



LUND UNIVERSITY  
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# Share Repurchase and Ownership Structure

A quantitative study on Swedish Large Cap firms

by

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May 2015

Master's Programme in Corporate and Financial Management

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# Acknowledgement

We would like to thank our supervisor Maria Gårdängen for her guidance and valuable comments throughout this process.

# Abstract

- Title:** Share Repurchase and Ownership Structure – A quantitative study on Swedish Large Cap firms
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- Course:** BUSN 89: Degree Project in Corporate and Financial Management – Master Level, 15 University Credit Points (15 ECTS)
- Seminar date:** 2015-06-03
- Key words:** Share repurchase, ownership structure, information asymmetry, agency theory, investor clientele, signalling, pay-out policy, institutional ownership, managerial ownership.
- Purpose:** The main purpose of this study is to examine if there is any relationship between Swedish companies' share repurchase policies and their ownership structure. The focus will be on managerial - and institutional ownership in relation to Swedish companies share repurchase policies. In addition several other factors, potentially related to share repurchases, will be examined.
- Theoretical Framework:** The theoretical framework is built on previous studies and theories that covers information asymmetry, agency cost of free cash flow, managerial incentives, monitoring and investor clientele. Furthermore are previous empirical findings within the area presented.
- Empirical Foundation:** The study includes 70 firms listed on NASDAQ OMX Large Cap and covers a time period of eleven years.
- Methodology:** This study uses a quantitative approach and examines the relationship between the dependent and independent variables using a linear regression model.
- Conclusion:** Institutional and managerial ownership shows no significant relationship to share repurchase. However, institutional ownership indicates a positive relationship to share repurchase, which can be explained by the tax effect. The book to market variable and the market value variable are significantly negative related with share repurchase. This relationship is in line with this studies expectation as well as with theory.

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# 1 Introduction

## 1.1 Background

It is of great importance that companies make the right financial decisions in order to be competitive and successful. To distribute excess cash to shareholders is part of the financial decisions making. There are two ways of distributing cash to the shareholders, either through dividend pay-out or by doing a share repurchase. This is commonly referred to as pay-out policy (Allen et al. 2002). Researcher argues that the relative importance of share repurchase has increased compare to dividends. There is a growing trend of repurchasing shares, especially in the US market where the rate of share repurchase has doubled in the last ten years (BusinessInsider.com, 2014). Share repurchase is a way to change the capital structure, withhold investment flexibility, reduce agency costs and to signal undervaluation. Share repurchase can also be more a tax-efficient way to distribute cash to the shareholders relative to dividend pay-outs (Allen et al. 2000). The growing trend of share repurchase in the US goes back to the early 80's (Grullon & Ikenberry, 2000; Ogden, et al. 2003). In Sweden this trend has been observed as well, although for a much shorter period of time (Råsbrant, 2011). This is due to the fact that Swedish listed firms were first allowed to engage in share repurchases in March 2000 (Proposition 1999/2000:34). The increased use of share repurchase programs is well-known as well as the motives to initiate them. However, there are few studies that actually examine the relationship between share repurchases and ownership structure.

## 1.2 Problem discussion

In general, most studies regarding pay-out policies examines the price effect of a share repurchase announcements and executions. Previous studies that examine the relationship between ownership structure, as a firm characteristics, and share repurchases are limited, especially on the Swedish market. Jensen (1986) argues that share repurchases can be an effective tool in order to reduce agency costs related to monitoring and excess cash. Scattered ownership can lead to insufficient monitoring of a company.

In that case, a share repurchase can improve the governance and the monitoring in the sense that it changes the ownership composition. Ultimately this leads to greater incentives to monitor management if the major shareholders relative voting rights and cash flow right increases. Hence, firms with scattered ownership might have greater incentives to use share repurchases as a way to mitigate agency costs related to managerial incentives. On the other hand, in cases where the ownership is relatively concentrated and the owners, to a large extent, consists of institutional investors the tax regulations on capital gains and dividend is important when a firm choose to distribute cash to its shareholders. In several countries institutional investors face a relative tax advantages on capital gains and might therefore try to influence management when they are distributing cash to the shareholders.

