies repurchase their own shares in a way that is designated to support their share price.
2. Managers exhibit timing ability in executing open-market share repurchases and pay less for the shares acquired than based on an average accumulation strategy.
3. Market liquidity increases when companies repurchase their own shares.
4. Foreign ownership, stock option plans, and lack of investment opportunities are associated with higher share of repurchases of total payout.

5. The total payout is higher in firms that repurchase their own shares from the market compared to companies that only pay cash dividends.

The first hypothesis can be interpreted and examined in a number of ways. In addition to signalling, it is related to the insider trading nature of buyback trades and thus the repurchases' liquidity effects are also of importance. This trading strategy can be tested using time-series model but also with event studies. The regulatory structure how repurchase trades can be executed may also affect the trading activity and the results of different methods. Increasing repurchase activity that follows a remarkable decrease in share price can also mean that the managers try to execute the buyback program at as low costs as possible and that provides a linkage to the second hypothesis.

It is of interest to the shareholders that the money spent by the management is used as well as possible. If the company does not have any business related investments and it has excess cash it should return the money to the shareholders to be invested in other companies and instruments. In addition to cash dividends, share repurchases are considered to be a flexible tool for returning money to shareholders. In doing so, companies should act in a wise manner and time repurchases when the share price of the company is on a reasonable level. The management team as insiders of a firm should have incomparable amount of information on the company and its future outlook assisting in evaluating the current share price. Maybe the most relevant and interesting comparison can be made between the actual repurchase costs and a naïve accumulation strategy.

The third hypothesis focuses on the liquidity effects of share repurchases. Most of the previous studies on the liquidity effects have focused on the repurchase

announcements due to limitations in accurate data. Trading liquidity and repurchase trades possible effects on it are of interest to all investors and market counterparts not least the company itself. If the execution of a buyback program would have a remarkable negative effect on the firm's liquidity, the benefits of distributing cash through repurchases might be exceeded by the costs associated with decreasing liquidity. The liquidity effects are studied using panel data regression models and event studies.

The total payout of firms and factors affecting the structure of payout and especially the share of repurchases of the total payout are studied under the fourth hypothesis. The existing wide range of research on the factors affecting repurchases seldom takes the structure of the total payout into consideration. Additionally the current data set provides an opportunity to study the factors associated with repurchases in an environment that is tax efficient to cash dividends. A panel data model is used in identifying these factors and testing the hypothesised factors effect on repurchases' share of total payout.

Finally the fifth hypothesis focuses on the amount of total payout and companies' reluctance to cut cash dividends after introducing share repurchases. The increasing total payout may have some impact on the future growth of companies or the indebtedness of companies. A comparison between the payout ratios of firms that have repurchases and companies that only pay cash dividends is made.

4.2 Data

The empirical analysis of this study is based on a sample of companies listed on the Helsinki Stock Exchange that have announced stock repurchase

programmes during the period 1998–2002. As repurchases became possible at the end of year 1997, the data covers all Finnish repurchase plans since the beginning. The accounting data and information on the ownership structure of companies was collected from the databases of Bloomberg and from the companies' annual reports. Information regarding stock repurchases was collected manually from stock market releases and annual reports⁹. Stock price data was taken from the databases of the University of Vaasa provided by the HESE. Information on the foreign ownership is based on statistics provided by the HESE.

The overall data covers all stock repurchase programmes of Finnish firms traded on the Helsinki Stock Exchange in the period 1998–2002 comprehending of 212 cumulative firm-year authorisation observations and 228 different share series observations (see Table 1). The number of companies with share repurchase authorisation increased from 22 in 1998 to 60 in 2002. The number of firms with actual share repurchases increased from 11 to 23. Year 2001 remains the most active repurchase year by the number of companies with actual share repurchases (25).

There were 149 companies listed on the HESE at the end of December 2002. These companies had 168 share series. Some 40% of the companies on the HESE had a valid share repurchase authorisation in 2002 and during the year 15% of companies bought back their own shares. The utilisation ratio of buyback authorisations on the HESE is 46% over the whole sample period.

⁹ I am grateful to Jussi Karhunen for providing the repurchase data covering the years 1998–2000 and to Panu Kalmi for providing data on Finnish companies' stock option plans.

Some of the firms have two share series and for the purposes of source data for this study both series have been included as separate programmes in order to take into account the different characteristics of the share series. Finnish firms with dual-class shares typically have different voting rights for the two share series. Due to the ownership structure of the shares, the liquidity of the shares with higher voting rights is typically lower than that of the more commonly traded share series. The execution of repurchase programs is thus also individual for each of the share series. Evidence on the liquidity difference due to the blockholders' concentrated ownership in shares associated with superior voting rights is documented in Neumann (2003).

There are only few companies that have had two consecutive repurchase plans authorised and actualised within a calendar year. In the following table, these firms have been included only once per year. The value of announced repurchase plans is based on the share price of each firm on the first date of the repurchase authorisation, the number of shares at the end of the previous financial year and the assumption that the buyback authorisation is for the maximum amount of 5% of the shares, which is the most common authorisation. The development of share prices throughout the sample period is reflected to the value of the programmes making the year 2000 cumulative value to be as high as EUR 18.2 billion with Nokia and EUR 5.5 billion excluding Nokia.

Table 1. Statistics over the volume of Finnish share repurchase programmes.

Year	Number of repurchase authorisations	Number of firms with actual repurchases	Value of announced programmes (EUR million)	Value of announced programmes excluding Nokia (EUR million)
1998	22	11	617	617
1999	30	16	10 775	925
2000	47	22	18 224	5 454
2001	53	25	10 037	3 123
2002	60	23	9 480	3 842

The information on programmes including the initial announcement day, start and end days of the authorisation as well as boards' confirmation dates and dates of first actual repurchase was collected from the companies' stock exchange announcements and compiled in a summary file. A complete list of share repurchase programmes included in this study is provided in the appendix. Another file includes the actual daily repurchases covering the date of the transaction, the number of shares purchased as well as the average price and value of shares repurchased. This unique information is available in the HESE, where the reporting rules require firms, or actually the stockbrokers acting on behalf of the firms, to publish a stock exchange press release on a daily basis whenever repurchase transactions take place. Most of the previous studies have used only estimates of actual repurchases or have focused on the events around the announcement date. Similar data has been used only in Brockman *et al.* (2001) and Karhunen (2002). Equal information, but gathered through a survey, has been used in a study by Cook *et al.* (2004). Regarding the Finnish market, this study extends the data of Karhunen to cover the years 2001–2002 (two additional years) and provides thus an insight into repurchases in Finland in decreasing stock markets as well. The focus of this study is also different from that of Karhunen (2002).

Information on the motivation to repurchase shares is also published in the stock exchange releases. Clearly the most popular motivation is preparing for acquisitions. About half of the companies refer to improving capital structure and around a fourth of the companies motivate repurchases with employee and executive options. Only a handful of companies motivate their repurchase programmes with increasing liquidity of their share. The published motives for repurchases differ from what companies actually think, when executing repurchases. According to a recent survey to Finnish companies, most of the companies start to repurchase their own shares because they think that the share is undervalued in the market (Kauppalehti 2004). Only 23 companies answered to a survey sent to all Finnish companies that had at least once had a repurchase authorisation. Only a handful of companies mentioned repurchases as an alternative to cash dividends. Although acquisitions were mentioned also in the survey, majority had never used the repurchased shares as a payment method. Almost half of the companies (11 companies) would like to increase the maximum repurchase authorisation from the current 5% to 9–10%.

The stock market data used in this study includes the last price, bid and ask prices at the end of the day as well as the daily volume and turnover. This data is delivered by the HESE. The market index used is the HEX Portfolio Index. Portfolio Index differs from All-Share Index (General Index) in terms of the weight limitation. If a company's market capitalisation exceeds the 10% limit, its weight in the index is limited to exactly 10%. The feasibility of the Portfolio Index comes from the limited index weight as a handful of companies represent a majority of the All-Share Index and thus the Portfolio Index is a much better estimate of the overall market development.

5. EMPIRICAL EVIDENCE

Chapter 5 presents the empirical evidence of the study divided into three sections based on the themes of the hypotheses presented in Chapter 4. Each section starts with a short introduction of the study and the dataset followed by a presentation of the model. The findings of each model are presented and discussed at the end of each subchapter before finally being concluded and summarised in the following Chapter 6. Chapter 5.1 focuses on the timing of share repurchases and the first two hypotheses are investigated in this section. Thereafter, Chapter 5.2 focuses on the liquidity effects of repurchases and on the third hypothesis. Finally, the Chapter 5.3 covers the last two hypotheses focusing on the structure of payout and the factors affecting the decision to choose between ordinary cash dividends and share repurchase.

5.1 Timing of share repurchases

The main purpose of this first set of studies concentrating on the first two hypotheses (Hypothesis #1 and #2) is to examine whether firms buy back their own shares in a manner that is intended to support the share price in decreasing markets and market turmoil, and whether managers exhibit timing ability in the execution of buybacks. These hypothesis are both related to the signalling of undervaluation but also related to inside information and wise use of corporate funds.

Previous studies have found evidence supporting the hypothesis that companies execute repurchases in a manner that is intended to support their share price after stock market crashes or decreases in company's share price. Netter *et al.* (1989) and Gu *et al.* (2003) have both reported increasing repurchase

activity after severe difficulties in stock markets. The first study focused on buybacks after the 1987 stock market crash and the latter on the 11 September 2001 terrorist attacks. However, despite of some managerial timing ability studies none of the previous studies have compared the buyback activity after market-wide crashes to the changes in repurchase activity after a remarkable decrease of the share price of a single share. The purpose of this study is thus utilise the accurate buyback data in order to identify the repurchase activity around situations of market turmoil but also to provide additional information on the execution of repurchase programs. This is important since although the strict regulation guiding the execution of buyback programs there is an evident risk of price manipulation related to repurchases.

Managerial timing ability is related to the insider trading nature of repurchases. Because repurchases are an alternative use of corporate funds, *e.g.* instead of capital expenditure, the timing of repurchase trades is important. Companies that pay a higher than average price of the shares acquired can be considered to destroy corporate funds in a manner that the shareholders of the firm should not accept. The art of timing is always challenging and especially when companies need to cope with the trading rules and avoid possible problems related to the insider trading regulations. Still, managers should have an informational advantage in deciding on the timing of the actual buybacks. This hypothesis is supported by previous evidence from the Hong Kong Stock Exchange (Brockman *et al.* 2001) and the USA (Cook *et al.* 2004).

We start by studying the managerial timing ability to identify whether managers utilise private information to time the execution of buyback plans. One key area of interest is whether the findings are similar to those in the USA and other foreign markets. It is also interesting to know whether companies are able to time buybacks utilising overall market crashes or extreme shocks in the

share price. The data covers all open-market repurchases in Finland from January 1998 to December 2002 for firms listed on the HESE. The empirical evidence is from a fully automated LOB market with strict reporting rules on actual repurchases. A detailed description of the data of each study is presented separately at the beginning of each section.

5.1.1 Managerial timing ability

The managerial timing ability in the execution of open-market share repurchases (Hypothesis #2) is studied comparing the actual cost of repurchases with the cost of a bootstrapped (uninformed) accumulation strategy presented in Brockman *et al.* (2001). Minimising the cost of repurchases may not be the key driver in executing acquisitions of own shares but managers as insiders most likely possess undisclosed information that consciously or unconsciously affects the timing of actual repurchases. The regulatory environment also limits the flexibility of repurchases. Due to the fact that no real-world sample of insider managers and non-insider managers executing buybacks are available, bootstrapping provides a useful tool to study the timing ability.

Bootstrapping is a method similar to simulation but with a major difference in how the data set is construed. While simulation means utilising artificial data, bootstrapping is used to obtain a description of the properties of empirical estimators by using the sample points themselves and involves sampling repeatedly with replacement from actual data (Brooks 2002). Thus, bootstrapping can be called data-based simulation. Typical values for bootstrap samples (replications) range from 50 to 200 for standard error estimation but

bootstrap confidence intervals add another factor to the number of replications and thus we use here 10,000 replications (Efron and Tibshirani 1993).

According to the test construction of Brockman *et al.* (2001) the authorisation period (typically one year or about 250 trading days), the number of actual repurchase days during the period, and the number of actual shares acquired on each repurchase day during the period are taken as given. In order to avoid overlapping authorisation periods, a constant 248-day authorisation period starting from the actual starting day of the authorisation is used for all shares. This also represents the actual number of trading days in a calendar year (*e.g.* in 2002 there were 249 trading days). For each firm-year sample we randomly generate 10,000 alternative repurchase plans holding the factors mentioned constant and allowing only the timing of transactions to vary. The empirical simulated results are then compared with the actual costs of the buyback plans in order to ascertain whether managers are able to minimise the cost of the acquisitions, *i.e.* if managers exhibit timing ability in buyback transactions.

As an example of a single buyback plan, Kone Corporation has acquired 167,890 own shares at a total cost of EUR 12,609,434 based on their repurchase authorisation in 2001. The bootstrapped simulation results in a mean cost of EUR 13,599,305 for the acquisitions and the mean, median, minimum and maximum bootstrapped costs are 107.9%, 107.9%, 98.6%, and 117.9% respectively of the actual repurchasing costs, revealing that Kone Corporation's management may have had timing ability in their 2001 repurchases. Of the 10,000 simulated repurchase plan executions only 13 (or 0.0013%) are below the actual cost of Kone's repurchases, leading to a so-called pseudo p-value of 0.001. This suggests that Kone's management had statistically significant timing ability in executing their buybacks in 2001.

The sample consists of 95 actual repurchase programmes over the years 1998–2002 (see Table 2). The sample includes all executed share repurchase programmes for which uninterrupted stock price data is available for the entire authorisation period. Due to acquisitions and other corporate actions a couple of companies with actual repurchases during the sample period were excluded from the final sample.

Table 2. Summary statistics on share repurchase activities included in the study.

	Mean	Median	Standard deviation	Minimum	Maximum
Number of shares	1 659 383	467 400	4 021 270	200	25 276 834
Value of shares, EUR	25 454 999	4 361 899	67 246 286	3 098	394 175 733
Number of repurchase days	48	37	37	1	205

The sample period is from 1 January 1998 to 31 December 2002 and covers 95 repurchase programmes of 50 companies. The firm-year period is a 248-day period starting from the first day of repurchase authorisation. Number (percentage) of programmes with less than 10 repurchase days is 11 (11.6%), with 10–50 repurchase days is 45 (47.4%) and with more than 50 repurchase days is 39 (41.1%).

The overall market timing results are presented in Table 3. The number of repurchase programmes is first listed in the second column after the year indicator. The average number of buyback days (*i.e.* days when a company has acquired their own shares during the authorisation period) is reported in the third column as it is also related to the interpretation of the results, especially considering firm specific results. The number of actual repurchase dates varies from 36 in 2002 to 58 in 2000. The repurchase data covers the period from 1 January 1998 to 31 December 2002 and thus the repurchase trades completed during 2003 before the end of the year 2002 authorisation are not included in the data, possibly biasing the number of actual repurchase dates slightly downwards in the last year of the sample. The following four columns list the overall minimum, mean (median) and maximum costs of the bootstrapped results in relation to the actual repurchase costs and the t-statistic provides

statistical evidence on the difference between the bootstrapped and actual repurchase costs.

The minimum bootstrapped costs compared to the actual costs range from 86% in 2002 to 96% in 1999 and 2001 while the maximum cost varies between 113% in 2000 and 134% in 1998. The mean costs vary between 99% in 2002 and 111% in 1998. The last two columns of the table report the number and percentage of repurchase programmes with pseudo-p-values below 5% and 1% significance levels. Overall 42.1% (36.8%) of the repurchase programmes are significant at the 5% (1%) level indicating managerial timing ability. The percentage of firms with timing ability varies from 23.8% in 2002 to 72.0% in 2001 at the 5% level and from 12.5% in 2000 to 64.0% in 2001 at the 1% level. Timing ability varies from year to year and does not follow any obvious pattern, but the annual samples are also small for statistical conclusions. The results show that on average circa 40% of companies time their repurchases very well.

The results are in line with earlier theory and findings on managerial timing ability. Netter *et al.* (1989) already showed in a study of repurchase programmes announced after the 1987 crash that companies were able to buy when stocks were underpriced and after they sold shares the stock prices underperformed the market or declined. Wansley *et al.* (1989) also showed that mispricing is one of the leading motivations behind repurchase programmes. The test structure used here is based on Brockman *et al.* (2001), which was one of the first studies ever to present empirical evidence of significant managerial timing ability in the execution of open-market share repurchases over a longer time period. Their data set was taken from the Hong Kong Stock Exchange, which has disclosure rules remarkably similar to those of the HESE and covered 370 repurchase plans in 1992-1999. Similar results are presented also in Cook *et al.* (2004) with US data.

Table 3. Evidence on managerial timing ability based on the comparison of actual repurchase costs to the costs based on bootstrapping simulated buybacks.

Year	Number of observations	Average number of buyback days	Min cost	Mean (median) cost	t-stat	Max cost	Number (percent) of programmes with pseudo-p-value < 0.05	Number (percent) of programmes with pseudo-p-value < 0.01
1998	10	40	0.91	1.11 (1.10)	-1.435	1.34	4 (40.0%)	4 (40.0%)
1999	15	45	0.96	1.08 (1.08)	-0.750	1.22	9 (60.0%)	7 (46.7%)
2000	24	58	0.87	1.00 (1.00)	-0.930	1.13	4 (24.0%)	3 (12.5%)
2001	25	54	0.96	1.10 (1.10)	-2.222 **	1.25	18 (72.0%)	16 (64.0%)
2002	21	36	0.86	0.99 (0.99)	-0.991	1.15	5 (23.8%)	5 (23.8%)
Total	95	48	0.91	1.05 (1.05)	-2.822 ***	1.20	40 (42.1%)	35 (36.8%)

The sample period is from 1 January 1998 to 31 December 2002 and covers 95 repurchase programmes (observations) of 50 companies. The firm-year period is a 248-day period starting from the first day of repurchase authorisation. The actual cost of repurchases is then compared with the bootstrapped repurchase costs *i.e.* the bootstrapped cost is divided by the actual cost. The bootstrapping is repeated 10,000 times, assuming that acquisition of own shares is made on randomly selected trading days during the authorisation period. A pseudo-p-value is calculated to represent the percentage of the distribution that is smaller than the actual repurchase cost. A small pseudo-p-value is interpreted to indicate managerial timing ability. The annual figures in the table are an average of the programme specific numbers obtained by comparing the actual repurchase cost with the simulated costs. A paired two-sample t-test is made to compare the actual repurchase costs to the mean bootstrapped cost. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% level (two-tailed) respectively.

Brockman *et al.* (2001) showed that the overall mean (median) bootstrapped costs represented 109% (104%) of the actual repurchase costs, suggesting that managers exhibit timing ability compared to a naïve accumulation strategy. The results from the HESE with the overall mean (median) bootstrapped costs representing 105% (105%) of the actual repurchase costs are in line with their earlier findings. The paired two-sample t-test was run to test whether the bootstrapped costs differed from actual costs. The t-statistic over the entire sample (p-value 0.006) supports the finding that managers exhibit timing ability. Of the annual samples, the sign of the t-statistic supports the finding in every single year but the small sample size affects the significance levels. Thus, only in 2001 was the annual bootstrapped costs are statistically significantly (p-value 0.036) different from the actual repurchase costs.

While looking at the results on company (programme) level, it is naturally the number of days with actual repurchases which is in relation to the overall timing results. Companies acquiring their own shares over a longer period typically pay an amount more closely related to the bootstrapped cost than those who execute their repurchases over a limited number of consecutive days. If successfully timed, companies buy back their shares at bargain prices if they concentrate repurchases over a short period of time (this also increases the risk of severe mistiming), while those companies which execute buybacks over longer periods are not able to time repurchases as well. Their behaviour is closer to a market makers' behaviour and may be beneficial to shareholders if repurchases provide liquidity to a thinly traded share, an area covered later on in this study. This is shown in Figure 3. In addition to the initial positive price reactions to repurchase announcements and actual repurchases, companies' repurchases could be a useful signal to time buying of shares supporting the signalling theory.

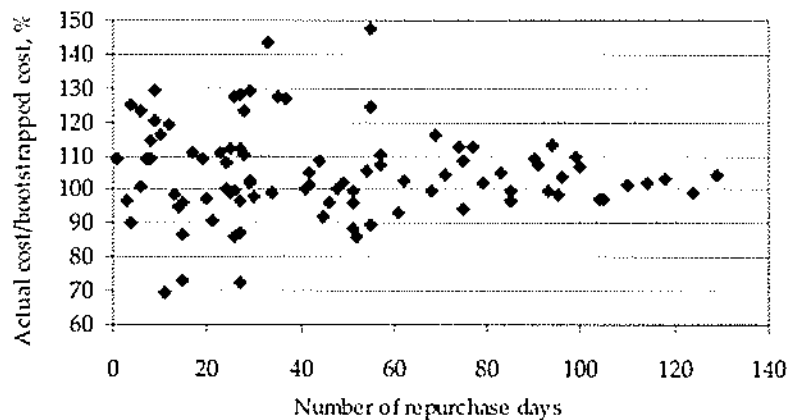


Figure 3. The relationship between repurchase costs and repurchase activity.