Jensen (1986) also argues that share repurchases is a way for management to signal to the market that they are willing to distribute excess cash to shareholders instead of spending it on non-value creating projects. In order to reduce the conflict of interest between shareholders and management and hence reduce agency cost of free cash flow many firms choose to compensate management via stocks and or stock options. Li and McNally (2002) studied the management ownership of repurchasing firms and finds that management have a larger ownership stake in firms that initiate repurchase programmes. Also, the announcement effects of the repurchases of these firms tend to be greater. The main argumentation for this finding is that management use repurchases to show that they are committed to distribute cash to shareholders instead of spending it and non-value creating investments.

The many studies made on share repurchases and the announcement effect finds strong support for a positive announcement effect. Among others, Stephens and Weisbach (1998) and Ikenberry et al. (1995, 2000), find that firms that announce share repurchase experience an average abnormal return of about 2 % on the announcement day. The theoretical explanation of this effect origin from the signalling hypothesis, in which there is information asymmetry between management and shareholders. Since there is asymmetric information in the market, the announcement of a share repurchase communicates important information about current earnings and future investment opportunities. Constantinides and Grundy (1989) and McNally (1999) means that the announcement of a share repurchase program may signal to the market that management thinks the stock is trading below its intrinsic value.

Other researchers like Vermaelen (1981), Stephens et al. (2000) and Grullon and Michaely (2002), suggest that capital structure adjustments, distribution of excess cash and substitution for cash dividends are other reasons for why firms do share repurchases.

With this discussion in mind the ownership structure may be an important factor for firms to initiate a share repurchase programme. Although ownership structure might be an important factor other researchers argue that factors like capital structure, distribution of excess cash and substitution for cash dividends are determine factors for the initiation of a share repurchase programme. Therefore it is of interest to investigate how share-repurchasing firms relates to the factors mentioned above.

The US market has been able to adopt share repurchase during a longer period of time, thus most studies in this subject are performed based on the US market. A research on the Swedish market, characterized by a different ownership structure than in US, is therefore of interest. In the next section the purpose and the research questions are outlined as well as the rationales behind the delimitations of this study.

### 1.3 Research Purpose and Research Questions

The main purpose of this study is to examine if there is any relationship between Swedish companies' share repurchase policies and their ownership structure. The focus of the study is on managerial - and institutional ownership in relation to Swedish companies share repurchase policies. In addition several other factors, potentially related to share repurchases, will be examined.

The following research questions have been set up;

- Is there any relationship between managerial- and institutional ownership and Swedish companies share repurchase policies?
- Based on traditional finance theories and previous research, what other variables may effect a company's decision to initiate a share repurchase?
- What could possibly explain a potential relationship?

## 1.4 Delimitations

This study cover firms listed on the Swedish OMX stock exchange. The rationales for choosing firms listed at this exchange are:

- i) Ownership structure – Sweden is a market with relatively concentrated ownership.
- ii) Investor clienteles – The clientele effect assumes that investors are attracted to specific company policies, such as pay-out policies.
- iii) Legal system – Sweden is characterized by a modified civil law system where strong focus lies on the alignment of interest between institutional owners and managers.

The following criteria's are used for the selections of companies in the study:

- i) Companies listed on the OMX Large Cap list 1<sup>st</sup> April 2015
- ii) Companies listed anytime between 2004 to 2014

The study only include companies that are listed at the Large Cap list. This is mainly due to the fact the share repurchase are quite limited among companies listed at the minor lists and also because the information is more readily available for Large Cap companies.

Apart from investigating the relationship between the ownership structure and share repurchases the following factors will be examined:

- i) Cash holdings in relation to share repurchase
- ii) Return on asset in relation to share repurchase
- iii) Debt to capital structure in relation to share repurchase
- iv) Dividend yield in relation to share repurchase
- v) Book to market value in relation to share repurchase
- vi) Firm size in relation to share repurchase

Economic theories and previous studies states that all the above mentioned factors could potentially have an influence in the pay-out policy decision making. As mentioned most of the studies and theories related to this is based on US market data. Hence, to investigate how these factors relate to share repurchases in the Swedish market is of interest, partly because Sweden differs from the US market in terms of ownership structure and legal structure and partly because this study has not been made on the Swedish market before.

## 1.5 Thesis outline

The second chapter in the thesis outlines the theoretical framework as well as previous studies that this paper is based on. The chapter begins with an introduction to and motives of share repurchases. This section is followed by more in depth descriptions of the theories used in this thesis. The third chapter describes of the methodology used and involves explanations and motivations of the variables included in the regression. This chapter also contains explanations of the statistical models used as well as the validity and reliability of this study. In chapter four are all statistical tests and the findings of the regression presented. These results are then analysed and discussed in the fifth chapter. The last chapter summarize the findings and presents the conclusion of the thesis.

## 2 Literature/theoretical review

*The first section of the following chapter presents a brief explanation to what share repurchase is and why firms choose to initiate share repurchases. Furthermore, to give the reader a good understanding of how a share repurchase can be beneficial for the company, several theories and previous studies are presented.*

### 2.1 Share repurchase

*“When companies with outstanding businesses and comfortable financial positions find their shares selling far below intrinsic value in the marketplace, no alternative action can benefit shareholders as surely as repurchases.”*

- Warren Buffet

The paper “Cost of capital, Corporation Finance and the Theory of investments” (Miller and Modigliani, 1958) outlines theories concerning the ideal capital market; the irrelevance of capital structure and that leverage does not affect the value of the firm. Miller and Modigliani (1958) define the ideal capital market by five assumptions; *Capital markets are frictionless, All market participants share homogeneous expectations, All market participants are atomistic, The firm’s investment program is fixed and known and The firms financing is fixed.* It is recognized that these assumptions do not hold in the real world and therefore makes it plausible for firms to take advantage of the situations that occur when the assumptions are violated.

There are many reasons for firms to pursue a share repurchase. Ogden et. al. (2003) states six effects that are achieved through share repurchase:

- *The asset base of the company will decrease due to the outflow of cash in order to pay the repurchase.*
- *The equity base will be reduced by the amount of shares being repurchased.*
- *The increased demand for the shares will increase the market price of the share.*
- *The liquidity of the shares might increase since a new potential buyer has entered the market.*

- *The liquidity might decrease due to the reduced number of outstanding shares and also because potential sellers know that there is an informed buyer causing the bid-ask spread to increase.*

When combining the violated assumptions of Miller and Modigliani by the potential effects of the repurchase mentioned above, three different hypothesis's arise; *Signalling Hypothesis, Free Cash Flow Hypothesis and Expropriation Hypothesis*, (Ogden et. al. 2003).

Signalling Hypothesis implies that the management of the firm has superior information about the firms "true" value and the future cash flow. Management will therefore perform a share repurchase when they believe that the firm is undervalued in terms of market value. The signal is seen as credible hence, the high cost associated with an inaccurate signal makes it hard to mimic (Ogden et. al. 2003). Vermaelen (1981) provides evidence of the signalling hypothesis where both an abnormal return and improved earnings are confirmed for firms announcing a share repurchase. D'Mello and Shroff (2000) examined the relation of share repurchase and the undervaluation of the firm. Using earnings-based valuation, they found that a majority of the firms that announced a share repurchase was indeed undervalued.

As opposed to market value signalling Nohel (1998) studied how the operating performance impacts of share repurchase. The study showed that improvements in performance were rather a result of better asset utilization.

Expropriation Hypothesis suggests that firms with risky debt outstanding will shift value from creditors to shareholders when executing a share repurchase. Creditors will lose value due to the decreased debt value caused by a shrunk asset- and equity base (Ogden et. al. 2003). In opposite, Dann (1981) argues that repurchase not necessarily results in an expropriation of wealth. Dann (1981) claims that the positive effect of the firms' upward revaluation, as result of a repurchase, will offset the expropriation for creditors.