5.1.2 Timing of share repurchases in relation to overall market performance

The first model used to study the timing of share repurchases in relation to overall market performance and to see whether companies trade in a manner that supports the share price (Hypothesis #1) is similar to that used in Grullon *et al.* (2000). In comparison to their quarterly repurchase data, we are able to use accurate daily data and thus expect more accurate and reliable results. The first study (5.1.1.) showed that managers have some timing ability to acquire shares at lower prices than a simulated accumulation strategy. The target of this section is to analyse the actual execution or buyback trades on a daily basis over a longer period. In the original study in which this model was first introduced, Grullon *et al.* (2000) used estimates of the timing of the actual repurchases while the data set here enables accurate measurement of buybacks on a daily basis thus revealing the true nature of buyback offers over a longer period. The panel data model estimated here is:

$$(3) \quad r_{it} = \beta_0 + \beta_1 r_{mt} + \beta_2 r_{mt} \times DUMNEG_t + \beta_3 r_{mt} \times DUMNEG_t \times DUMREP_t + \varepsilon_{it}$$

where r_{it} is the daily return for the repurchasing firm i , r_{mt} is the daily market return measured by the Helsinki Stock Exchange HEX Portfolio Index, $DUMNEG$ is a dummy variable equal to one if the market return is negative and zero otherwise, and $DUMREP$ is a dummy variable equal to one if the firm has repurchased shares on the observation date and zero otherwise.

Following the ideas of Grullon *et al.* (2000) the interaction variable (β_3) captures the impact of repurchases on stock returns. The variable measures the markets' sensitivity to the firm's returns on days when the market is declining and the company is also repurchasing shares. According to Grullon *et al.* (2000), this term can be thought of as the change in market beta for repurchasing

companies when markets are bearish. Accordingly, if companies repurchase their shares in a way that is designed to support their stocks, the coefficient β_3 should be negative, *i.e.* their beta risk should decrease.

The whole sample is also divided into two sub-samples for more accurate testing purposes based on market capitalisation (MKTCAP), share price performance (RETURN), and buyback activity (ACTIVITY). Market capitalisation of the companies at the end of December 2002 is used to analyse whether the size and liquidity, following the size of the companies, makes a difference. The companies in the group of high market capitalisation should be more liquid and thus the effect of repurchases on liquidity could be smaller than to those with small market capitalisation. Share price performance is calculated as the percentage development of share price during a period starting at the end of December 1997 and ending at the end of December 2002. The companies in the sub-sample of loosely performing companies should behave differently from those with better stock market performance in this test. One could argue that the companies with less than average market performance should be more active in supporting their stock price through buybacks. The third factor used to divide the full sample into two sub-samples, *i.e.* buyback activity, should also make a difference in the estimation results, as one argument for buying back a firm's own shares is to support the share price and thus those that are more active in repurchases could behave in a manner that also supports their share price. In the earlier study by Grullon *et al.* (2000), the entire sample was divided into five quintiles based on the companies' repurchase activity and the β_3 coefficient was most negative in the quintile of most active companies.

As the stock market has experienced both a period of extreme growth and a long bull market, the sample has also been divided into two separate time

periods. The bull market period covers 315 trading days ending at the end of February 2000, while the bear market period covers the following 315 trading days starting from March 2000. The bear market period could stimulate companies to support their share price and especially at the end of the long-term downward slope in share prices companies might become active in repurchases. During a bull market companies should not be so active in repurchases except at the very beginning of the take-off if the signalling for underpricing is considered to be a key factor affecting buyback activity.

The model and the coefficients and their covariance are estimated using the usual OLS techniques for fixed effects model with balanced data. Both the full sample and the sub-samples were also estimated both with the standard technique and with the White heteroskedasticity consistent covariance matrix for OLS (Greene 2000), but as the results did not materially differ from each other, only the results with White model are reported.

The final sample consisted of 33 companies and 36 share series. The sample is limited as the requirement was that the company should have been quoted uninterruptedly throughout the entire period starting in January 1998 and ending in December 2002. One company that had bought back its own shares and was listed throughout the period was excluded due to extremely infrequent trading. The following Table 4 summarises the data set and presents background information on the sample. As shown, the repurchase activity measured by number of buyback days was highest in 2000 and 2001 with altogether 1,080 and 1,095 buyback days respectively. The table also shows that there are some companies that are remarkably more active than the average and that most of the companies in the sample have bought back their own shares at least in two years throughout the period.

Table 4. Descriptive information on sample companies.

#	Company/Stock	Number of Buyback Days					Total	Return, % 1998-2002	Market Cap. 12/2002
		1998	1999	2000	2001	2002			
1	Amer	0	0	33	119	0	152	98.6 %	811
2	Asko/Uponor	80	56	11	132	95	374	31.3 %	721
3	Citycon	0	23	81	0	0	104	-18.3 %	112
4	Efore	0	0	30	21	0	51	-87.6 %	6
5	Finlines	0	0	0	0	15	15	-43.8 %	410
6	Honkarakenne	0	0	0	0	75	75	-41.0 %	14
7	Huhtamäki	0	0	0	74	56	130	0.9 %	896
8	Interavanti	0	66	3	0	30	99	86.2 %	23
9	Jaakko Pöyry	13	0	0	57	6	76	53.8 %	207
10	KCI Konecranes	0	26	0	0	23	49	-23.1 %	317
11	Kekkilä	0	0	0	0	45	45	47.4 %	16
12	Kemira	0	42	151	136	18	347	-24.4 %	774
13	Kone	0	0	114	53	14	181	132.0 %	1 792
14	Lännen Tehtaat	35	71	43	7	0	156	-21.2 %	62
15	Martela	0	0	2	17	55	74	-33.8 %	29
16	Ncomarkka	0	0	0	3	15	18	-28.9 %	33
17	Nokia	0	0	6	0	0	6	272.4 %	72 519
18	Novo	6	0	0	0	45	51	-45.9 %	95
19	Olvi	8	0	0	0	0	8	-14.5 %	51
20	Orion A	0	0	0	0	33	33	-9.8 %	655
21	Orion B	0	0	0	0	33	33	-10.2 %	787
22	Outokumpu	0	0	0	90	0	90	-18.0 %	1 433
23	Rakentajain Konevuokraamo	0	0	0	25	24	49	89.4 %	75
24	Rautaruukki	0	0	74	124	0	198	-52.4 %	467
25	Roela	20	25	8	0	0	53	-22.5 %	25
26	Sampo	0	0	12	0	28	40	21.8 %	4 033
27	Stockmann A	0	0	95	0	0	95	-17.8 %	344
28	Stockmann B	0	0	51	0	0	51	-14.6 %	366
29	Stora Enso A	0	0	49	103	55	207	41.3 %	1 841
30	Stora Enso R	0	0	51	95	101	247	41.6 %	7 210
31	Talentum	0	27	0	0	0	27	-49.2 %	58
32	Tanro	33	107	40	0	0	180	-24.4 %	436
33	TietoEnator	55	0	31	4	0	90	-24.3 %	1 077
34	Tulikivi	0	0	41	0	19	60	25.2 %	36
35	UPM	62	50	94	32	0	238	66.9 %	7 940
36	YIT	0	57	60	3	0	120	62.3 %	490
Total		312	550	1 080	1 095	785	3 822		
% of All		8.2 %	14.4 %	28.3 %	28.6 %	20.5 %	100.0 %		
Average		9	15	30	30	22	106		

The table summarises the number of actual buyback days in each year as well as during the entire period. The stock price performance in percentage in 1998-2002 and the market capitalisation in million euros at the end of year 2002 are shown in the two far right columns.

The results of the estimation of the full sample and the sub-samples are presented in Table 5. The whole sample as well as the bull and bear market samples consist of 36 shares series while each of the sub-samples consist of 18 share series.

Table 5. Effect of share repurchases on stock returns based on the model estimated. Model wide statistic is presented in the far right column.

Variable		β_0	β_1	β_2	β_3	Adj. R-squared F-stat (p-value)
<u>Entire sample</u>	Coefficient	0.0001	0.4549 ***	0.0054	-0.0076	0.07
n=36	t-stat	0.5384	26.2378	0.1907	-0.1840	1 183.34
T=1 250	p-value	0.5903	0.0000	0.8488	0.8540	(0.0000)
<u>Repurchase activity</u>						
High		0.0001	0.4861 ***	-0.0057	-0.0275	0.09
n=18		0.4708	20.2459	-0.1454	-0.5807	701.91
T=1 250		0.6378	0.0000	0.8844	0.5615	(0.0000)
Low		0.0001	0.4237 ***	0.0190	0.0120	0.06
n=18		0.3036	16.9015	0.4593	0.1290	498.91
T=1 250		0.7615	0.0000	0.6460	0.8974	(0.0000)
<u>Liquidity</u>						
High		0.0000	0.5585 ***	-0.0132	-0.0391	0.11
n=18		0.1620	23.8827	-0.3515	-0.8019	965.35
T=1 250		0.8713	0.0000	0.7375	0.4226	(0.0000)
Low		0.0002	0.3513 ***	0.0318	-0.0790	0.04
n=18		0.5792	13.7574	0.7671	-0.9704	341.97
T=1 250		0.5625	0.0000	0.4430	0.3319	(0.0000)
<u>Return</u>						
High		0.0006 ***	0.3744 ***	0.0354	0.1596 ***	0.07
n=18		2.7631	16.8529	0.9500	3.3067	573.32
T=1 250		0.0057	0.0000	0.3421	0.0009	(0.0000)
Low		-0.0004	0.5345 ***	-0.0250	-0.2006 ***	0.08
n=18		-1.6209	20.2014	-0.5809	-2.9168	628.20
T=1 250		0.1051	0.0000	0.5613	0.0035	(0.0000)
<u>Market conditions</u>						
Bull market		-0.0001	0.4985 ***	-0.0133	-0.0157	0.06
n=18		-0.3441	13.3591	-0.2114	-0.1342	229.41
T=315		0.7308	0.0000	0.8326	0.8933	(0.0000)
Bear market		-0.0006 *	0.3816 ***	-0.1047 **	-0.0259	0.05
n=18		-1.6463	13.0554	-2.2392	-0.4114	179.90
T=315		0.0997	0.0000	0.0252	0.6808	(0.0000)
<i>Grullon & Ikenberry (2000)</i>		0.0009 ***	0.7196 ***	0.2116 ***	-0.0418 ***	

The entire sample covers 36 share series (cross-sections) and each of the sub-samples covers 18 share series (cross sections). The time period is 1 250 trading days and the number of firm-year observations is 45 000 in the entire sample and 22 500 in the sub-samples. The lowest panel describing the effect of market conditions covers 315 trading days and has thus 5 670 firm-year observations. Of the reported figures the first one is the estimated coefficient followed by the t-stat and p-value. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% level, respectively.

The results show that the estimated value of β_3 for the whole sample of 36 share series of 33 companies during the estimation period 1998–2002 is negative but

not significant while the same coefficient in the Grullon *et al.* (2000) study was negative and significantly different from zero, indicating that companies repurchase their own shares in a manner that supports the stock price (decreases the beta coefficient). With the Finnish daily data, the only coefficient significantly different from zero (at the 1% level) for the entire sample and in all sub-samples was β_1 i.e. the market return.

β_0 or the constant of the estimation was slightly positive and different from zero at the 1% level in the sub-sample of companies with good stock market performance. The intercept was negative and slightly significant at 10% level in the bear market sample. Which is also the only sample where β_2 was significant but negative in contrast to the original study.

Market return coefficient, β_1 , was positive and quite high, being 0.4549 for the entire sample and as high as 0.5585 for the sub-sample of companies with high market capitalisation, due to the inclusion of bigger companies with greater impact on market index in this sub-sample. Not surprisingly, the market return coefficient was statistically significant at the 1% level in all samples.

β_3 was negative (-0.2006) and significant in the sub-sample of badly performing companies, which is a natural result but also a signal of trading behaviour intended to support the share price. It was also negative (-0.0275) in the sub-sample of companies with the highest buyback activity but not significant in contrast to the findings of Grullon *et al.* (2000).

These findings do not, however, suffer from noisy data as the earlier estimations. One common problem still remains, as most of the repurchase programmes are not explicitly managed to provide liquidity, as Grullon *et al.* (2000) also point out. One additional reason possibly limiting more remarkable

reductions in betas during open-market repurchase programmes may depend on the technical execution of buybacks. Our more timely accurate data enabled us to find out a lot more negative β_3 coefficient for the companies with poor stock market performance than Grullon *et al.* (2000). These findings support the theory that companies at least in some market conditions, and especially those with lower than average stock market performance, support their stock through share buybacks or at least make repurchases during periods when share prices decrease.

The number of companies included in this sample was only 33 and number of different share series 36 compared to the full sample of 1,913 in Grullon *et al.* (2000). Our results should, however, be more accurate as the data used in this study is based on daily observations in contrast to the quarterly buyback information used in the previous study. The period under consideration in this study is 1998-2002 while the Grullon *et al.* (2000) study comprehends of buyback programmes that took place in 1980-1990. The estimation period in this study is five years or 1,250 trading days, while the period in the original study was four years around the repurchases.

The way companies usually manage their repurchases on a day-to-day basis may bias the results. Typically firms choose one stockbrokerage firm to take care of their repurchases and ask them to purchase their shares according to the guidelines given. Thus the timing of the repurchases may not fully reflect the behaviour to support the stock price on daily basis, but repurchases are typically completed over periods of high activity within relatively short time periods. The decision to start and to stop repurchase of shares is, of course, made by the company executives, but within those decisions the daily repurchase decisions are made by the broker. Thus, the following event study may be able to shed additional light on the timing issue in special occasions.

5.1.3 Share repurchases in market turmoil

The results on the timing of repurchases on days with negative market return over a longer estimation period presented in Chapter 5.1.2 do not clearly support the hypothesis that companies behave in a manner that is designated to support their share price, although managers have overall timing ability in executing share buyback as shown in Chapter 5.1.1. We therefore will utilise classic event study methodology to study whether the buyback activity increases around major drops in stock prices (Hypothesis #1). Chapters 5.1.1 and 5.1.2 concentrated on management's timing ability and repurchase behaviour on a day-to-day basis. As noted at the end of the previous study, there are many factors that might affect the results and make them less clear. In this chapter, we focus on the timing and decision to start to repurchase of shares or to increase the daily volume in extreme market events, when management could have a motivation to support the share price and when buybacks could typically be executed at remarkably lower market prices than few days before the event. The studies in this chapter are structured as event studies around selected event days of interest.

Event study methodology is most widely used in investigating how share prices or stock markets respond to public announcements of new information. Typical event studies measure abnormal returns around *e.g.* earnings and dividend announcements, but the methodology is also widely used to study stock market reactions to other type of information. The first event studies include Fama, Fischer, Jensen and Roll (1969) on stock splits and Ball and Brown (1968) on earnings announcements. The necessary information to design and complete an event study is to know the exact event day around which the market reactions or changes in market variables can be analysed.

In this study the changes in the daily repurchase volumes and in the number of companies actively buying back their own shares are measured around specific market events. The first study is based on the 11 September 2001 terrorist attacks and a period from -20 to +20 days around the event day. There were totally 21 repurchase programmes ongoing within this 41-day event period, all included in the sample (see Table 6 for descriptive statistics).

Table 6. Sample statistics of the 11 September 2001 study.

	-20 to -1	Event day	+1 to +20	Total
Total repurchases	2 148 948	481 450	8 540 660	11 171 058
Mean	102 331	40 121	406 698	531 955
Median	45 000	8 100	64 400	197 700
Standard deviation	169 940	112 081	1 063 391	1 264 533
Minimum	0	200	0	1 200
Maximum	626 500	395 500	4 892 200	5 914 200
	<i>n</i> =21	<i>n</i> =12	<i>n</i> =21	<i>n</i> =21

The total sample contains 21 events. The total repurchases is the total number of shares repurchased by the companies before, after and on the event day. The last column describes the total sample over the 41-day event window. Mean and median are the average and median number of shares acquired before, after and on the event day by the companies in the sample. Minimum number of shares is zero for both the period before and after the event day because the sample contains also repurchase programs where actual repurchases have taken place either before of after the event day. Before the event day 15 programs, after the event day 19 programs and on the event day 12 programs of the 21 were active. All programs with actual repurchases on both or one side of the event day have been included into the final sample. The 21-day sample contains 17 programs.

The average daily repurchase volume before the attacks was 13,011 and after the attacks 35,629. The difference is statistically significant at the 10% level (p-value of 0.081). The results with total repurchases are similar. Many companies that had bought back their own shares during the 20 days before the attacks increased their daily repurchase volume after the event. An extreme example of this is Stora Enso, which bought back over 3,000,000 R-shares during a ten-day period following the attacks. The average number of companies buying back their shares was 6.8 before and 11.3 after the event day the change being statistically significant at the 1% level (p-value of 0.000). While shortening the window of the event study to cover -10 to +10 days around the event day the repurchase activity measured by the number of shares increases but not at a statistically significant level (p-value of 0.149). The number of companies

increases statistically significantly at the 1% level. An additional measure is the number of repurchase day before and after the terrorist attacks, which is also supporting increasing activity at the 1% significance level. Table 7 summarises the results of the study.

Table 7. Share repurchase activity before and after the terrorist attacks of 11 September 2001.

Days	-20 to -1	-10 to -1	Event day	+1 to +10	+1 to +20	t-stat -/+20 (p-value)	t-stat -/+10 (p-value)
<u>Total repurchases</u>							
Mean	102 331	67 976	40 121	283 388	406 698	-1.451	-1.213
Median	45 000	45 000	8 100	60 300	64 400	(0.081)*	(0.121)
Standard deviation	169 940	107 635	112 081	830 768	1 063 391		
	n=21	n=17	n=12	n=17	n=21		
<u>Daily repurchases</u>							
Mean	13 011	15 144	40 121	32 779	35 629	-1.450	-1.074
Median	11 114	13 732	8 100	32 779	33 682	(0.081)*	(0.149)
Standard deviation	23 492	24 960	112 081	83 427	85 895		
	n=21	n=17	n=12	n=17	n=21		
<u>Number of rep. days</u>							
Mean	6.4	4.6	-	6.8	10.8	-2.883	-2.873
Median	4.0	4.0	-	8.0	12.0	(0.005)***	(0.006)***
Standard deviation	6.5	3.4	-	3.1	6.6		
	n=21	n=17	-	n=17	n=21		
<u>Active companies</u>							
Mean	6.8	7.9	-	11.5	11.3	-6.649	-4.099
Median	7.0	8.5	-	11.0	11.0	(0.000)***	(0.000)***
Standard deviation	2.0	1.9	-	2.1	2.3		
	n=20	n=10	-	n=10	n=20		

The first panel (Total repurchases) describes the mean, median and standard deviation of the total number of shares purchased by sample companies on average before, after and on the event day. The second panel (Daily repurchases) describes the mean, median and standard deviation of the daily shares repurchased by sample companies on average before, after and on the event day. Only days when companies have acquired their shares are included in the calculation of the average daily repurchases. The mean is the average of the company specific mean daily repurchases and the median is the average of the company specific median daily repurchases. The standard deviation is the standard deviation of the company specific mean daily repurchases. The third panel (Number of rep. days) describes the mean, median and standard deviation of the number of repurchase days (i.e. the number of days when companies have actually repurchased their own shares from the market out of the possible 20 or 10 days) before and after the event day by sample companies on average. The last panel (Active companies) describes the number of active companies repurchasing their shares before, after and on the event day. For actual share repurchases, the average volume during the measurement period is first calculated for the periods of -20/+20 and -10/+10 days around the event day on company level. Thereafter, a t-test for paired two samples is done based on these average figures. During the -20/+20 window there are 21 share series included and during the -10/+10 window there are 17 share series included. The t-test for the number of repurchase days is based on the actual number of repurchase before and after the event day for each company. The t-test for the number of active companies is based on the daily number of companies each day and the sample size for the 20- and 10-day periods is thus 20 and 10 respectively. H_0 : Pre = Post and H_1 : Pre < Post. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% level (one-tailed) respectively.

The terrorist attacks of 11 September 2001 were truly an exogenous and unanticipated shock to the market. The Finnish stock exchange was not closed due to the attacks and trading continued uninterrupted at the time of the attacks and thereafter in contrast to the US markets, which were closed for several days. The flexibility of repurchases as a managerial instrument is highlighted in such extreme events. In September 2001, there were altogether 56 valid repurchase authorisations, of which 23 were confirmed by the board to be taken into use. As an example, two companies, Tekla and TietoEnator, acted immediately after the attacks by making the repurchase decision in the board based on the authorisation given by the annual general meeting. Four companies made their first repurchases of 2001 in September just after the attacks. Table 7 summarises the buyback activity around the event day, giving an overview on the development of daily buyback activity around the event day. Karhunen (2002) studied the timing of repurchases in Finland and shows that the most active repurchase months, both in terms of number of transactions and in value of buyback deals, are September, October, November and February. This might explain the slight increase in the number of active companies on a daily basis just before the event day. Nevertheless the increase in the number of active market participants is statistically highly significant (p-value of 0.000).

Figure 4 shows how share prices developed on the Helsinki Stock Exchange compared to the NASDAQ and the Dow Jones. The HEX General Index is a market capitalisation weighted price index of companies on the HESE. The NASDAQ Composite Index is a broad-based capitalisation-weighted index of all NASDAQ National Market and Small Cap stocks. The Dow Jones Industrial Average is a price-weighted average of 30 blue-chip stocks that are generally the leaders in their industries. It has been a widely followed indicator of the

(median) *completion ratio* before the event day was 29.5% (19.1%), on the event day 2.6% (0.8%) and after the event day 67.9% (78.5%). The difference in the relative completion ratio before and after the event day is tested using a one-tailed t-test for paired two samples. The post event day completion ratio is statistically significantly higher at the 1% level with t-value of -2.785 (p-value 0.001).

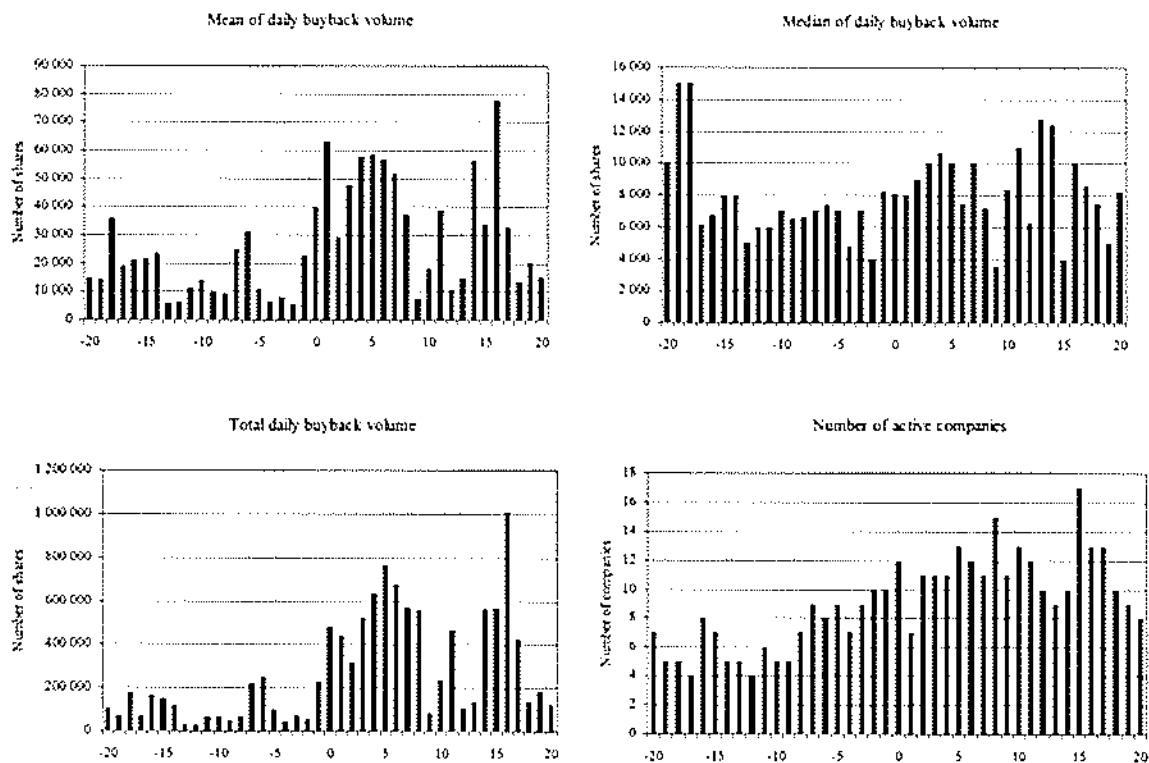


Figure 5. Daily repurchase activity in the HESE around the 11 September 2001 terrorist attacks in the USA.

An additional nonparametric sign test gives strong support towards increasing repurchase volume measured with the total number of shares acquired after the terrorist attacks. The sign test is the simplest nonparametric test and it is used for testing hypothesis about the central location of a population distribution and is often used in analysing data from matched pairs and is thus suitable to be used here as well (see *e.g.* Newbold 1995). The test statistic was $z=1.9640$

(significant at the 5% level) for the 41-day event window with 15 companies having more repurchases after the event day of the total of 21. For the 21-day event window $z=2.1828$ (significant at the 5% level) with 13 companies of 17 being more active after the event day.

Another possibility for testing whether companies utilise share repurchases to support their share price in extreme events is to study the repurchase activity around major market drops. In an early work by Netter *et al.* (1989) companies were found to activate in repurchases following the 1987 stock market crash and a recent study by Gu *et al.* (2003) focuses on open-market repurchases after the 11 September 2001 terrorist attacks. In the following study, data on repurchase activity around the most remarkable one-day decreases in the share prices in the HESE are studied using the same event study methodology as earlier. The sample consists of 60 share repurchase programmes over a 41-day event window and 53 share repurchase programmes over a 21-day event window around selected major changes in the stock prices in the HESE measured with the HEX Portfolio Index, market value weighted index with 10% limit for one company (see Table 9 for descriptive statistics). The selected event days included are presented in Table 8.

Table 8. Major market drops in the HESE included in the event study.

Date	Index value (close)	Change from previous day, %	Number of sample companies
11 August 1998	3 239.40	-5.21	6
10 September 1998	2 820.55	-5.00	6
8 October 1998	2 272.57	-5.67	7
13 January 1999	3 089.47	-5.01	4
5 January 2000	4 827.71	-5.92	7
11 April 2000	4 715.16	-4.87	5
27 July 2000	4 426.10	-5.19	13
12 June 2001	3 166.27	-5.17	12

In order to identify the event days all market-wide one-day drops in share prices of around 5% or more measured with the HEX Portfolio Index were studied. The included eight event days (first column) that took place in 1998–2002 when actual share repurchases took place within the 41-day event window are listed in this table. The value of the HEX Portfolio Index at closing on the event day is shown in the second column. The third column shows the percentage change of the index compared to the closing value of the index on the previous trading day. The fourth column indicates the number of sample companies that have had repurchase trades within the 41-day event window.

Table 9. Sample statistics of the market drop study.

	-20 to -1	Event day	+1 to +20	Total
Total repurchases	16 595 860	893 770	14 324 210	31 813 840
Mean	276 598	42 560	238 737	530 231
Median	53 514	18 600	74 750	183 250
Standard deviation	530 960	59 013	430 437	890 601
Minimum	0	400	0	1 400
Maximum	2 360 095	213 000	2 073 895	4 575 742
	<i>n</i> =60	<i>n</i> =21	<i>n</i> =60	<i>n</i> =60

The total sample contains 60 events. The total repurchases is the total number of shares repurchased by the companies before, after and on the event day. The last column describes the total sample over the 41-day event window. Mean and median are the average and median number of shares acquired before, after and on the event day by the companies in the sample. Minimum number of shares is zero for both the period before and after the event day because the sample contains also repurchase programs where actual repurchases have taken place either before of after the event day. Before the event day 48 programs, after the event day 54 programs and on the event day 21 programs of the 60 were active. All programs with actual repurchases on both or one side of the event day have been included into the final sample. The 21-day sample contains 53 programs.

The average daily repurchase volume before the market drops is 24,284 and after the drops 21,575 over the 41-day period and 23,603 and 21,038 over the 21-day period, *i.e.* the repurchase volumes measured by the number of shares repurchased did not increase after major market drops in contrast to what one could expect. The total number of shares acquired was also smaller after the event day than before it. The average number of companies buying back their own shares was 23.2 before and 26.2 after the event day, the change being statistically significant at the 1% level (*p*-value of 0.005). When the window of the event study is shortened to cover -10 to +10 days around the event day the number of companies increases statistically significantly at the 1% level as well. The number of repurchase days increased statistically significantly over the 21-day event window. Table 10 summarises the results of the study and Figure 6 provides a visual presentation of the results.

Table 10. Share repurchase activity around major market drops.

Days	-20 to -1	-10 to -1	Event day	+1 to +10	+1 to +20	t-stat -/+20 (p-value)	t-stat -/+10 (p-value)
<u>Total repurchases</u>							
Mean	276 598	138 553	42 560	133 224	238 737	0.690	0.128
Median	53 514	36 000	18 600	28 200	74 750	(0.246)	(0.449)
Standard deviation	530 960	305 045	59 013	239 669	430 437		
	n=60	n=53	n=21	n=53	n=60		
<u>Daily repurchases</u>							
Mean	24 284	23 603	42 560	21 038	21 575	0.823	0.542
Median	23 164	23 097	18 600	19 476	18 806	(0.207)	(0.295)
Standard deviation	40 959	46 110	59 013	29 601	30 256		
	n=60	n=53	n=21	n=54	n=60		
<u>Number of rep. days</u>							
Mean	7.7	3.9	-	4.8	8.7	-1.013	-1.494
Median	7.5	4.0	-	4.0	9.0	(0.158)	(0.071)*
Standard deviation	6.5	3.2	-	3.7	6.6		
	n=60	n=53	-	n=53	n=60		
<u>Active companies</u>							
Mean	23.2	20.6	-	25.3	26.2	-2.753	-2.976
Median	24.0	22.0	-	24.5	26.5	(0.005)***	(0.004)***
Standard deviation	3.9	3.7	-	3.4	2.9		
	n=20	n=10	-	n=10	n=20		

The first panel (Total repurchases) describes the mean, median and standard deviation of the total number of shares purchased by sample companies on average before, after and on the event day. The second panel (Daily repurchases) describes the mean, median and standard deviation of the daily shares repurchased by sample companies on average before, after and on the event day. Only days when companies have acquired their shares are included in the calculation of the average daily repurchases. The mean is the average of the company specific mean daily repurchases and the median is the average of the company specific median daily repurchases. The standard deviation is the standard deviation of the company specific mean daily repurchases. The third panel (Number of rep. days) describes the mean, median and standard deviation of the number of repurchase days (i.e. the number of days when companies have actually repurchased their own shares from the market out of the possible 20 or 10 days) before and after the event day by sample companies on average. The last panel (Active companies) describes the number of active companies repurchasing their shares before, after and on the event day. For actual share repurchases, the average volume during the measurement period is first calculated for the periods of -20/+20 and -10/+10 days around the event day on company level. Thereafter, a t-test for paired two samples is done based on these average figures. During the -20/+20 window there are 60 share series included and during the -10/+10 window there are 53 share series included. The t-test for the number of repurchase days is based on the actual number of repurchase before and after the event day for each company. The t-test for the number of active companies is based on the daily number of companies each day and the sample size for the 20- and 10-day periods is thus 20 and 10 respectively. H₀: Pre = Post and H₁: Pre < Post. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% level (one-tailed) respectively.

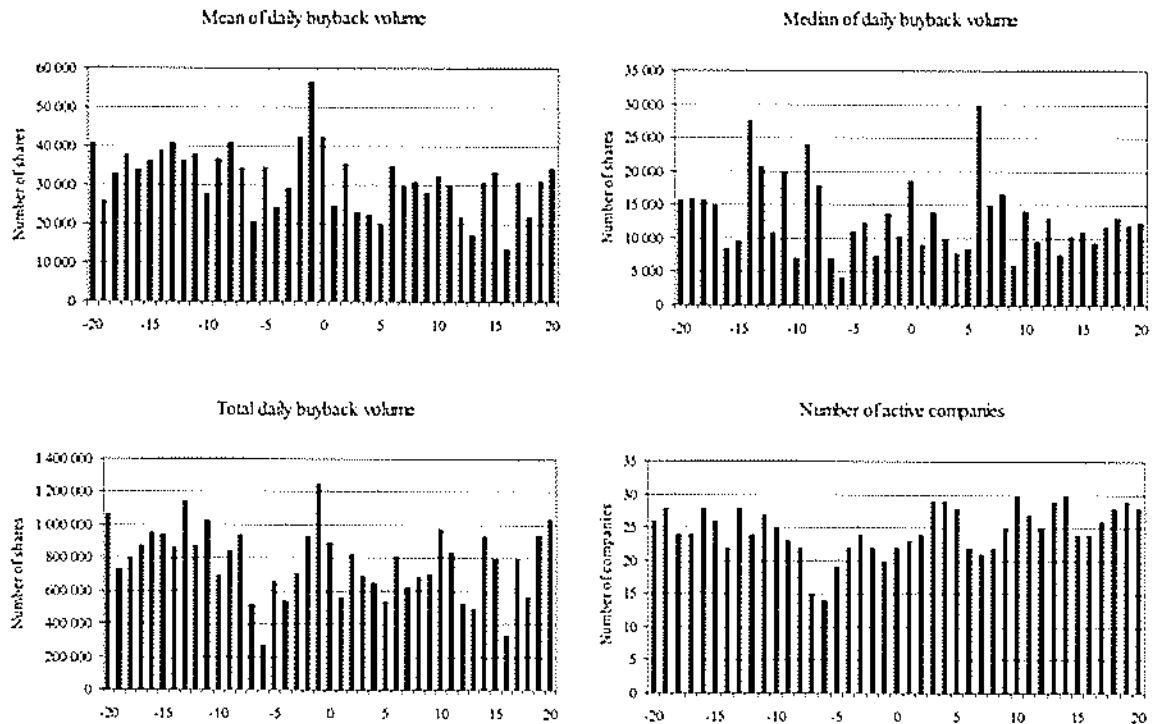


Figure 6. Cumulative daily repurchase activity on the HESE around selected market drops.

Figure 6 gives a visual presentation of the repurchase activity around the event day. The statistical results did not support an increasing repurchase activity after the event day. Only the number of active companies was higher during the 20-day period after the event day. An additional method to compare the repurchase activity before and after the event day is to compare the relative amount of shares repurchased before and after the event day of the total amount of shares acquired during the entire 41-day event window. The benefit of this relative method is its neutrality towards the size of the companies and the absolute volume of their repurchase trades. Of the 60 repurchase programs the mean (median) *completion ratio* before the event day was 42.8% (39.1%), on the event day 2.8% (0.0%) and after the event day 54.4% (53.8%). The difference in the relative completion ratio before and after the event day is tested using a one-tailed t-test for paired two samples. The post event day completion ratio is

statistically significantly higher at the 10% level with t-value of -1.302 (p-value 0.099) giving some support for increased activity after a market-wide share price drop.

An additional nonparametric sign test did not support increasing repurchase volume measured with the total number of shares acquired after the market-wide drops. The test statistic was $z=0.2582$ for the 41-day event window with 31 companies having more repurchases after the event day compared to the total of 60 companies. For the 21-day event window $z=0.6868$ with 29 companies being more active after the event day of 53.

Finally, the repurchase activities around company specific drops in share price are studied. This is an addition to the two previous event-studies and also connected to Netter *et al.* (1989). In this study we focus on single shares facing a decline in share price of 10% or more in one day measured by the difference of the closing price to the closing price of the previous day. Using the share price data for the period 1998-2002 for all the companies that have had an active share repurchase program going on at least once during the period we identified 74 events, when the share price of the company had declined by 10% or more in one day. Of these 34 companies had actual repurchases over the 41-day event window. One company (Espoon Sähkö) was removed from the final sample due to the extremely low liquidity and the fact that only one minor repurchase trade took place over the entire event window. Thus, the final sample consists of 33 share repurchase programmes over a 41-day event window and 22 share repurchase programmes over a 21-day event window around the selected stock specific event days (see Table 11 for descriptive statistics). The mean change in share price in the event day is -12.6% and median change -12.0% the standard deviation being 2.9%. The smallest change included in the sample is -10.3% and the most remarkable change is -25.3%. Of the 33 events, four took place in 1998,

five in 2000, 11 in 2001, and 13 in 2002. The same event study methodology familiar from the two previous studies is used in this study as well.

Table 11. Sample statistics of the share price drop study.

	-20 to -1	Event day	+1 to +20	Total
Total repurchases	2 196 040	178 600	3 685 065	6 059 705
Mean	66 547	17 860	111 669	183 627
Median	3 000	15 300	30 400	55 200
Standard deviation	175 916	19 224	190 754	271 964
Minimum	0	200	0	800
Maximum	725 520	55 900	778 420	965 780
	n=33	n=10	n=33	n=33

The total sample contains 33 events. The total repurchases is the total number of shares repurchased by the companies before, after and on the event day. The last column describes the total sample over the 41-day event window. Mean and median are the average and median number of shares acquired before, after and on the event day by the companies in the sample. Minimum number of shares is zero for both the period before and after the event day because the sample contains also repurchase programs where actual repurchases have taken place either before of after the event day. Before the event day 17 programs, after the event day 29 programs and on the event day 10 programs of the 33 were active. The all programs with actual repurchases on both or one side of the event day have been included into the final sample. The 21-day sample contains 22 programs.

The sample companies have, on average, acquired 66 547 and 111 669 shares over the 20-day windows before and after the event day respectively. The standard deviation of the total repurchase volumes is high because the sample includes both liquid blue chip companies and small companies with low liquidity and small repurchase volumes. The high standard deviation together with the limited sample size may affect that the difference is not statistically significant although the sign is as hypothesised (p-value of 0.157). The average daily repurchase volume before the share price drop is 4 864 and after the drops 11 432 over the 41-day period. The repurchase volumes measured by the average number of shares repurchased daily has over doubled after major market drops, the change being statistically significant at the 5% level (p-value of 0.039). Similarly the average number of repurchase days increased from 5.0 to 7.5 when comparing the 20 days before to the 20 days after the event day, the change being statistically significant at the 5% level (p-value of 0.025). The

average number of companies buying back their own shares of the total of 33 was 8.3 before and 12.4 after the event day, the change being statistically significant at the 1% level (p-value of 0.000). Table 12 summarises the results of the study and Figure 7 provides a visual presentation of the results.

Table 12. Share repurchase activity around major share price drops.

Days	-20 to -1	-10 to -1	Event day	+1 to +10	+1 to +20	t-stat -/+20 (p-value)	t-stat -/+10 (p-value)
<u>Total repurchases</u>							
Mean	66 547	56 517	17 860	60 122	111 669	-1.023	-0.120
Median	3 000	2 000	15 300	11 525	30 400	(0.157)	(0.453)
Standard deviation	175 916	110 223	19 224	92 528	190 754		
	n=33	n=22	n=10	n=22	n=33		
<u>Daily repurchases</u>							
Mean	4 864	6 936	17 860	14 842	11 432	-1.820	-1.121
Median	3 858	5 244	15 300	12 640	8 918	(0.039)**	(0.137)
Standard deviation	9 362	11 775	19 224	29 166	17 580		
	n=33	n=22	n=10	n=22	n=33		
<u>Number of rep. days</u>							
Mean	5.0	3.9	-	4.3	7.5	-2.046	-0.445
Median	3.0	3.0	-	3.5	7.0	(0.025)**	(0.331)
Standard deviation	6.7	4.2	-	2.9	5.0		
	n=33	n=22	-	n=22	n=33		
<u>Active companies</u>							
Mean	8.3	8.6	-	9.4	12.4	-4.218	-0.805
Median	8.0	8.5	-	9.5	12.0	(0.000)***	(0.217)
Standard deviation	1.6	1.7	-	2.6	4.0		
	n=20	n=10	-	n=10	n=20		

The first panel (Total repurchases) describes the mean, median and standard deviation of the total number of shares purchased by sample companies on average before, after and on the event day. The second panel (Daily repurchases) describes the mean, median and standard deviation of the daily shares repurchased by sample companies on average before, after and on the event day. Only days when companies have acquired their shares are included in the calculation of the average daily repurchases. The mean is the average of the company specific mean daily repurchases and the median is the average of the company specific median daily repurchases. The standard deviation is the standard deviation of the company specific mean daily repurchases. The third panel (Number of rep. days) describes the mean, median and standard deviation of the number of repurchase days (i.e. the number of days when companies have actually repurchased their own shares from the market out of the possible 20 or 10 days) before and after the event day by sample companies on average. The last panel (Active companies) describes the number of active companies repurchasing their shares before, after and on the event day. For actual share repurchases, the average volume during the measurement period is first calculated for the periods of -20/+20 and -10/+10 days around the event day on company level. Thereafter, a t-test for paired two samples is done based on these average figures. During the -20/+20 window there are 33 share series included and during the -10/+10 window there are 22 share series included. The t-test for the number of repurchase days is based on the actual number of repurchase before and after the event day for each company. The t-test for the number of active companies is based on the daily number of companies each day and the sample size for the 20- and 10-day periods is thus 20 and 10 respectively. H₀: Pre = Post and H₁: Pre < Post. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% level (one-tailed) respectively.

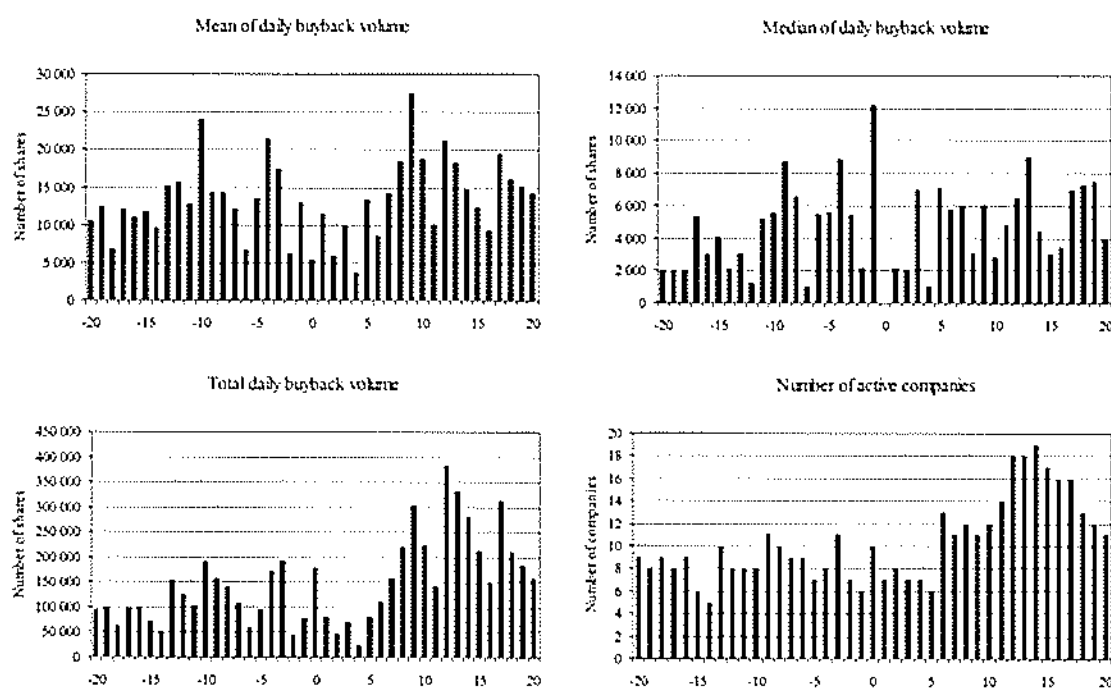


Figure 7. Daily repurchase activity around share price drops.

The charts in Figure 7 show an increase in the mean and median of the daily buyback volume. More clearly the change in the repurchase volume is shown in the chart describing the total buyback volume. The increasing activity is also visible in the chart describing the number of companies repurchasing their shares on daily basis around the event day. The increase in the activity takes place about five trading days after the drop in the share price. An additional method to compare the repurchase activity before and after the event day is to compare the relative amount of shares repurchased before and after the event day of the total amount of shares acquired during the entire 41-day event window. The benefit of this relative method is its neutrality towards the size of the companies and the absolute volume of their repurchase trades. Of the 33 repurchase programs the mean (median) *completion ratio* before the event day

was 30.6% (11.6%), on the event day 1.9% (0.0%) and after the event day 67.5% (88.4%). The difference in the relative completion ratio before and after the event day is tested using a one-tailed t-test for paired two samples. The post event day completion ratio is statistically significantly higher at the 1% level with t-value of -2.521 (p-value 0.001).

An additional nonparametric sign test gives additional support for increasing repurchase volume measured with the total number of shares acquired after the share price drops. The test statistic was $z=2.6112$ (significant at the 1% level) for the 41-day event window with 24 companies having more repurchases after the event day compared to the total of 33 companies. For the 21-day event window $z=1.2792$ with 14 companies being more active after the event day of 22.

Figure 8 describes the relative distribution of share acquisitions around the event day. The negative pre drop indicator shows the share of pre event day repurchases and the positive post drop indicator shows the share of post event day repurchases in each of the events included in the sample. Some companies have experienced multiple share price drops in the same year and have also had repurchase trades around the 41-day event window around the event day.

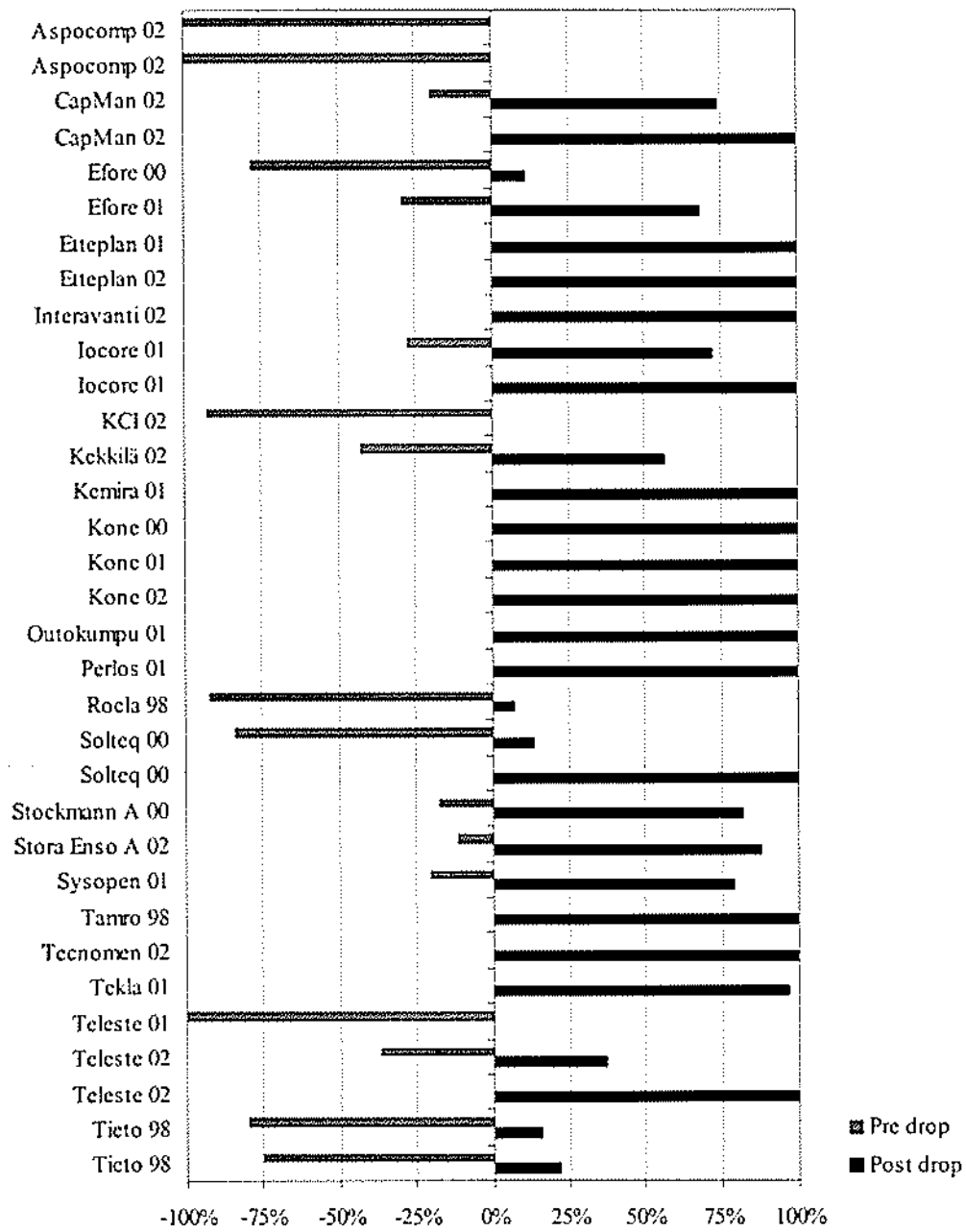


Figure 8. Relative distributions of repurchase activity +/-20 days around the selected share price drops.

5.1.4 Concluding remarks

Chapter 5.1 provides empirical findings on managerial timing ability and on buyback activity in market turmoil. The panel data model over the years 1998–2002 did not support the previous findings of Grullon *et al.* (2000) on the US market, but due to the more accurate data (daily data compared to quarterly data in the original study), the results should be more reliable, suggesting that the way repurchases are performed affects the results more than timing based on daily market movements. Management makes repurchases over periods of high activity without paying attention on day-to-day market movements (see e.g. Cook *et al.* 2004 and Karhunen 2002).

The latter event studies on major market movements, however, shed light on the tactical timing of repurchases, giving support on the hypothesis that managers are interested in supporting their share price during periods of major changes in market valuations and/or willing to complete the acquisitions as cost efficiently as possibly. Although the actual structure of repurchase execution probably affects the findings, the event studies give strong evidence on the tactical timing of repurchases. Market-wide movements, if not extreme, do not have much influence on the repurchase volumes although they increase the activity in the market measured with the number of repurchase days and active companies. Extreme shocks, like 11 September 2001 terrorist attacks, have a clear effect on the buyback volumes according to the results. The results do support the previous evidence of Netter *et al.* (1989) regarding the increasing buyback activity after the 1987 stock market crash and the findings of Gu *et al.* (2003) around the terrorist attacks in the USA. These studies are the most comparable ones since they focus on buyback announcements motivated by a single macro-economic event. The difference is their focus on the announcement effect and market reactions to buyback announcements. This is

the first study to provide information on the actual repurchases around this kind of event.

The study provides also clear evidence on increased repurchase activity after individual shares experience a remarkable drop in price. While previous studies have tried to identify reasons for share repurchases and the market reaction to buyback announcements, this study provides information on the actual repurchase trades around major movements in share prices. Finally, the bootstrapping methodology supports managerial timing ability over longer time periods and the results are close to those of Brockman *et al.* (2001) and in line with Cook *et al.* (2004). The availability of accurate repurchase data has also limited the number of studies on this important economic phenomenon. The Brockman *et al.* (2001) has a very similar data environment utilising Hong Kong data but the Cook *et al.* (2004) study is based on data gathered through a questionnaire, thus possibly suffering from a bias related to the type of companies that have answered compared to those that have chosen not to disclose the buyback data to them.

5.2 Changes in liquidity around stock repurchases

There are only a few studies that have focused on the liquidity effects of share repurchases (see Brockman *et al.* 2001 and Cook *et al.* 2004). Most of the previous studies have focused on the liquidity changes around the announcement of a buyback program due to lack of accurate repurchase data (see *e.g.* Barclay *et al.* 1988 and Wiggins 1994). Some of the studies have shown that repurchase trades would have a negative effect on liquidity whereas some have found evidence that the bid-ask spread would decrease as a consequence

of repurchase trades. My third hypothesis (Hypothesis #3) focuses on the liquidity effects of repurchase trades.

The purpose of this Chapter 5.2 is to study whether market liquidity measured with higher trading volume and smaller bid-ask spread increases when companies repurchase their own shares. The emphasis is to find out the true nature of repurchase trades' liquidity effects using accurate daily data and to develop new more accurate methods to measure the liquidity changes around actual repurchase trades. First, I study the impact of share repurchase on stock market liquidity by utilising a panel model with the same data set as in the study presented in Chapter 5.1.1 and second by event study methodology around buyback announcements and the first actual repurchases. The data covers all open-market repurchases in Finland from January 1998 to December 2002 for firms listed on the HESE. The empirical evidence is from a fully automated LOB market with strict reporting rules on actual repurchases. The liquidity effects of repurchases may differ on the LOB market compared *e.g.* to markets with market makers. Hauser, Levy and Yaari (2001) have shown findings that challenge the presumption that automated continuous trading in a non-dealer market is more efficient than discrete trading of all securities. Their results suggest that a non-dealer market would not provide the best liquidity for thinly traded securities. Improving liquidity of small-cap shares in this study could support their findings. A detailed description of the data of each study is presented separately at the beginning of each section.

5.2.1 Repurchases as a source of liquidity

The third hypothesis that market liquidity would increase when companies buyback their own shares is first studied using panel data on liquidity sources

during the period 1998–2002. As described earlier in Chapter 3, liquidity is multidimensional and it is thus difficult to quantify with exact measures. In this model, two of the common measures of liquidity are used as an estimate on liquidity and to study the effects of different factors, including repurchases, on liquidity, namely relative and absolute bid-ask spread. The framework is similar to that of Brockman *et al.* (2001) and the study is also closely related to Cook *et al.* (2004).

The data covers all companies and repurchase programmes of companies that have been listed on the HESE throughout the entire estimation period from 1 January 1998 to 31 December 2002, comprising 33 companies and 36 share series leading to 180 firm-year (share series) observations. The total estimation period is 1,250 days long leading to 45,000 daily observations. The number of repurchase days totals to 3,822 over the entire period, being on average 106 days per share over the period. The most active buyback periods in terms of daily activity were 2000 and 2001.

Bid-ask spread is a common and widely used measure of liquidity. Two alternative bid-ask spread measures include relative bid-ask spread stated in percentage and absolute bid-ask spread measured in local currency (here Euros). The relative bid-ask spread is calculated as follows:

$$(4) \quad SPREAD\% = \frac{(Ask - Bid)}{[(Ask + Bid) / 2]}$$

Absolute bid-ask spread is simply the difference of the lowest ask and the highest bid at the time of measurement. The lower the relative spread and the smaller the absolute spread the higher the liquidity.

The same regression model presented below is estimated using two measures of liquidity (*LIQUIDITY*), the relative and the absolute spread. The basic structure and the variables of the regression model follow Brockman *et al.* (2001) but is adjusted for the utilisation of daily data. In order to be able to measure the impact of repurchase trades on firm liquidity we need to control for changes in price, volume and volatility, *i.e.* general effects of trading activity on firm liquidity (see *e.g.* Tinic and West 1974, Weston 2000 and Brockman *et al.* 2001). The factors affecting the bid-ask spread included are: share price in euros (*PRICE*), the daily number of shares traded (*VOL*), the volatility of the share price measured with the squared daily logarithmic return (*VOLA*) and the actual daily repurchases measured with the number of shares repurchased (*REPO*), dummy variable (*REPO DUMMY*) or relative repurchases (*REPVOL*). The new measure taken into use in this study is the ratio of repurchases to total daily volume (*REPVOL*). This factor should capture the effect of repurchases, especially in thinly traded securities and during periods of low volume when share repurchases play a remarkable role in daily trading activity. Additionally, the model is estimated using a repurchase dummy instead of actual repurchases to compare whether the results differ across the estimate used on actual repurchases. All variables except the dummy variable are transformed by taking natural logarithms. The basic regression model estimated including the above-mentioned factors is constructed as follows:

$$(5) \quad \begin{aligned} \text{LIQUIDITY}_{it} = & \beta_0 + \beta_1 \times \text{PRICE}_{it} + \beta_2 \times \text{VOL}_{it} + \beta_3 \times \text{VOLA}_{it} \\ & + \beta_4 \times \text{Repurchases}_{it} + \varepsilon_{it}. \end{aligned}$$

Table 13 summarises the estimation results for the entire sample. The expected signs of the factors on relative spread are: *PRICE* (-), *VOL* (-), *VOLA* (+), *REPO* and *REPO dummy* (-), and *REPVOL* (-). Similarly the expected signs of the factors on absolute spread are equal, except the sign of the share price (*PRICE*)

that should be positively related to absolute spread. All the signs except that of repurchases are equal to the findings of Brockman *et al.* (2001). The effect of repurchases is hypothesised to be beneficial to firm liquidity similarly to the findings of Cook *et al.* (2004).

Before the regression analysis the calculation of correlation coefficients gives an idea of the effects of the variables on the liquidity measures. The results are presented in the correlation matrix (see Table 16). The highest correlation, although not on a level that typically cause problems with multicollinearity, is between relative bid-ask spread and trading volume and the alternative liquidity measure, absolute spread, has a lower correlation and provides thus an opportunity to compare the results of these two measures. Additionally the model is estimated using annualised data (see Table 17) in order to test the robustness of the estimation and cope with the possible problems related to the frequent data. The correlation matrix and results of the annualised regression model are discussed after presenting the results of the model utilising daily data.

As shown in Table 13, there are three different model specifications. The first one uses actual number of shares repurchased as a measure of repurchases whereas the second model specification is based on Brockman *et al.* (2001). The use of actual repurchases in addition to repurchase dummy enables us to identify whether the daily repurchase dummy yields results similar to actual repurchases. In the third specification repurchases and the repurchase dummy are replaced with the new factor, REPVOL.

Table 13. Regression results of liquidity measures for the entire sample of 36 share series over the period 1998–2002.

	Relative spread					
	Estimated coefficient	t-stat	Estimated coefficient	t-stat	Estimated coefficient	t-stat
Intercept	-2.4675	-194.62 ***	-2.4710	-195.25 ***	-2.4650	-193.99 ***
Price	-0.1543	-32.23 ***	-0.1537	-32.18 ***	-0.1576	-33.09 ***
Volume	-0.1689	-108.34 ***	-0.1693	-109.55 ***	-0.1673	-107.80 ***
Volatility	0.0050	3.79 ***	0.0051	3.89 ***	0.0049	3.75 ***
Repurchases	0.0188	10.29 ***				
Repurchases/volume					-0.0502	-4.96 ***
Repurchase dummy			0.2492	15.06 ***		
Adjusted R-squared		0.4011		0.4026		0.4000
F-statistic		7533.99 ***		7581.98 ***		7500.79 ***
	Absolute spread					
	Estimated coefficient	t-stat	Estimated coefficient	t-stat	Estimated coefficient	t-stat
Intercept	-1.1686	-77.90 ***	-1.1713	-78.08 ***	-1.1654	-77.62 ***
Price	0.6734	138.35 ***	0.6734	138.63 ***	0.6714	138.31 ***
Volume	-0.2362	-145.78 ***	-0.2363	-146.88 ***	-0.2355	-145.42 ***
Volatility	0.0251	18.96 ***	0.0252	19.04 ***	0.0250	18.89 ***
Repurchases	0.0168	9.65 ***				
Repurchases/volume					-0.0745	-7.79 ***
Repurchase dummy			0.1987	12.51 ***		
Adjusted R-squared		0.4263		0.4270		0.4260
F-statistic		8360.32 ***		8384.38 ***		8348.88 ***

The cross sectional time-series model is estimated with 36 companies (cross sections) over 1 250 daily observation (t) and the number of observations is 45 000. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% levels respectively.

The results are in line with the hypothesised signs, except the sign of repurchases when measured with the number of shares acquired or the dummy variable. Share price decreases relative spread while increasing absolute spread as hypothesised. Volume, another measure of liquidity and a control variable, decreases spread and is beneficial to liquidity. Volatility by contrast has a positive sign and increases spread. The hypothesis that repurchases are beneficial to liquidity measured with bid-ask spread seems not to be true. As shown in Table 13, repurchases as well as the repurchase dummy do increase spread, *i.e.* decrease liquidity while measured with bid-ask spread having a positive sign. This, however, is in line with several recent studies on the

liquidity effect of repurchases (e.g. Brockman *et al.* 2001) and supports the information asymmetry hypothesis as suggested by Barclay *et al.* (1988)¹¹.

The results of the estimation of the model with slightly different structure shows that the dummy variable works as well as actual repurchases in this model and there is no difference in their sign nor in their ability to capture the effect of repurchases on spread. This supports that the model of Brockman *et al.* (2001) that uses only repurchase dummy gives equal results than if they had used actual repurchases. Of course the dummy variable used here is also based on actual daily information contrary to many previous studies, where instead of actual repurchase data the existence of repurchases is based e.g. on infrequent (monthly, quarterly, semi-annual) estimates. Interestingly, the ratio of actual repurchases to daily volume seems to have a negative sign, as anticipated. The negative sign of the variable is in line with the assumption that the buybacks of smaller firms' especially may increase the liquidity. This is consistent, since illiquid shares would be most likely to benefit from repurchases (Grullon *et al.* 2000). The higher the share of repurchases of the total volume is, the smaller the spread. This is evident especially in smaller or less liquid firms, where repurchases may play a considerable role in daily trading volume but the variable has a negative sign and is highly significant for large companies as well. The coefficient of REPVOL on relative spread is -0.0502 for the entire sample, -0.0764 for large firms, and -0.1954 for small firms.

To be able to identify the effect of repurchases on liquidity even more specifically in large and small companies, we divided the entire sample into two sub-samples based on the market capitalisation of the firms and share

¹¹ According to Barclay *et al.* (1988) the asymmetric information hypothesis predicts that liquidity will decrease with buybacks as the management of the repurchasing company is better informed than the existing liquidity providers (*i.e.* investors or market makers).

series at the end of December 2002. The results of the sub-samples are presented in the following two tables.

Table 14. Regression results of liquidity measures for large firms consisting of 18 share series over the period 1998–2002.

	Relative spread					
	Estimated coefficient	t-stat	Estimated coefficient	t-stat	Estimated coefficient	t-stat
Intercept	-2.2100	-62.94 ***	-2.2161	-63.24 ***	-2.2023	-62.50 ***
Price	-0.1614	-22.80 ***	-0.1606	-22.72 ***	-0.1628	-23.11 ***
Volume	-0.1902	-67.70 ***	-0.1903	-68.22 ***	-0.1906	-67.73 ***
Volatility	0.0215	12.07 ***	0.0216	12.13 ***	0.0214	12.03 ***
Repurchases	0.0132	6.77 ***				
Repurchases/volume					-0.0764	-7.30 ***
Repurchase dummy			0.1685	9.06 ***		
Adjusted R-squared		0.2824		0.2835		0.2829
F-statistic		2214.64 ***		2226.78 ***		2219.65 ***
	Absolute spread					
	Estimated coefficient	t-stat	Estimated coefficient	t-stat	Estimated coefficient	t-stat
Intercept	-1.4261	-47.77 ***	-1.4319	-47.99 ***	-1.4171	-47.42 ***
Price	0.7510	111.02 ***	0.7513	111.26 ***	0.7500	111.49 ***
Volume	-0.2343	-89.17 ***	-0.2341	-89.73 ***	-0.2351	-89.53 ***
Volatility	0.0299	16.38 ***	0.0300	16.43 ***	0.0298	16.34 ***
Repurchases	0.0134	7.04 ***				
Repurchases/volume					-0.0869	-8.50 ***
Repurchase dummy			0.1577	8.62 ***		
Adjusted R-squared		0.4704		0.4710		0.4712
F-statistic		4997.50 ***		5008.86 ***		5012.70 ***

The cross sectional time-series model is estimated with 18 companies (cross sections) over 1 250 daily observation (t) and the number of observations is 22 500. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% levels respectively.

Table 15. Regression results of liquidity measures for small firms consisting of 18 share series over the period 1998–2002.

	Relative spread					
	Estimated coefficient	t-stat	Estimated coefficient	t-stat	Estimated coefficient	t-stat
Intercept	-2.5924	-183.71 ***	-2.5951	-184.17 ***	-2.5816	-181.68 ***
Price	-0.1597	-23.78 ***	-0.1627	-24.37 ***	-0.1672	-25.01 ***
Volume	-0.1478	-63.00 ***	-0.1469	-63.13 ***	-0.1444	-61.65 ***
Volatility	-0.0122	-6.20 ***	-0.0121	-6.18 ***	-0.0121	-6.11 ***
Repurchases	0.0661	17.54 ***				
Repurchases/volume					-0.1954	-6.55 ***
Repurchase dummy			0.5763	19.97 ***		
Adjusted R-squared		0.3522		0.3539		0.3457
F-statistic		3059.26 ***		3081.71 ***		2973.02 ***

	Absolute spread					
	Estimated coefficient	t-stat	Estimated coefficient	t-stat	Estimated coefficient	t-stat
Intercept	-1.1628	-67.43 ***	-1.1645	-67.52 ***	-1.1556	-67.04 ***
Price	0.6284	92.25 ***	0.6263	92.21 ***	0.6237	91.66 ***
Volume	-0.2218	-97.01 ***	-0.2212	-97.14 ***	-0.2197	-95.82 ***
Volatility	0.0170	8.84 ***	0.0171	8.87 ***	0.0171	8.79 ***
Repurchases	0.0445	11.34 ***				
Repurchases/volume					-0.1530	-5.80 ***
Repurchase dummy			0.3839	12.85 ***		
Adjusted R-squared		0.3648		0.3654		0.3624
F-statistic		3231.73 ***		3240.12 ***		3197.76 ***

The cross sectional time-series model is estimated with 18 companies (cross sections) over 1 250 daily observation (t) and the number of observations is 22 500. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% levels respectively.

The model estimation using the two sub-samples is much as anticipated. The coefficient of repurchases and the repurchase dummy of large companies are smaller than for the whole sample or for the sample of smaller companies, suggesting that their effect is actually smaller. For the sub-sample of small companies the highly negative coefficient of repurchases to volume is characteristic, suggesting that repurchases can serve as a source of liquidity although the result is not in line with the positive coefficients of repurchases or repurchase dummy. The statistically significant and negative coefficient of volatility on relative spread in smaller companies could be caused by the fact that some of the sample companies are so thinly traded that extremely low

values of volatility are actually related to infrequent trading and wider spreads meanwhile companies that have higher volatility are actually more frequently traded and due to the trading activity have lower spreads.

In order to capture the positive liquidity effects of share buybacks, the new measure of the relative share of repurchases of daily volume seems to be more accurate than previous measures. As long as volume is also included in the estimation model the compound effects of repurchase volume and total turnover are somewhat overlapping but as the following correlation matrix in Table 16 shows, the correlation of VOL and REPO is relatively low, indicating no multicollinearity or other problems in the results. The highest correlation coefficient between two co-existing explanatory variables is -0.62 between relative spread (% spread) and trading volume (VOL). This level of correlation does not normally cause multicollinearity problems and the relatively high correlation is natural because both bid-ask spread and trading volume are frequently used measures of liquidity of a share.

Table 16. Correlation matrix of the factors of the model.

	% spread	Absolute spread	PRICE	VOL	VOLA	REPO	REPVOL	REPO DUMMY
% spread	1.00							
Absolute spread	0.70	1.00						
PRICE	-0.46	0.19	1.00					
VOL	-0.62	-0.40	0.56	1.00				
VOLA	0.36	0.17	-0.46	-0.52	1.00			
REPO	-0.06	-0.09	0.01	0.17	-0.07	1.00		
REPVOL	0.08	0.07	-0.04	-0.17	0.07	-0.74	1.00	
REPO DUMMY	-0.02	-0.06	0.01	0.14	-0.06	0.98	-0.75	1.00

Correlation matrix of all variables of the panel model. The data covers 36 companies and 45,000 daily observations per variable over the cross sections based on the 1,250 days data per company.

Calculating annual averages of variables based of the daily data performs an additional test of the robustness of the model. For each of the 36 companies the number of time-series observations is thus reduced from 1,250 daily

observations to five annual observations. The estimation results of the adjusted model are shown in Table 17. The signs of the coefficients of the variables stay stable compared to those of the original model with daily data. The two differences are related to volatility and repurchase dummy. The sign of the volatility's effect gets negative, although statistically insignificant, when the dependent variable is relative spread and it stays positive and statistically significant at the 10% level with absolute spread. Additionally, the repurchase dummy loses its significance with annual data although the sign stays positive. This is a natural consequence of the less frequent and accurate data. The dummy gets a value of one if the company has repurchased its shares during the year and zero otherwise. This comparison between the results with the dummy variable with the daily data and annual data highlight the importance of accurate daily data on estimating the actual effects of share repurchases. A dummy variable is unable to capture the effect of repurchases or may result to biased results if the frequency of the data is not high enough, a possible problem in some previous studies.

The frequency of the have also a natural effect on the results. Daily data measures liquidity changes on daily bases while a monthly or quarterly dummy can give a more general view of the liquidity effects. The comparison between the results of the daily data and the annualised data as well as the event studies in Chapter 5.2.2 is thus interesting and provides a better understanding and alternative angles to observe the short-term and long-term liquidity effects and how those effects may differ between large and small companies and what kind of measures might provide the most correct results.

Table 17. Regression results of liquidity measures for the entire sample of 36 share series over the period 1998–2002 using annual data.

	Relative spread					
	Estimated coefficient	t-stat	Estimated coefficient	t-stat	Estimated coefficient	t-stat
Intercept	-1.8723	-20.86 ***	-1.8792	-20.31 ***	-1.8537	-20.47 ***
Price	-0.1620	-3.57 ***	-0.1749	-3.76 ***	-0.1639	-3.66 ***
Volume	-0.2616	-11.84 ***	-0.2574	-11.69 ***	-0.2633	-11.88 ***
Volatility	-0.0256	-0.60	-0.0295	-0.67	-0.0254	-0.60
Repurchases	0.0384	2.14 **				
Repurchases/volume					-0.2797	2.76 ***
Repurchase dummy			0.0120	0.23		
Adjusted R-squared		0.8670		0.8648		0.8683
F-statistic		292.74 ***		287.24 ***		295.99 ***

	Absolute spread					
	Estimated coefficient	t-stat	Estimated coefficient	t-stat	Estimated coefficient	t-stat
Intercept	-0.7921	-6.22 ***	-0.8278	-6.75 ***	-0.7663	-5.94 ***
Price	0.8876	19.35 ***	0.8740	18.46 ***	0.8838	19.58 ***
Volume	-0.3026	-14.41 ***	-0.2974	-14.08 ***	-0.3046	-14.39 ***
Volatility	0.0791	1.85 *	0.0750	1.69 *	0.0789	1.85 *
Repurchases	0.0570	2.98 ***				
Repurchases/volume					-0.3911	-4.25 ***
Repurchase dummy			0.0903	1.53		
Adjusted R-squared		0.8594		0.8568		0.8612
F-statistic		274.51 ***		268.68 ***		278.71 ***

The cross sectional time-series model is estimated with 36 companies (cross sections) over five annual observations (t) and the number of firm-year observations is 180. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% levels respectively.

5.2.2 Changes in bid-ask spread and trading volume around repurchases

As in Chapter 5.2.1, here, too, we test the changes in liquidity measured with both bid-ask spread and volume. In order to see the actual effects around the announcement of repurchases and around the actual repurchases we introduce a classical event study methodology here. Event studies, introduced to empirical finance by Fama *et al.* (1969), are widely used in share repurchase studies, but have been concentrated on the abnormal returns associated with the announcement or the beginning of actual repurchases (see *e.g.* Stephens *et*

al. 1998). Here the same methodology is used to study possible liquidity changes around repurchase announcements and the beginning of actual repurchases. This is especially interesting, since most of the previous studies have focused on the announcement effects. Studying the liquidity changes around both the announcement of repurchases and the actual repurchases enables us to compare the effect of these two events and provides an opportunity for a comparison with the time-series models. The major difference to most of the previous studies is that we are able to analyse the actual repurchases effect on liquidity. This has another benefit, namely the avoidance of event contamination. Initial announcements of seeking repurchase authorisation are often made simultaneously with releasing other corporate information to the market. The announcement of the beginning of actual repurchases is typically pure and does not contain any other information. The first day actual repurchases is of course the cleanest event. Thus, event contamination is not a problem in this study as in many of the previous studies focusing on the original buyback announcements.

The decision on repurchase authorisation is made in the firm's annual general meeting based on the board's proposal. Boards, however, typically publish separate press releases on the decision to realise the authorisation to buy back own shares and this announcement is a more precise signal. Announcements related to the annual general meeting usually cover several issues and the effect of a single issue cannot be distinguished. Contrary to many other studies, we also know the exact date of the actual repurchases. A stock exchange press release follows all repurchase trades and all the market participants are thus aware of buyback trades, making the buyback market quite transparent compared to many other regulatory environments.

The event window used in this study is $-/+10$ days around the board's announcement about starting to purchase the company's own shares or alternatively around the first day of actual repurchases based on the general meeting's authorisation. The event windows $-/+5$, $-/+20$ and $-/+30$ days were also used but not reported here since the results were in line with these findings. The total number of announcement observations is 112 and actual repurchases 107. The number of observations included in the volume sample is 111 as Nokia Corporation is excluded from the sample due to the extremely high volume through their Q2/2000 result announcement that took place within the sample period. Espoon Sähkö is excluded from the sub-sample of large companies because of infrequent trading. As in the earlier studies, we have divided the entire sample into two sub-samples, *i.e.* small and large firms, based on the market capitalisation as of 31 December 2002 in order to identify differences between more and less liquid firms' share price and trading volume behaviour around the event day.

Table 18 summarises the results of the t-tests for differences in spread and volume and of the sign test (z-stat) for the change in volume around the event day. As shown, the spread of the entire sample decreases statistically significantly at the 5% level around the announcement day. The decrease in spread is also statistically significant at the 5% level while comparing the 10-day periods around the first actual repurchases, while the increase in trading volume is statistically significant at the 5% level only around 10-day periods around repurchase announcement.

The changes in large companies' spreads are not statistically significant around announcement nor around actual repurchases while the decrease in spread is highly significant (p-value of 0.0099) for the sample of smaller firms $-/+10$ days around the announcement as well as statistically significant at the 5% level

-/+ 10 days around actual repurchases. The changes in smaller firms' volumes are statistically significant only around announcement when using t-test on trading volume. The sign of the t-statistic around the actual repurchases is negative (p-value of 0.1426) supporting increased trading volume after the first day of actual repurchases and increased liquidity. The sign test supports this increase at the 10% significance level.

Table 18. Estimation results of the changes in bid-ask spread and trading volume around repurchase announcement and first actual repurchases.

	Announcement				Actual			
	Before (mean)	After (mean)	Difference	-/+ 10	Before (mean)	After (mean)	Difference	-/+ 10
All								
Spread	3.16%	2.70%	-0.46%		2.87%	2.62%	-0.25%	
t-stat				2.3567 **				1.7677 **
Number of observations				112				107
Volume	167 334	198 831	31 497		189 894	197 328	7 434	
t-stat				-2.1656 **				-0.5229
z-stat				1.4237 *				0.4834
Number of observations				111				107
Large								
Spread	1.54%	1.46%	-0.08%		1.45%	1.49%	0.04%	
t-stat				0.3768				-0.5805
Number of observations				60				60
Volume	325 858	379 177	53 319		350 590	359 325	8 735	
t-stat				-1.8563 **				-0.2884
z-stat				0.0060				-0.9113
Number of observations				58				59
Small								
Spread	5.04%	4.10%	-0.94%		4.68%	4.03%	-0.65%	
t-stat				2.4047 ***				1.1202 **
Number of observations				52				47
Volume	17 016	27 806	10 790		19 516	27 358	7 842	
t-stat				-2.1603 **				-1.6814
z-stat				1.9415 **				1.6045 *
Number of observations				52				47

The mean of the relative spread and trading volume before and after the event day is calculated per share series (repurchase program) and the results of the t-test (paired two sample for means) and z-test (sign test for volume only) are presented in this table separately around the announcement day and the first day of actual repurchases. The total sample of 116 programmes contains 112 programmes with announcements and 107 programmes with actual repurchases. In the whole sample for volume around announcement one company, Nokia Corporation, is excluded because of an earnings announcement that caused the volume to increase extraordinarily. The sample is split into large and small companies based on the market capitalisation of the companies. The sub-sample of large companies comprises 63 share series for 3 of which announcements are missing 3 are without actual repurchases. For volume testing two companies, Nokia Corporation and Espoon Sähkö, are excluded, Nokia because of extraordinarily high trading volume and Espoon Sähkö because of extraordinarily infrequent trading. The sub-sample of small companies comprises of 53 share series of which one without announcement and 6 without actual repurchases.

The hypotheses of the t-test are for spread H₀: Pre = Post and H₁: Pre > Post and for volume H₀: Pre = Post and H₁: Pre < Post. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% level (one-tailed), respectively.

Figures 9 and 10 give a visual presentation of the changes in relative bid-ask spread and in the median daily volume around actual share repurchases while Table 19 presents more detailed information about the spreads and volumes around the 30, 20, 10 and 5-day periods. The decrease in spread and the increase in median daily volume, especially prominent for smaller firms, start

already some five days before the event day. This may be because most of the firms have given their announcements about starting to repurchase their own shares a week before the first actual repurchases. This could increase the trading volume and likewise decrease the spread. What also can be seen from the following figure is that the larger companies' spread is not affected by buyback activity and the increase in median volume is also very limited because the regular trading activity is already very remarkable. It is noteworthy to compare the slightly different evidence of the event-study methodology to the time-series models as well as notice the use of the new relative repurchase measure in the panel model and compare its evidence with the event studies.

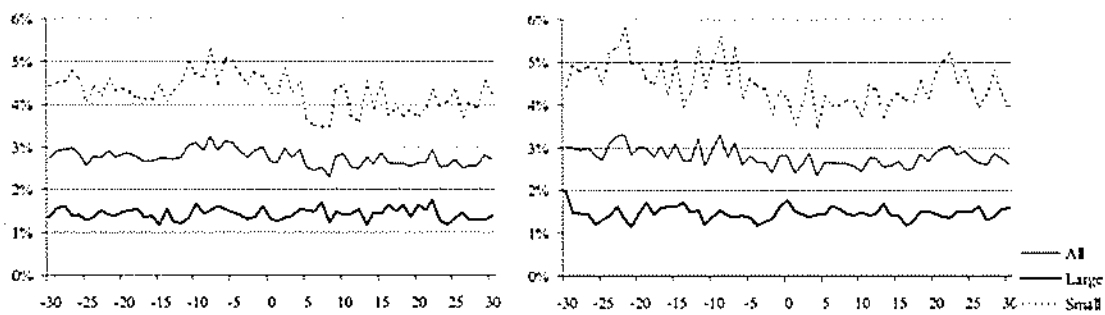


Figure 9. Relative bid-ask spread around the announcement day (left chart) and the beginning of actual repurchases (right chart) for the entire sample and the sub-samples of large and small companies.

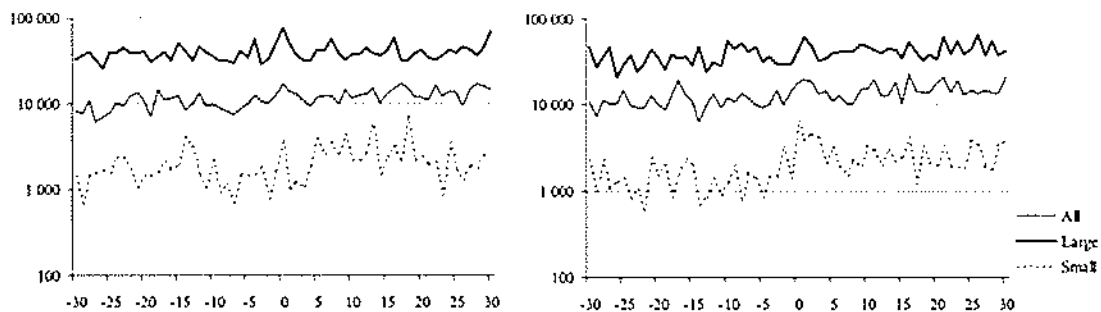


Figure 10. Median trading volume around the announcement day (left chart) and the beginning of actual repurchases (right chart) for the entire sample and the sub-samples of large and small companies (logarithmic scale).

Table 19. Relative spread (left panel) and daily volume (right panel) around the announcement day and the first day of actual repurchases.

All	Announcement			Actual repurchase			All	Announcement			Actual repurchase		
	Mean	Standard deviation	Median	Mean	Standard deviation	Median		Mean	Standard deviation	Median	Mean	Standard deviation	Median
Pre 30	2.95%	0.028	1.86%	3.09%	0.031	1.73%	170 160	495 550	24 890	178 320	516 933	23 667	
Pre 20	2.95%	0.019	1.84%	2.93%	0.019	1.80%	171 694	535 736	23 426	189 150	549 965	24 155	
Pre 10	3.18%	0.034	1.74%	2.87%	0.030	1.77%	167 334	512 427	23 619	189 894	540 336	22 160	
Pre 5	3.22%	0.042	1.65%	2.69%	0.028	1.73%	166 705	511 461	23 960	186 187	552 375	17 121	
Event day	2.66%	0.033	1.45%	2.81%	0.030	1.77%	260 278	900 570	17 000	223 360	617 936	18 400	
Post 5	2.79%	0.028	1.90%	2.59%	0.023	1.73%	188 414	567 729	19 157	210 935	567 958	24 377	
Post 10	2.70%	0.024	1.88%	2.61%	0.023	1.76%	198 831	581 670	24 235	197 328	542 116	23 581	
Post 20	2.67%	0.023	1.92%	2.69%	0.023	1.79%	191 923	544 959	23 861	185 132	494 660	28 055	
Post 30	2.67%	0.033	1.93%	2.74%	0.024	1.93%	185 205	521 299	24 605	180 500	474 592	27 610	

Large firms	Announcement			Actual repurchase			Large firms	Announcement			Actual repurchase		
	Mean	Standard deviation	Median	Mean	Standard deviation	Median		Mean	Standard deviation	Median	Mean	Standard deviation	Median
Pre 30	1.51%	0.015	1.15%	1.55%	0.016	1.19%	330 719	676 437	54 079	327 613	690 411	60 601	
Pre 20	1.55%	0.017	1.15%	1.52%	0.015	1.52%	338 818	719 830	59 823	347 521	734 500	60 710	
Pre 10	1.54%	0.018	1.12%	1.45%	0.014	1.45%	335 858	702 816	58 751	330 590	719 245	51 881	
Pre 5	1.54%	0.022	1.11%	1.43%	0.013	1.43%	323 730	701 360	53 710	342 137	735 572	48 833	
Event day	1.31%	0.016	0.76%	1.75%	0.019	1.73%	492 460	1 247 739	88 060	383 449	818 155	50 479	
Post 5	1.40%	0.013	0.99%	1.46%	0.012	1.46%	366 626	777 309	59 958	377 830	753 297	57 608	
Post 10	1.46%	0.014	1.19%	1.49%	0.013	1.49%	379 177	796 837	51 660	339 325	720 675	56 155	
Post 20	1.49%	0.013	1.07%	1.45%	0.014	1.48%	365 600	744 800	72 099	336 109	636 220	63 312	
Post 30	1.45%	0.014	1.06%	1.49%	0.015	1.49%	353 902	711 348	67 195	328 877	628 114	62 175	

Small firms	Announcement			Actual repurchase			Small firms	Announcement			Actual repurchase		
	Mean	Standard deviation	Median	Mean	Standard deviation	Median		Mean	Standard deviation	Median	Mean	Standard deviation	Median
Pre 30	4.61%	0.030	3.96%	4.87%	0.036	3.78%	17 677	31 252	3 157	18 393	32 617	6 174	
Pre 20	4.66%	0.031	4.00%	4.73%	0.032	3.86%	16 792	30 199	4 666	18 620	36 275	5 166	
Pre 10	5.04%	0.040	4.57%	4.68%	0.034	3.67%	17 016	34 669	3 713	19 516	43 495	4 632	
Pre 5	5.17%	0.050	3.59%	4.31%	0.034	3.24%	17 124	46 355	2 718	22 533	53 655	4 836	
Event day	4.23%	0.040	2.45%	4.13%	0.037	3.03%	41 576	141 949	3 675	57 550	175 706	6 550	
Post 5	4.33%	0.033	3.19%	4.02%	0.026	2.92%	19 193	37 982	3 428	36 439	92 519	6 289	
Post 10	4.10%	0.026	3.18%	4.03%	0.025	3.19%	27 806	52 193	4 674	27 358	54 158	6 631	
Post 20	4.02%	0.025	2.93%	4.20%	0.025	3.47%	28 110	48 112	6 756	26 485	47 163	7 100	
Post 30	4.06%	0.024	3.01%	4.32%	0.024	3.70%	25 300	39 459	7 067	24 691	41 040	6 267	

A case example of the effect of repurchase trades in a typical small-cap company, Honkarakenne Plc, shows that the median daily trading volume during the 30-day period preceding the actual repurchases is only 400 while during the 30-day period when repurchase trades have started it is 1,745 (see Figure 11). Likewise, the bid-ask spread decreases from 5.6% to 3.1%. It is also typical that repurchase trades account for a large share of the daily turnover, here 51% of the trading volume during the days from +1 to +30. Many days, repurchase trades stand for 100% of volume, *i.e.* more than the general rules allow. If we look at the number of days with zero volume, the change is even more considerable. The number of non-trading days during the pre-30-day period is 13 and post-30-day period only 4, suggesting that repurchases have increased the actual liquidity remarkably and that the company's repurchase

trades serve as a market maker type of broker providing additional liquidity and demand on the ask-side.

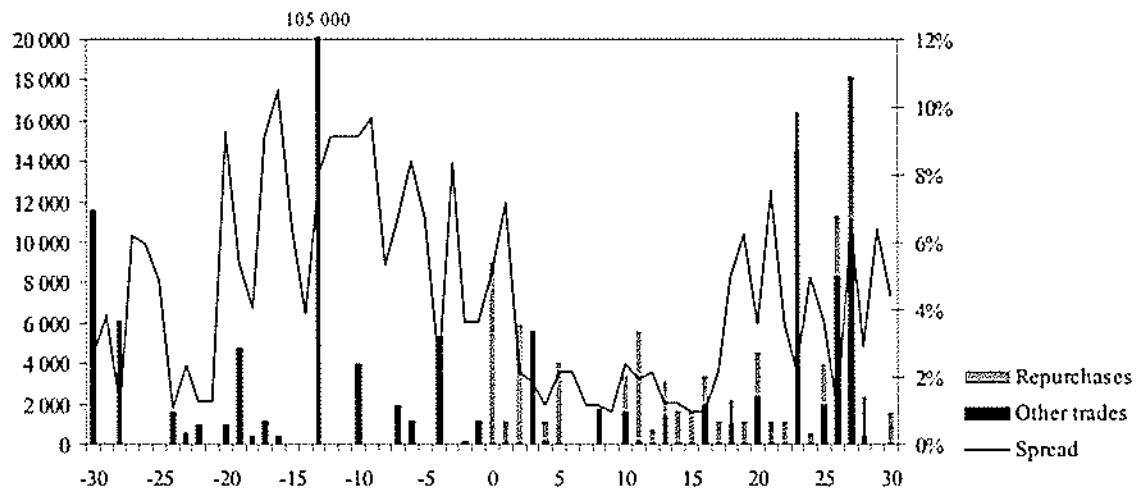


Figure 11. Small-cap company's trading volume and bid-ask spread around the beginning of actual repurchases.

5.2.3 Concluding remarks

The aim of the studies in Chapter 5.2 was to identify whether repurchase trades increase or decrease stock market liquidity. The underlying hypothesis presented in Barclay *et al.* (1988) served as the basis for this study. We chose the hypothesis that repurchases would have a beneficial effect on liquidity and that their effect on spread would be negative and effect on trading activity (volume) positive. This was based on the assumption that the Finnish market is less liquid, when measured by trading activity and market-wide bid-ask spreads, than most of the world's major markets where many of the preceding studies have been done. Hauser, Levy and Yaari (2001) have shown findings that challenge the presumption that automated continuous trading in a non-dealer market is more efficient than discrete trading of all securities. The findings of this study do also support the previous findings of Hauser *et al.* (2001) that a

non-dealer market would not provide the best liquidity for thinly traded securities. Improving liquidity of small-cap shares following repurchase trades in this study support their findings in addition to being in line with the market-maker hypothesis of Barclay *et al.* (1988). Thus, the market maker hypothesis could be valid with this dataset and repurchase trades would provide buy-side demand.

The panel data model is comparable to that of Brockman *et al.* (2001) with few differences. Their data set was taken from Hong Kong and covers most of the 1990s. Both models focus on liquidity changes and have same control variables. The variables are daily averages taken at 30-second intervals while this study utilises actual daily variables. Although Brockman *et al.* (2001) have as accurate data they apply repurchases to the model only as a dummy variable. The results of this study show that the ability of the dummy variable and actual repurchase volume to capture the same effect equals. The Brockman *et al.* (2001) model is estimated over shorter periods and their buyback dummy gets the value of one on actual repurchase days and on the following day and value of zero on surrounding five trading days before and five trading days after. This study comprises the entire daily data over the five years totalling to 1,250 daily observations. The buyback dummy gets the value of one only on actual repurchase days. The idea of Brockman *et al.* (2001) in having also the following day as a repurchase day was based on the possible delay in the information flow. The press release on repurchase trades is often sent in the evening or the following morning. The major difference is in the new relative repurchase variable that is believed to capture the true nature of buyback trades better than the previous variables.

If we compare the estimations results of this study to those of Brockman *et al.* (2001) we can notice that they equal and that repurchases have a positive and

small, but highly significant, effect on the spread supporting the information asymmetry hypothesis. But, when equal variables are used despite of the buyback measure and when the buyback measure is replaced by the new relative measure (REPVOL) the effect of repurchases reveals to be different. The coefficient of REPVOL is negative and statistically highly significant.

Additionally we utilised event study methodology to observe the possible liquidity changes following an announcement to start to buyback own shares and the first day of actual repurchases. The measures studied were relative bid-ask spread and trading volume. The t-tests and sign test provided evidence of narrowing spreads and increasing trading activity. The results are in line with the evidence shown in the study by Cook *et al.* (2004). The study shows small-cap companies' bid-ask spreads to decrease and trading volume to increase statistically significantly after the repurchase announcement and actual repurchases. The bid-ask spread of large companies remains unchanged but the trading volume increases after the repurchase announcement. The event study supports the panel model results being in line with the sign of the relative repurchase measure. The increase in trading volume and the interpretation of the results might be problematic because there is evidence that firms repurchase during periods of high trading volume (Karhunen 2002). The key issues is the actual contemporaneousness of base volume or normal trading volume, repurchase trades and increasing trading activity as a consequence of buyback announcement or actual buyback trades. Although the results are somewhat mixed, the event study together with the relative buyback measure provide overwhelming evidence in favour of the market-maker hypothesis (*i.e.* repurchases' positive liquidity effects) of Barclay *et al.* (1988).

5.3 Development of total payout and factors affecting payout policy

Finally, evidence on total payout is analysed and discussed, remembering the current Finnish tax regime beneficial to cash dividends. Fama and French (2001) report that the proportion of firms that pay cash dividends fall from 66.5% in 1978 to 20.8% in 1999 in the USA. The factors affecting this development include the changing characteristics of firms. Fama *et al.* (2001) find that the population of publicly traded firms has increased remarkably, but at the same time the average size has decreased and an increasing number of public companies have low profitability but strong growth prospects. They also find that regardless of characteristics, firms have become less likely to pay dividends. Payout policy is not important only because of the amount of money involved but also because payout policy is closely related to most of the financial and investment decisions firms make (Allen *et al.* 2002). Most of the previous research has focused either on cash dividend or share repurchases, while the present study focuses on the total payout, its composition and determination.

The purpose of this study is to find out what factors cause Finnish firms to choose repurchases of shares instead of cash dividends but also to analyse the overall payout policy of Finnish firms and factors affecting the dividend and total payout yield. This study focuses on the hypothesis that foreign ownership, stock option plans and lack of investment opportunities are associated with higher share of repurchases of total payout (Hypothesis #4) and on the hypothesis that the total payout is higher in firms that repurchase their own shares from the market in addition to paying regular cash dividends (Hypothesis #5).

Since share repurchases have been possible in Finland only since the late 1997, the data is limited to the years 1997–2002. The data is, as described earlier, more

accurate regarding the true timing and value of repurchases compared to most of the previous studies due to the reporting requirements. The data covers 51 companies that have been constantly publicly traded on the HESE during the period and of which all needed data has been available in April 2003 totalling 306 firm-year observations. Banks, insurance companies and investment firms have been excluded from the sample.

5.3.1 Payout policy and the interaction of cash dividends and repurchases

In the USA, companies pay more than 80% of their annual earnings to shareholders. During the 1970s the average dividend payout was 38% and the average repurchase payout was 3% and during the 1990s the average dividend payout was 59% and the average repurchase payout was 27%. Larger companies might affect these figures as the percentages are calculated from cumulative figures. If the payout is calculated separately to each firm, the average (equal weight) overall payout relative to earnings is around 25%. Another way to measure payout is the dividend yield (total dividends over market value of equity), repurchase yield (repurchases over market value of equity) and payout yield (dividends plus repurchases over market value of equity). Whether the repurchases are measured relative to earnings or to the market value of the firm, repurchases as a payout method have increased in relation to cash dividends since the late 1980s. (Allen *et al.* 2002, Grullon and Michaely 2002)

Many previous studies on dividends and payout policy have taxation as a starting point. These studies focus on analysing whether there is a tax efficient way to distribute excess cash to shareholders and if companies minimise the amount of taxes paid by different shareholder groups. The method of payout

may be affected by the shareholder structure of the company, because different shareholder groups are typically taxed differently. In many countries, repurchases are the most tax efficient method of distributing cash to shareholders. In Finland, however, the *avoir fiscal* system has made cash dividends a preferred method of payout. Even if statutory tax rates on dividends and capital gains were equal, from a tax perspective receiving unrealised capital gains is preferred to dividend payments (Allen *et al.* 2002). This is because a shareholder can decide when to realise the capital gains and thus associated tax can be postponed, this can be referred as "tax timing option" (Constantinides 1984).

In Finland, the average total payout of the 51 stock exchange listed companies included in the sample of this study has been 46% in 1997–2002 compared to the 80% in the USA. The average dividend payout has been 40% and the average repurchase payout has been 6%. Regarding the yields (comparison to market value of equity), the average payout yield has been 1.93%, the average dividend yield 1.70%, and the average repurchase yield 0.23%. In Finland, repurchases have accounted for some 15% of the total payout in 1998–2002 when they have been available (see Figure 12).¹²

¹² Cole, Helwege and Laster (1996) used net repurchases (repurchases less funds raised through issuance) to construct a repurchase yield while the definition of repurchase yield of this study is equal to a recent study by Grullon and Michaely (2002).

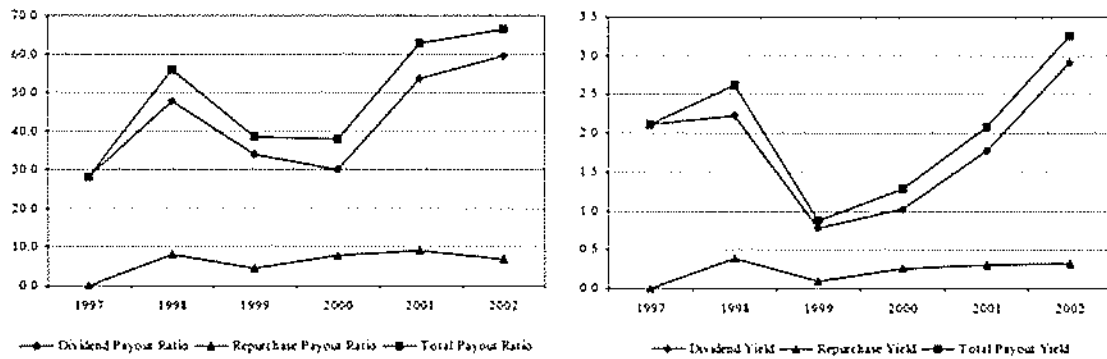


Figure 12. Development of cash distributions to equity holders in Finland in 1997–2002 (left panel describes the development the of payout ratio and right panel the yields).

5.3.2 Payout policy in a dividend friendly tax environment

The sample of 51 Finnish companies over the period 1997–2002 provides a unique data set to study the factors affecting payout policy and especially the choice between cash dividends and stock repurchases (Hypothesis #4). The current Finnish taxation favours cash dividends, especially for Finnish owners. A Finnish company, with mostly Finnish shareholders, should thus prefer cash dividends to buybacks as a principle method of distributing excess cash to shareholders. In order to make the study as comprehensive as possible, a cross-sectional time series model is estimated using multiple factors that might have or has been found to have an effect on companies' payout policies.

The regression model is estimated separately for four different dependent variables. First, in order to study the factors affecting the choice of the payout method a regression with the share of stock repurchases of the total payout (REP/TOT) as a dependent variable ($PAYOUT$) is estimated. Thereafter, the dividend policy issues are studied by three different estimations having the dividend yield (DIV/MV), repurchase yield (REP/MV), and total payout yield

(TOT/MV) as dependent variables. The yields are calculated by dividing the value of cash dividends, repurchases and the sum of these two by the market value of equity. The same estimation was performed with payout factors relative to earnings and the results are in line with the yield factors but the model as whole has a lower adjusted R-squared and statistical significance. The benefit of using market capitalisation scaled payout instead of earnings scaled payout is also related to the fact that market value is always greater than zero while one-year earnings may also be negative or zero. The basic model estimated for all the four independent variables is as follows:

$$(6) \quad \begin{aligned} PAYOUT_{it} = & \beta_0 + \beta_1 \times MV_{it} + \beta_2 \times CAPEX_{it} + \beta_3 \times CASH_{it} \\ & + \beta_4 \times DEBT_{it} + \beta_5 \times FOROWN_{it} + \beta_6 \times TOP5_{it} + \beta_7 \times MB_{it} \\ & + \beta_8 \times NOPER_{it} + \beta_9 \times FCF_{it} + \beta_{10} \times PERF_{it} + \beta_{11} \times OPT_{it} + \varepsilon_{it}. \end{aligned}$$

The independent factors are the market capitalisation of the firm (MV), capital expenditure (CAPEX), cash and near cash (CASH), long- and short-term interest-bearing debt (DEBT), foreign ownership (FOROWN), the ownership of the five biggest shareholders (TOP5), market-to-book ratio (MB), non-operating income (NOPER), free cash flow (FCF), share price performance during the financial year (PERF), and stock options dummy (OPT) with a value of one if the company has a valid stock option plan and zero if not. Market capitalisation is the logarithm of the market value ($\ln(MV)$). CASH, FCF, and DEBT are scaled with the value of total assets and NOPER and CAPEX with the net sales. FOROWN, TOP5, and PERF are expressed in percentages. The following Table 20 provides descriptive statistics of the sample companies split into those with only cash dividends and those with both cash dividends and share repurchases.

Table 20. Descriptive statistics concerning the sample divided into two panels: firms that have only paid cash dividends (right panel) and firms that have paid both cash dividends and repurchased their shares (left panel).

	DIV + REPO		DIV		t-stat
	Mean	Median	Mean	Median	
MV	6 317.1	599.9	312.3	199.5	2.52 **
CAPEX	8.3%	5.7%	7.6%	5.0%	0.66
CASH	10.7%	8.2%	9.6%	6.1%	1.14
DEBT	21.9%	22.2%	25.8%	25.7%	-2.57 **
FOROWN	31.0%	24.2%	15.0%	13.2%	6.61 ***
TOP-5	38.9%	39.0%	50.0%	49.0%	-4.09 ***
MB	2.4	1.5	1.8	1.4	2.23 **
NOPER	2.0%	1.0%	1.6%	0.7%	1.15
FCF	1.4%	3.1%	0.6%	1.6%	0.78
PERF	21.9%	5.1%	11.5%	3.0%	0.94
DIV/EARN	72.1%	36.3%	53.8%	39.6%	0.92
TOT/EARN	80.2%	47.2%	53.8%	39.6%	1.31
DIV/TOTAL	81.5%		18.5%		
REPO/TOTAL	100.0%				

The table reports descriptive statistics by payout policy for a sample of 51 Finnish firms (24 DIV+REPO companies and 27 DIV companies) 1997-2002 totalling 306 firm-year observations. The sample consists of all firms that have been publicly traded on the HESSE throughout the period and where all needed data was available in Bloomberg's database in April 2003. Banks, insurance companies, real estate companies and investment firms have been excluded. The first panel (DIV) contains information on firms that have only paid dividends over the period while the second panel (DIV + REPO) contains all firms that have at least in one year repurchased their shares over the sample period. The averages are calculated for both of the sub-samples based on the firm year observations. A two-sample t-test was made to compare the characteristics of the two groups. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% levels (two-tailed) respectively.

The predicted signs of the variables are based on previous studies and finance theory. The signs concerning the share of repurchases of total payout (REP/TOT) are: MV (-), CAPEX (+), CASH (-), DEBT (-), FOROWN (+), TOP5 (-), MB (-), NOPER (+), FCF (+), PERF (+), and OPT dummy (+). Large market capitalisation could be considered to be a sign of maturity of the firm. Mature firms do often have strong cash flow compared to their investment needs and alternative financing sources and they can thus pay out a considerable share of their earnings as ordinary cash dividends. Vermaelen (1981) has argued that smaller firms are more likely to signal their true value to the market through

repurchases. High level of capital expenditures would enhance the willingness to choose repurchases over cash dividends due to their flexibility, while cash rich companies would prefer ordinary cash dividends. High level of indebtedness should be negatively related to payout as such, but also to the REP/TOT figure. Companies with high equity ratio may repurchase to move towards some higher level of debt whereas companies with high debt levels should have a lower propensity to repurchase. The financial structure of companies and the needs of companies in different phases of their development in the context of dividend policy is discussed *e.g.* in Damodaran (2003).

Due to the different taxation of domestic shareholders and certain foreign shareholders, high level of foreign ownership should have a positive effect on the repurchases share of total payout. The motivation to this hypothesis is arrived from a range of studies focusing on the tax driven reasons for companies to substitute repurchases for dividends (see *e.g.* Grullon *et al.* 2002).

A concentrated shareholder base might reflect a high share of institutional shareholders that prefer cash dividends and high market-to-book ratio classifies a share to value stock category. Maury (2004) has provided evidence that dividend payouts are lower in firms with potentially high agency problems between corporate insiders and outside investors *i.e.* firms with concentrated ownership and control. We hypothesise that firms with concentrated institutional ownership would still prefer cash dividends to repurchases.

MB is a widely used measure to try to capture possible discrepancy between the market value of a firm compared to its intrinsic value (or actually book value). High MB reflects also the company's growth prospects while a low MB is associated with a mature or even undervalued company and lack of investment opportunities. Ikenberry *et al.* (1995) have also shown that firms with low MB earn significant long-term abnormal returns after the repurchase

announcement. Due to the nature of repurchases and the associated flexibility, non-operating income should be positively associated with REP/TOT similarly to free cash flow. The flexibility of repurchases is highlighted *e.g.* in Grullon *et al.* (2002) and Dittmar (2000). Good stock market performance might follow repurchases when used as a signalling tool. Thus, the expected sign is positive. If repurchases would be completed after a long period of decreasing share price, the share price performance in a given year might still be negative and motive for buybacks could be both buying cheaply and supporting share and signalling. The connection between stock options and repurchases has been shown in many studies and the expected sign is thus positive (see *e.g.* Jolls 1998, Kahle 2002 and Karhunen 2002).

Before the regression analysis the calculation of correlation coefficients gives an idea of the effects of the variables on the measures of payout. The results are presented in the correlation matrix (see Table 21). The highest correlation (0.57) is between market capitalisation (MV) and foreign ownership (FOROWN). This is not on a level that should cause problems with multicollinearity and the correlation is also very natural. The inclusion of both of these two variables to the model is also meaningful because MV is a stable and relevant control variable and the effect of FOROWN is of special interest in this study. The grey area contains the correlation coefficients between the dependent variables. Coefficients of the single variables are in line with the assumptions except MV, CAPEX and MB. Based on these correlations one cannot state that there would or would not exist a strong dependency between the dependent and independent variable and therefore the effects of explanatory variables are examined with the panel model.

Table 21. Correlation matrix of the factors of the model.

	REPTOT	DIVMV	TOTMV	REPMV	MV	CAPEX	CASH	DEBT	FOROWN	TOPS	MB	NOPIR	ICF	PERF	OPT
REPTOT	1.00														
DIVMV	-0.01	1.00													
TOTMV	0.28	0.94	1.00												
REPMV	0.83	0.16	0.48	1.00											
MV	0.16	-0.14	-0.11	0.04	1.00										
CAPEX	-0.02	-0.02	-0.03	-0.03	0.09	1.00									
CASH	-0.03	-0.06	-0.07	-0.06	-0.04	0.09	1.00								
DEBT	-0.06	0.01	0.00	-0.02	-0.11	0.17	-0.43	1.00							
FOROWN	0.23	-0.32	-0.24	0.13	0.57	-0.05	0.00	-0.11	1.00						
TOPS	-0.18	-0.04	-0.09	-0.13	-0.52	0.10	-0.01	0.15	-0.34	1.00					
MB	0.03	-0.24	-0.23	-0.03	0.39	0.04	0.35	-0.26	0.38	-0.24	1.00				
NOPIR	0.04	0.11	0.10	0.00	0.13	0.23	0.28	-0.13	0.04	-0.12	0.06	1.00			
ICF	0.12	-0.05	-0.01	0.09	0.16	-0.43	0.11	-0.23	0.18	-0.19	0.07	-0.10	1.00		
PERF	0.04	-0.21	-0.20	-0.03	0.12	0.09	0.06	-0.09	0.02	-0.07	0.24	0.03	-0.06	1.00	
OPT	0.22	0.02	0.04	0.19	0.41	-0.01	-0.16	0.05	0.30	-0.53	0.06	0.11	0.03	0.03	1.00

Correlation matrix of all variables of the panel model. The data covers 51 companies and 306 yearly observations per variable over the cross sections based on the six-year time series.

Table 22 summarises the estimation results of the four regressions. The first panel presents the results of the factors likely to affect the payout structure, *i.e.* the mixture of repurchases and cash dividends measured by the value of repurchases divided by the value of total payout (REP/TOT). The following three panels present the results over the payout yields. As appraised, the foreign ownership (at the 1% significance level) with the stock options and free cash flow (both at the 5% significance level) are the three most important factors increasing the relative share of repurchases of the total payout.

Unlike domestic investors, not all foreign shareholders of Finnish companies are protected against the double taxation of dividends and for them repurchases might be an attractive alternative mode of cash distribution. Also, a high free cash flow and existing stock options have a positive effect on the REP/TOT factor. High free cash flow may be a sign of lack of investment opportunities or of occasional excess cash flow. The positive relationship between stock option plans and repurchase activity has been shown in many studies and is further confirmed with these findings.

Table 22. Determinants of payout structure.

	REP/TOT		DIV/MV		REP/MV		TOT/MV	
	Estimated coefficient	t-stat	Estimated coefficient	t-stat	Estimated coefficient	t-stat	Estimated coefficient	t-stat
Intercept	0.0645	1.34	0.0638	6.11 ***	0.0799	1.33	0.0718	4.87 ***
Market capitalisation	-0.0054	-0.73	0.0003	0.22	-0.0098	-1.25	-0.0007	-0.35
Capital expenditure	0.1182	1.18	-0.0095	-0.59	0.0887	1.40	-0.0007	-0.04
Cash	-0.1607	-1.85 *	-0.0201	-1.10	-0.0666	-1.18	-0.0268	-1.39
Debt	-0.0887	-1.38	-0.0148	-1.31	-0.0333	-0.56	-0.0182	-1.22
Foreign ownership	0.1322	2.63 ***	-0.0469	-5.18 ***	0.0715	1.97 **	-0.0397	-3.80 ***
Top-5 owners	-0.0240	-0.62	-0.0189	-2.50 **	-0.0435	-1.10	-0.0232	-2.33 **
M/B	-0.0033	-1.01	-0.0013	-1.90 *	-0.0022	-0.90	-0.0016	-1.89 *
Non-operating income	0.1492	0.60	0.1073	1.85 *	-0.0180	-0.09	0.1055	1.64
Free cash flow	0.2076	2.01 **	-0.0112	-0.58	0.1360	1.81 *	0.0024	0.11
Share price performance	0.0145	1.75 *	-0.0060	-2.36 **	-0.0037	-0.50	-0.0064	-2.03 **
Stock options	0.0493	2.48 **	0.0012	0.34	0.0424	2.55 **	0.0054	1.31
Adjusted R-squared	0.1070		0.1974		0.0348		0.1623	
F-statistic	3.20 ***		6.58 ***		2.00 **		5.18 ***	

The same cross-sectional time series model is estimated with three different dependent variables, i.e. REP/TOT, DIV/MV, REP/MV, and TOT/MV. REP/TOT is calculated by dividing the value of annual repurchases by the total sum of cash dividends and repurchases. DIV/MV is calculated by dividing the value of cash dividends by the market capitalisation, REP/MV by dividing the value of share repurchases by the market capitalisation, and TOT/MV is calculated by dividing the total value of cash dividends and repurchases by market capitalisation. The coefficients of REP/MV are scaled by 1 000 in order to be easier comparable to the other models. The sample consists of 51 companies over the years 1997-2002 totalling 306 firm-year observations. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% levels respectively.

In addition to these, share price performance (at the 10% significance level) seems to have a positive effect on the REP/TOT factor. This result has two explanations, because the data is on an annual basis and the share price performance factor is the percentage change in share price over the year, the exact timing of the boom in the share price is not known. As shown earlier, managers exhibit some timing ability and thus repurchases are executed during periods when share prices are low and repurchases can be found to boost the share price. Especially smaller companies' shares with low liquidity overperform the market when companies announce and start to execute a repurchase plan. It was also shown earlier in this study that 1999 and 2000, when the stock market as whole performed well, were active periods for repurchase trades. Cash and near cash in relation to total assets has a negative sign (at the 10% significance level) as predicted. This prediction was based on the fact that cash dividends are paid from sustainable income and cash, and repurchases are more often based on occasional excess cash.

Other factors, although not statistically significant, that had a sign as predicted are CAPEX, DEBT, TOP5, MB, and NOPER. The higher the investment needs of a firm are the less probable it is that the firm has a high payout ratio or dividend yield, but in addition to repay excess cash to shareholders repurchases might be a preferred and flexible tool for this. Higher indebtedness is negatively related to both dividend yield and REP/TOT. The concentration of ownership measured by the percentage ownership of the shares of the five biggest shareholders (TOP5) reflects the possible information asymmetries between different shareholder groups. This question was raised *e.g.* by Brennan *et al.* (1990), who predicted that if informed shareholders predominate, firms will repurchases (the sign should be positive). In contrast to this, Allen *et al.* (2000) highlight the role of large outside shareholders' constant monitoring role and the findings indicate that large shareholders prefer dividends. Our results thus slightly support those of Allen *et al.* (2000). Market-to-book ratio is a measure of valuation and it is used to separate value stocks from growth stocks. High market-to-book value can signal both overvaluation and value stock nature. The negative sign on MB indicates that the probability of repurchases is lower with higher market-to-book ratio, which is plausible. Finally, the sign of non-operating income is positive and in line with previous evidence that repurchases are used as a flexible tool to distribute occasional excess cash.

The following three panels describe the results of the estimation of the dividend, repurchase and total payout yields. Foreign ownership (at the 1% significance level), top-5 owners' share, and share price performance (both at the 5% significance level) all have a negative effect on dividend yield and total payout yield. Additionally, MB has a negative effect on dividend yield and total payout yield (at the 10% significance level) and NOPER a positive effect on dividend yield (at the 10% significance level). FOROWN and OPT have a

positive effect at the 5% significance level and FCF at the 10% significance level on repurchase yield.

The results are logical compared to the estimation results of the REP/TOT model. Foreign ownership is negatively related to cash dividends and positively related to repurchases and stock options are positively related to repurchases. The negative sign of MB is in line with financial theory. Established large companies, known to be the best dividend-payers are often considered as value stocks. The market-to-book ratio of those companies is often low, because the book value of assets equals the market value of equity. Growth companies, *i.e.* companies with high market-to-book ratio, are companies with significant growth prospects and relatively high investment needs. Growth companies are thus less potential dividend-payers.

The sign of the TOP5 factor is negative in all models and indicates that the more concentrated the ownership of the firm is, the lower is the repurchase, dividend and total payout yield of the firm. In many firms in the sample the concentrated ownership is based on a history as a family-owned company or on government ownership. Institutional investors, like insurance companies and pension funds, also have considerable ownership stakes in many Finnish companies. Family owners should prefer high dividend yield and this has also been shown empirical studies (see *e.g.* Maury and Pajuste 2002). Investment funds and institutional investors might prefer capital gains to dividends, which might explain the result. Maury *et al.* (2002) have shown that dividend payouts are lower in firms with concentrated ownership and with potentially high agency problems between corporate insiders and outside investors. They found that control concentration is significantly negatively related to the firm's dividend payout ratio. Additionally they show that the type of the controlling shareholder affect the dividend policy differently. When the CEO is among the

three largest shareholders the firm has lower dividend payouts. However, ultimate private controlling shareholders in general tend to be associated with higher dividend levels. (See also Maury 2004.)

The negative sign of the share price performance on the yields can be at least partly explained by the fact that the yield is calculated by dividing payout by the market value of equity, thus increasing share prices (market value) decrease the yield in cases when the payout in Euro is more stable from year-to-year (smoothed). Excluding share price performance from the model only affects the statistical significance of market-to-book ratio. Its coefficient will change to -0.0021 (at the 1% significance level) and the overall adjusted R-squared of the model will decrease to 0.1336. High non-operating income is associated with higher yields as companies have more excess funds to distribute to shareholders similarly to high free cash flows being associated with higher repurchase yield.

Many of these findings support previous studies or are in line with the existing empirical evidence. Brav, Graham, Harvey and Michaely (2003) performed a qualitative study on the payout policy in the 21st century by surveying opinions of 384 Chief Financial Officers and treasurers in the USA. Their survey documented stylised facts concerning dividend policy and the aim of the survey and interviews was to contribute to the previous theoretical and empirical studies using hands-on information directly from the decision makers who decide on the actual payout policy in firms. An existing study on the determinants of the authorisation decision for share repurchases and dividends in Finland has also shown that the main determinant for buybacks in Finland is foreign ownership (Pasternack 2002). In addition to the foreign owners, operating income, stock options and high free cash flow have a positive effect

on the probability of repurchase authorisation whereas market-to-book ratio is negatively correlated with the probability of repurchase authorisation.

Bray *et al.* (2003) found that the key finding of Lintner (1956) still hold, *i.e.* dividend policy is very conservative. Firms are reluctant to cut dividends and the current level of dividends is taken more or less as given. Some of the managers included in the study reported that, if needed, even external funds are raised before dividends are cut. The preferred payout form of many firms seems to be repurchases. Even firms with stable cash flows are positive towards repurchases and would consider repurchases before increasing cash dividends. Bray *et al.* (2003) point out that this could partly explain the recent findings in the USA regarding the popularity of repurchases. Although the Finnish data of this study are limited to 1997–2002 and do not provide information from other years than 1997 before repurchases became an option to Finnish firms, it supports the case that, instead of replacing cash dividends by repurchases, buybacks increase the total payout (Hypothesis #5) as shown in Table 23 (see also Table 20 and Figure 12). The mean total payout ratio of companies with both cash dividends and share repurchases is 73.9% (median 62.6%) and the mean total payout ratio of companies with cash dividends only is 64.5% (median 37.8%). The total payout yield is a more stable measure of corporate payout because market value is never zero or negative. The total payout yield of companies with both cash dividends and share repurchases is 6.3% (median 5.9%) and the mean total payout yield of companies with cash dividends only is 3.8% (median 3.4%). The mean total payout yield of companies with both cash dividends and repurchases is 250 basis points higher and the difference is statistically significant at the 1% level.

Table 23. Effect of share repurchases on the total payout ratio and yield.

	Total Payout Ratio		Total Payout Yield	
	Mean	Median	Mean	Median
DIV + REPO (n=57)	73.86%	62.64%	6.34%	5.93%
DIV (n=249)	64.49%	37.81%	3.48%	3.38%
t-stat	0.57		4.60 ***	
p-value	0.3523		0.0000	

The table reports the total payout ratio (total value of cash dividends and repurchases divided by earnings) and total payout yield (total value of cash dividends and repurchases divided by market capitalisation) for a sample of 51 Finnish firms in 1997-2002 totalling 306 firm-year observations. The sample is split into firm-year observations of companies with both cash dividends and repurchases and companies with cash dividends only on year-by-year basis. A t-test is made to compare the characteristics of the two groups. The hypothesis is H_0 : DIV+REPO Total Payout = DIV Total Payout and H_1 : DIV+REPO Total Payout > DIV Total Payout. ***, **, and * denote significantly different from zero at the 1%, 5%, and 10% levels (one-tailed) respectively.

Two other stylised facts dating back to Lintner's (1956) model no longer hold anymore according to Bray *et al.* (2003). The new data does not support a target payout ratio, but rather indicates that companies prefer to hold the current level of dividends or dividend growth. One single important reason for the popularity of repurchases is found to be their flexibility. Managers can increase payout during periods of scarce investment opportunities and scale back payout when attractive investment opportunities arise. The baseline amount for a repurchase programme is effectively zero, rather than historical levels of buybacks unlike dividends, where previous volumes count. The surveyed executives mentioned also the undervaluation of the stock affecting the buyback decision similarly to the desire to increase EPS, the extent to which firms use stock options, and the level of cash on the balance sheet. Managers also believe in the ability of both dividends and repurchases to disseminate information to the market, but do not give strong support to costly signalling. In the USA, managers admit that repurchases are a more tax efficient way to return capital to shareholders but that taxes are not a dominant factor affecting the payout decision. Executives believe that repurchases are equally as attractive as dividends to most institutions, and much more attractive to institutions than to individual investors.

According to Bray *et al.* (2003) managers tend to employ decision rules that are fairly straightforward in response to a handful of widely held beliefs about how outsiders and stakeholders will react. These beliefs are called as the “rules of the game” in their study. In summary, the rules of the game include the following: cutting dividends is penalised, payout policy should be in line with key competitors, one should maintain a good credit rating, a broad and diverse investor base is favourable, one should maintain flexibility, many investors price stock based on earnings multiples and no actions should reduce per share figures.

When shareholders have different plans to sell their shares, they will, in general, have different preferences concerning the firm’s decision to pay out cash using dividends or share repurchase. Lucas *et al.* (1998) illustrated these different preferences and developed a model of payout policy that highlights the adverse selection costs of repurchases when managers have superior information about the value of the firm. In their study they showed that in the absence of fixed costs to repurchasing shares, there is a separating equilibrium in which managers use taxable dividends to signal the quality of the firm, with better firms paying lower dividends, and using repurchases for the remainder of the payout. With fixed costs to repurchasing, small payouts are made via dividends and large payouts are divided between repurchases and dividends, as in the no-fixed cost case. In both cases, the percentage of shares repurchased increases with the size of the payout and larger repurchases are better news.

5.3.3 Concluding remarks

This chapter provided empirical findings on the payout structure of Finnish firms and on the factors affecting the choice of the payout method and the payout policy itself. The panel data modelled over the years 1997–2002 highlighted the effect of foreign ownership, free cash flow and stock options on the decision to ably share repurchases as a payout method in an environment where cash dividends are more tax efficient for most shareholders, and especially to domestic shareholders. The results on the factors affecting the repurchases relative share of earnings are similar to the determinants to repurchases presented in Pasternack (2002).

Further, foreign shareholders are negatively related to the total payout yield and dividend yield and positively related to the repurchase yield further supporting the previous finding. Concentrated ownership is negatively related to the total payout yield and dividend yield and stock option plans are positively related to the repurchase yield. The overall data on the development of the total payout of the firms included in the sample support the idea that adoption of repurchases increases the total payout of firms, a finding consistent with recent US data. The final payout decisions of firms are often made based on simple rules of thumb, or the rules of the game as Bray *et al.* (2003) call them. Companies prefer the flexibility of repurchases and if the taxation does not substantially differentiate from cash dividends, repurchases will be the preferred method of payout. This study provides additional evidence on the key motives for share repurchases and gives new information on the factors affecting the total payout and its decomposition. The current Finnish tax regime offers an environment different to that in the USA and thus a comparison between the Finnish and international evidence can provide additional information on this important phenomenon. The already accepted changes in Finnish tax system may additionally increase the repurchase activity and volumes.

6. CONCLUSIONS AND IMPLICATIONS

The importance of share repurchases as a payout method has been increasing throughout the world since the 1980s. The growth has been most remarkable in the USA, where the value of repurchases has recently exceeded the value of cash dividends. With the emergence of this new flexible payout form, the importance of the research on the effects of repurchases on stock returns, liquidity and the total payout of firms have increased. Most of the early studies on repurchases have focused on the stock price reactions to buyback announcements and actual buybacks as well as on the long-term performance of companies with share repurchases. More recently, the focus has changed to studies on the reasons affecting the decision to replace cash dividends by repurchases, on the development of the total payout of the firms as well as on the liquidity effects of repurchases.

This study focuses on the stock market liquidity effects of repurchases, on the timing of repurchase programmes and on the factors affecting the payout policy. The data covers all share repurchase programmes of HESE listed firms in 1997–2002 comprising of 228 repurchase authorisations and 107 actually realised repurchase programmes. The study is relevant to investors, financial analysts, firms and managers as well as to legislators and researchers. The unique data set provides accurate information on the timing, value and volume of repurchase trades. The strict reporting rules of HESE require companies to publish all intentions and decisions regarding share repurchases as well as to report actual repurchase trades on a daily basis. The guidelines to prevent insider trading are closely related to those used in the USA and in Sweden. Another important difference from US data, for example is the current taxation of dividends in Finland. Domestic and many foreign shareholders are protected against double taxation dividends and thus cash dividends are a tax efficient

way to distribute excess capital to shareholders compared to repurchases as capital gains have been taxed at a 29% tax rate. Thus the tax environment does not as such bias the selection of the payout form towards repurchases.

The first study on the timing of the repurchases is in line with Brockman *et al.* (2001), who showed that the overall mean (median) bootstrapped costs represented 109% (104%) of the actual repurchase costs, suggesting that managers exhibit timing ability compared to a naïve accumulation strategy. The results from the HESE with the overall mean (median) bootstrapped costs representing 105% (105%) of the actual repurchase costs is in line with their earlier findings. All the other figures are also very much in line with their findings. When looking at the results on company (programme) level, it is natural to notice that the number of days with actual repurchases is in relation to the overall timing results. Companies that acquire their own shares over a longer period typically perform less well than those who execute their repurchases during a limited number of consecutive days. The latter studies on major market movements, however, shed light on the tactical timing of repurchases, giving support on the hypothesis that managers are interested in supporting their share price during periods of major changes in market valuations. Remarkable falls in market prices may also make managers interested in being active on the buyback market because the share prices typically drop in one day and quite often benefit from a rebound within a day or a week.

The underlying hypothesis presented in Barclay *et al.* (1988) formed the basis for the second study on liquidity changes around stock repurchases. We chose the hypothesis that repurchases would have a beneficial effect on liquidity, that their effect on spread would be negative and effect on trading activity (volume) positive. This was based on the assumption that the Finnish market is less

liquid, when measured with trading activity and market-wide bid-ask spreads, than most of the world's major markets, where many of the preceding studies have been conducted and thus the market maker hypothesis could be valid with this dataset. The results were, however, somewhat ambiguous, suggesting that the overall effect of repurchases increases spread (when using traditional models), but partially supportive to the hypothesis, especially when focusing on smaller and less liquid firms and when the share of repurchase trades of the daily trading volume is high. For the sub-sample of smaller companies the average bid-ask spread over the 10-day period preceding the first day of actual repurchases was 4.68% and during the 10 days following the event day 4.03%, supporting the market maker hypothesis at the 5% level. Similarly the new relative measure provides additional evidence on repurchases beneficial effects on liquidity.

The third study provided empirical findings on the payout structure of Finnish firms and on the factors affecting the choice of payout method and the payout policy itself. The panel data model over the years 1997-2002 highlighted the importance of foreign ownership, free cash flow and stock options in the decision to ably share repurchases as a payout method in an environment where cash dividends are more tax efficient for most shareholders, and especially for domestic shareholders. Similarly, foreign shareholders are negatively related to the total payout yield and dividend yield and positively related to the repurchase yield further supporting the previous finding. Concentrated ownership is negatively related to the total payout yield and dividend yield and stock option plans positively related to the repurchase yield. The overall data on the development of the total payout of the firms included in the sample support the idea that the adoption of repurchases increases the total payout of firms, a finding consistent with recent US data.

The overall results shed further light on the relatively new phenomenon in Finland. Being the first study on the managerial timing ability and the liquidity effects of share repurchases in Finland, this study will further confirm that due to the insider trading nature of repurchases, strict reporting rules and guidelines on the actual execution of repurchases used in Finland are necessary for well-functioning and informational efficient stock market. Following the rules on the execution has already proved to save corporate executives from insider trading charges and provide both investors and researchers with valuable information of this important and material financial action. The key factors behind repurchases seem, in addition to free cash flow, to be the shareholder base of the firm (foreign ownership) and stock options.

The importance of repurchases as a payout method has not grown as fast in Finland as in the USA, but the money spent on repurchases has already accounted for some 15% of the total payout in 1998–2002. The development of the Finnish tax regime and the suggested changes in the taxation of cash dividends will further direct the interest towards share repurchases. With the growth of international shareholders' stakes in Finnish companies and the possible tax reform, the volume of repurchases will grow markedly. And as the findings on the liquidity effects of repurchase trades show, repurchase programmes can also be beneficial to other shareholders as well – as long as they are based on financially sustainable facts.

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APPENDIX

Finnish Share Repurchase Programmes in 1998 – 2002

Stock	Program	Announcement date	Authorisation start	Authorisation end	Confirmation date	First actual repurchases
Cultor I	1	10/01/98	11/17/98	11/17/99	11/20/98	12/04/98
Cultor II	1	10/01/98	11/17/98	11/17/99	11/20/98	12/04/98
Efore A	1	02/26/98	03/11/98	03/11/99		
Finvest A	1	03/17/98	04/07/98	04/07/99	05/12/98	11/17/98
Finvest B	1	03/17/98	04/07/98	04/07/99	05/12/98	05/25/98
Fiskars A	1	10/12/98	11/23/98	11/23/99		
Fiskars K	1	10/12/98	11/23/98	11/23/99		
Jaakko Pöyry	1	02/26/98	03/31/98	03/31/99	05/14/98	07/03/98
KCI Konecranes International	1	02/17/98	03/04/98	03/04/99		
Kyro	1	03/11/98	04/03/98	04/03/99		
LännenTehtaat	1	03/03/98	04/02/98	04/02/99	09/14/98	09/23/98
Länsivoima	1	03/02/98	03/23/98	03/23/99		
Leo Longlife A	1	04/14/98	04/30/98	04/30/99		
Markkinointi Viherjuuri	1	03/11/98	03/26/98	03/26/99		
Martela A	1	03/10/98	06/24/98	06/24/99		
Novo Group	1	03/23/98	04/07/98	04/07/99	11/24/98	12/01/98
Olvi A	1	04/20/98	05/07/98	05/07/99	06/10/98	06/24/98
Rocla	1	03/16/98	04/01/98	04/01/99	09/01/98	09/10/98
Saunatec	1	03/17/98	03/31/98	03/31/99		
Tampereen Puhelin	1	05/05/98	05/20/98	05/20/99		
Tamro	1	05/22/98	06/17/98	06/17/99	06/26/98	07/13/98
Tieto Corporation	1	02/26/98	03/13/98	03/13/99	08/26/98	09/07/98
UPM-Kymmene	1	12/19/97	03/25/98	03/25/99	03/26/98	04/03/98
Uponor	1	02/18/98	03/18/98	03/18/99	06/24/98	08/03/98
Yleiselektronikka	1	05/15/98	06/18/98	06/18/99		
Amer A	1	02/11/99	03/11/99	03/11/00		
Citycon	1	09/24/99	11/04/99	03/30/00	11/17/99	11/25/99
Espoon Sähkö	1	03/04/99	04/09/99	04/09/00	04/15/99	04/30/99
Fiskars A	2	02/01/99	03/19/99	03/19/00		
Fiskars K	2	02/01/99	03/19/99	03/19/00		
Interavanti	1	03/24/99	04/09/99	04/09/00	05/12/99	05/31/99
J Tallberg-Kiinteistöt B	1	02/24/99	03/09/99	03/09/00		
Jaakko Pöyry	2	02/18/99	03/19/99	03/19/00	06/24/99	
KCI Konecranes International	2	02/11/99	03/11/99	03/11/00	09/30/99	10/07/99
Kemira	1	02/19/99	04/07/99	04/07/00	06/08/99	06/15/99
Kyro	2	03/11/99	04/15/99	04/15/00		
LännenTehtaat	2	03/02/99	04/15/99	04/15/00	05/10/99	10/15/99
Länsivoima	2	03/12/99	03/29/99	03/29/00		
Martela A	2	03/02/99	03/18/99	03/18/00		
Metso	1	07/01/99	08/18/99	08/18/00	09/30/99	10/12/99
Nokia	1	10/21/99	12/13/99	12/13/00	02/01/00	02/21/00
Novo Group	2	03/23/99	04/09/99	04/09/00		
Partek	1	03/18/99	04/08/99	04/08/00		
PKC Group	1	11/30/99	12/30/99	12/30/00		
Proha	1	11/25/99	12/07/99	12/07/00		
Ramirent / A-Rakennusmies	1	03/24/99	04/16/99	04/16/00		
Rocla	2	03/08/99	03/26/99	03/26/00	04/16/99	06/08/99
Sampo A	1	03/04/99	04/28/99	04/28/00	12/22/99	01/03/00
Sponda	1	02/17/99	03/10/99	03/10/00	08/28/99	09/06/99
Talentum	1	03/05/99	03/29/99	03/29/00	05/18/99	05/26/99

Tamro	2	03/25/99	04/28/99	04/28/00	05/07/99	06/18/99
Tieto Corporation	2	02/11/99	03/11/99	03/11/00		
UPM-Kymmene	2	02/12/99	03/24/99	03/24/00	08/23/99	08/30/99
Uponor	2	02/16/99	03/17/99	03/17/00	03/30/99	04/07/99
YIT-Yhtymä	1	02/17/99	03/09/99	03/09/00	03/12/99	03/18/99
Yleiselektronikka	2	03/01/99	03/19/99	03/19/00		
Amer A	2	02/09/00	03/08/00	03/08/01	11/02/00	11/10/00
Aspo	1	03/03/00	03/13/00	03/13/01	05/29/00	06/07/00
Citycon	2	02/29/00	03/30/00	03/30/01	04/27/00	05/09/00
Conventum	1	02/28/00	03/16/00	03/16/01		
Efore A	2	02/29/00	03/17/00	03/17/01	08/03/00	08/24/00
Espoon Sähkö	2	03/17/00	04/06/00	04/06/01	05/18/00	05/30/00
Fiskars A	3	02/10/00	03/16/00	03/16/01		
Fiskars K	3	02/10/00	03/16/00	03/16/01		
Honkarakenne B	1	03/31/00	04/14/00	04/14/01		
Instrumentarium	1	02/23/00	03/23/00	03/23/01	06/29/00	
Jaakko Pöyry	3	02/11/00	03/08/00	03/08/01		
KCI Konecranes International	3	02/10/00	03/09/00	03/09/01		
Kemira	2	03/14/00	04/11/00	04/11/01	05/09/00	05/23/00
Kone	1	01/11/00	02/25/00	02/25/01	03/08/00	03/16/00
Kontram-yhtiöt	1	03/24/00	04/05/00	04/05/01		
Kyro	3	03/09/00	04/06/00	04/06/01		
LännenTehtaat	3	03/07/00	04/13/00	04/13/01	05/15/00	06/22/00
Lassila&Tikanoja	1	02/28/00	03/16/00	03/16/01		
Leo Longlife A	2	04/17/00	04/28/00	04/28/01		
Martela A	3	02/18/00	03/21/00	03/21/01	11/29/00	12/20/00
Merita NB	1	03/10/00	04/11/00	04/11/01		
Metra A	1	02/16/00	03/23/00	03/23/01		
Metra B	1	02/16/00	03/23/00	03/23/01		
Metso	2	02/16/00	03/29/00	03/29/01		
Nokia	2	02/01/00	03/22/00	03/22/01	07/28/00	
Novo Group	3	03/27/00	04/11/00	04/11/01		
Olvi A	2	03/09/00	04/14/00	04/14/01		
Partek	2	03/16/00	03/30/00	03/30/01		
Ramirent / A-Rakennusmies	2	03/28/00	04/13/00	04/13/01		
Rautaruukki	1	02/10/00	03/28/00	03/28/01	03/31/00	04/10/00
Rocla	3	05/29/00	06/15/00	06/15/01	06/21/00	07/13/00
Sampo A	2	02/29/00	04/12/00	04/12/01		
Soltec / TH Tiedonhallinta	1	03/16/00	03/31/00	03/31/01	08/15/00	09/06/00
Soltec / TH Tiedonhallinta	2	11/01/00	11/15/00	03/28/01		
Sonera	1	02/16/00	03/22/00	03/22/01	04/26/00	05/09/00
Sponda	2	03/14/00	03/27/00	03/27/01	05/03/00	05/11/00
Sponda	3	11/29/00	12/14/00	12/14/01	12/22/00	01/04/01
Stockmann A	1	03/15/00	04/11/00	04/11/01	05/17/00	05/24/00
Stockmann B	1	03/15/00	04/11/00	04/11/01	05/17/00	05/24/00
Stora Enso A	1	08/20/99	03/20/00	03/20/01	08/18/00	09/14/00
Stora Enso R	1	08/20/99	03/20/00	03/20/01	08/18/00	09/14/00
SysOpen	1	11/02/00	11/23/00	11/23/01	11/30/00	02/12/01
Talentum	2	03/01/00	03/31/00	03/31/01		
Tamro	3	03/10/00	04/12/00	04/12/01		
Teleste	1	03/21/00	04/12/00	04/12/01		
Tieto Corporation	3	02/18/00	03/29/00	03/29/01	09/27/00	11/01/00
Tieto-X	1	03/24/00	04/12/00	04/12/01		

Tuikkivi	1	03/17/00	04/26/00	04/26/01	04/26/01	05/04/00	11/01/00
UPM-Kymmene	3	05/16/00	06/13/00	06/13/01	06/13/01	06/13/00	06/21/00
Uponor	3	02/16/00	03/21/00	03/21/01	03/21/01	08/01/00	12/13/00
YIT-Yhtymä	2	02/16/00	03/06/00	03/06/01	03/06/01		07/11/00
Yhteiskonehtimiska	3	03/02/00	03/21/00	03/21/01	03/21/01		
A Company Finland	1	01/16/01	02/02/01	02/02/01	02/02/01		
Amer A	3	02/07/01	03/07/01	03/07/01	03/07/01	04/05/01	04/17/01
Aspo	2	02/15/01	04/26/01	04/26/01	04/26/01	10/26/01	11/02/01
Aspocomp Group	1	02/19/01	03/23/01	03/23/01	03/23/01	07/16/01	07/30/01
CapMan B	1	05/14/01	05/31/01	05/31/01	05/31/01		
Citycon	3	02/23/01	03/29/01	03/29/01	03/29/01	04/23/01	
Componenta	1	01/23/01	02/09/01	02/09/01	02/09/01		
Compiel	1	03/05/01	03/27/01	03/27/01	03/27/01		
Efore A	3	02/14/01	03/06/01	03/06/01	03/06/01		
Elmo	1	04/20/01	05/15/01	05/15/01	05/15/01		
Elcom Network	1	02/14/01	03/14/01	03/14/01	03/14/01		
Espoon Sähkö	3	03/07/01	04/05/01	04/05/01	04/05/01		
Eteplan	1	02/22/01	03/28/01	03/28/01	03/28/01	09/10/01	09/19/01
Finvest A	2	01/22/01	02/09/01	02/09/01	02/09/01	08/30/01	09/06/01
Finvest B	2	01/22/01	02/09/01	02/09/01	02/09/01	08/30/01	09/06/01
Fiskars A	4	02/01/01	03/16/01	03/16/01	03/16/01		
Fiskars K	4	02/01/01	03/16/01	03/16/01	03/16/01		
Huhimäki	1	02/13/01	04/03/01	04/03/01	04/03/01	04/03/01	04/11/01
Instrumentarium	2	03/07/01	03/26/01	03/26/01	03/26/01		
Iscore	1	01/04/01	01/22/01	01/22/01	01/22/01	04/10/01	09/21/01
Jabko Pöytä	4	02/13/01	03/08/01	03/08/01	03/08/01	03/09/01	08/23/01
Jantun	1	11/20/01	11/20/01	11/20/01	11/20/01		
KCI Konecranes International	4	02/08/01	03/08/01	03/07/01	03/07/01		
Kemira	3	02/12/01	04/03/01	04/03/01	04/03/01	04/24/01	05/02/01
Kone	2	01/10/01	02/23/01	02/23/01	02/23/01	03/07/01	03/29/01
Kyro	4	05/15/01	06/12/01	06/12/01	06/12/01	08/17/01	08/30/01
LännenTehot	4	02/27/01	04/05/01	04/05/01	04/05/01		
Martela A	4	02/20/01	03/21/01	03/21/01	03/21/01	10/30/01	11/14/01
Merita NB	2	02/21/01	04/10/01	04/10/01	04/25/01		
Metsä	3	02/13/01	03/28/01	03/28/01	03/28/01		
Neomarkka	1	02/08/01	03/20/01	03/19/01	03/19/01	04/02/01	04/11/01
Nokia	3	01/30/01	03/23/01	03/21/01	03/21/01		
Norvesta	1	02/21/01	03/27/01	03/21/01	03/21/01		
Novo Group	4	02/15/01	03/21/01	03/21/01	03/21/01		
Outokumpu	1	01/31/01	03/21/01	03/21/01	03/21/01	03/22/01	04/09/01
Panostaja A	1	02/23/01	03/27/01	03/27/01	03/27/01		
Panostaja B	1	02/23/01	03/27/01	03/27/01	03/27/01		
Partek	3	03/09/01	03/29/01	03/29/01	03/29/01		
Perlos	1	03/30/01	04/19/01	04/19/01	04/19/01	09/07/01	09/14/01
Rakentajain Konevuokraamo	1	03/22/01	04/25/01	04/25/01	04/25/01	09/23/01	08/31/01
Ranrenti	3	03/30/01	04/26/01	04/26/01	04/26/01		
Rautaruukki	2	02/06/01	03/29/01	03/29/01	03/29/01	04/03/01	04/11/01
Sampo A	3	02/28/01	04/05/01	04/05/01	04/04/01		
Sohtec	3	03/09/01	03/28/01	03/28/01	03/28/01		
Siora Enso A	2	02/07/01	03/20/01	03/19/01	03/19/01	03/29/01	03/28/01
Siora Enso B	2	02/07/01	03/20/01	03/20/01	03/19/01		
Tampo	4	03/15/01	04/23/01	04/23/01	04/23/01		
Tekla	1	03/15/01	04/05/01	04/05/01	04/05/01	09/17/01	09/26/01

06/27/01	06/18/01	04/06/02	04/06/01	03/01/01	2	Teleste
10/02/01	09/19/01	03/22/02	03/22/01	02/15/01	4	Tieto-X
09/05/01	08/28/01	04/10/02	04/10/01	03/22/01	2	Tuhtiivi
03/29/01	03/22/01	03/22/02	03/22/01	02/21/01	4	UPM-Kymmene
04/24/01	04/02/01	03/13/02	03/13/01	02/08/01	4	Uponor
04/04/01	03/20/02	03/20/01	03/20/01	02/15/01	1	Wartsila
04/04/01	03/08/02	03/08/01	03/08/01	02/09/01	3	YTT-Yhtymä
03/20/02	03/22/01	03/22/02	03/22/01	03/20/01	4	Yhteiskonekka
02/07/03	04/25/03	04/25/02	04/25/02	01/18/02	2	A Company Finland
04/25/03	04/25/03	04/25/02	04/25/02	03/25/02	3	Aspo
04/05/03	04/05/03	04/05/02	04/05/02	02/15/02	2	Aspocomp Group
04/03/03	04/03/03	04/03/02	04/03/02	03/08/02	2	Belton-Yhtiöt
04/03/03	04/03/03	04/03/02	04/03/02	02/26/02	2	CapMan B
04/03/03	04/03/03	03/26/03	03/26/02	02/28/02	4	Citycon
04/03/03	03/20/03	03/20/02	03/20/02	02/15/02	2	Compiel
04/15/03	04/15/03	04/15/02	04/15/02	03/11/02	2	Emo
03/26/03	03/26/03	03/26/02	03/26/02	03/06/02	2	Erephan
03/15/03	03/15/03	03/15/02	03/15/02	02/25/02	1	Finnlines
02/15/03	02/15/03	02/15/02	02/15/02	01/22/02	3	Finvest
03/14/03	03/14/03	03/14/02	03/14/02	01/29/02	5	Fiskars A
03/14/03	03/14/03	03/14/02	03/14/02	01/29/02	5	Fiskars K
04/19/03	04/19/03	04/19/02	04/19/02	03/28/02	2	Honkarakenne B
03/25/03	03/25/03	03/25/02	03/25/02	02/25/02	2	Huhtimäki
03/25/03	03/25/03	02/22/02	02/22/02	01/31/02	2	Intervani
01/24/03	01/24/03	01/24/02	01/24/02	01/18/02	2	Iscore
03/06/03	03/06/03	03/06/02	03/06/02	02/08/02	5	Jakko Pöyry
04/18/03	04/18/03	04/18/02	04/18/02	03/27/02	2	Jantun
03/06/03	03/06/03	03/07/02	03/07/02	02/13/02	5	KCI Konecranes International
04/09/02	04/09/02	04/09/02	04/09/02	03/22/02	1	Kokkila
04/03/03	04/03/03	04/03/02	04/03/02	02/11/02	4	Kemira
02/22/03	02/22/03	02/22/02	02/22/02	01/08/02	3	Kone
03/20/03	03/20/03	03/20/02	03/20/02	02/28/02	5	Kyro
03/19/03	03/19/03	03/19/02	03/19/02	02/18/02	5	Marela A
04/24/03	04/24/03	04/24/02	04/24/02	02/21/02	3	Merita NB / Norda
03/27/03	03/27/03	03/27/02	03/27/02	02/07/02	4	Metsä
03/13/03	03/13/03	03/13/02	03/13/02	02/15/02	2	Neomarcka
03/21/03	03/21/03	03/21/02	03/21/02	01/24/02	4	Nokia
03/19/03	03/19/03	03/19/02	03/19/02	02/18/02	2	Norvestia
03/19/03	03/19/03	03/19/02	03/19/02	02/14/02	5	Novo Group
04/15/03	04/15/03	04/15/02	04/15/02	03/03/02	1	Oton-Yhtymä
10/11/02	05/15/02	04/08/03	04/08/02	02/21/02	2	Outokumpu
02/07/03	02/07/03	02/07/02	02/07/02	01/04/02	2	Panosaja A
04/04/03	04/04/03	04/04/02	04/04/02	03/04/02	4	Panosaja B
04/11/03	04/11/03	04/11/02	04/11/02	03/19/02	2	Partek
03/05/03	03/05/03	03/05/02	03/05/02	02/15/02	1	Perlos
04/04/03	04/04/03	04/04/02	04/04/02	03/12/02	2	Polar Kintestit
04/29/03	04/29/03	04/29/02	04/29/02	04/05/02	4	Rakennejain Konevuokraamo
03/14/03	03/14/03	03/14/02	03/14/02	02/18/02	4	Roda
04/10/03	04/10/03	04/10/02	04/10/02	02/27/02	4	Sampo A
03/27/03	03/27/03	03/27/02	03/27/02	03/07/02	4	Soltec

Sonera	2	02/06/02	04/03/02	04/02/03		
Sponda	4	03/01/02	03/27/02	03/27/03	04/25/02	
Stora Enso A	3	01/30/02	03/19/02	03/18/03	03/19/02	06/05/02
Stora Enso R	3	01/30/02	03/19/02	03/18/03	03/19/02	05/24/02
Suomen Helasto	1	01/23/02	02/11/02	02/11/03		
Suominen Yhtymä (J.W.)	1	02/06/02	03/13/02	03/13/03		09/25/02
Tecnomen	1	03/12/02	04/11/02	04/11/03	05/15/02	05/22/02
Tekla	2	02/28/02	03/21/02	03/21/03		
Teleste	3	03/08/02	04/08/02	04/08/03	05/06/02	05/15/02
TietoEnator (Tieto Corporation)	5	02/14/02	03/21/02	03/21/03		
Tieto-X	3	03/01/02	03/20/02	03/20/03		
Tulikivi	3	02/20/02	04/04/02	04/04/03	08/26/02	
UPM-Kymmene	5	02/05/02	03/19/02	03/19/03		
Uponor	5	02/05/02	03/13/02	03/13/03	04/23/02	06/12/02
Vacon	1	03/07/02	03/25/02	03/25/03		
Wärtsilä	2	02/07/02	03/12/02	03/12/03		
YIT-Yhtymä	4	02/14/02	03/07/02	03/07/03		11/01/02
Yleiselektronikka	5	03/05/03	03/26/02	03/26/03		
Yomi / KSP Yhtiöt	1	02/22/02	03/26/02	03/26/03		