Bartov et al. (1998) identifies three major sources for companies to engage in a share repurchase. The first one is the, earlier mentioned, undervaluation of the shares. The second one is related to management's ownership in the firm.

Firms that use stock options or shares, as a part of the compensation program would be reluctant to distribute cash to shareholders via dividend pay-outs, since this would affect the value of the managers' ownership negatively.

Subsequently, managers in these firms have strong incentives to use share repurchase as a way to distribute excess cash. The last factor considers the institutional ownership in the firm. The reason for this is that institutional investors are facing different taxation on dividend pay-out than for capital gains. Therefore, firms with large institutional owners are believed to face a higher pressure of pursuing a share repurchase as a consequence of tax differences.

## 2.2 Agency theory – Principal – Agent problem

Corporate governance often refers to how companies are controlled and directed. Since the ownership and the control of a company often are separated, different problems may arise. Some of these problems can be summarized in the agency theory, which refers to the relationship between the principals, such as shareholders, and the agents, such as managers, (Jensen & Meckling, 1976). The problem with separation of ownership and control occurs because of the information asymmetry between the parties. The agency theory assumes that the agents, who make decisions on behalf of the principals, are better informed than the principals and might act in their own best interest rather than in the interest of the principals (Ogden et. al. 2003). Since the principals are unable to perfectly monitor the agents, various costs associated with the interest conflict will arise.

## 2.3 Agency costs of free cash flow

According to Shleifer and Vishny (1997), agents without any ownership in the company tend to use excess cash to invest in projects with negative net present value, NPV, and thus only benefit themselves rather than the shareholders. Ogden et. al. (2003) argues that shareholders are able to diversify themselves; therefore they are only facing the systematic risk of the stock. On the other hand are managers facing the total risk of the firm since their wealth depends on the firm to be affluent. Hence, managers have incentives to decrease the risk of the firm and act in a way that does not benefit the shareholders. One way for managers to lower the risk is to use free cash flow for *empire building*.

This means that management engage in excessive diversification by diversifying the firms' activities into industries outside their main industry, which does not increase the value for the shareholders, who are able to diversify themselves.

The difference of interests between the managers and the shareholders means that monitoring is needed to control the managers. However, monitoring by outside investors would only happen if the shareholders have incentives to do so. Therefore large institutional investors plays an important role in the monitoring process since there incentives to monitor are greater than for minority investors (Weiss and Beckerman 1995).

## 2.4 Ownership concentration – Institutional investors

Concentrated ownership is seen as an important monitoring mechanism. Shleifer and Vishny (1986) argues that a higher concentrated ownership will lead to better monitoring since large stakeholders are more tied to the company than minority investors. Large stakeholders have more cash flow rights as well as more voting rights in the company, which gives them a greater incentive to monitor compare to scattered owners.

Allen et al. (2000) means that institutional owners are in a better position to access information about the firm and its performance. Hence, their ability to control managers in a beneficial way is higher compare to scattered owners. A too dispersed ownership can lead to insufficient monitoring, which increase the information asymmetry and ultimately the agency costs. Since it is hard for scattered owners to collectively monitor managers a free-rider problem will occur. Firms with too dispersed ownership can therefore use pay-out policies such as dividend pay-outs and share repurchase to reduce this problem. (Jensen, 1986)

## 2.5 Tax clientele and share repurchase vs. dividends

There are several theories that try to explain why some firms prefer dividend pay-outs rather than share repurchase. Allen et al. (2000) developed a theoretical model to address this question. The model is based on two main assumptions; (1) there are only two types of investors, taxed individuals and institutions that are untaxed.

The second assumption is that institutional investors have a greater tendency and incentive to become informed about the performance of the firm than taxed individuals. Under these assumptions a firm can attract institutional investors by paying dividends. The logic behind this argument is that the equilibrium price will be lower for dividend paying stock compare to non-dividend paying stocks because of individual taxation on dividends.

Ultimately it leads to that *good firms* pay dividend while *bad firms* do not pay dividend to avoid the monitoring from institutional investors.

However, more recent studies indicate that companies choose share repurchase in favour of dividends. Ross et al (2005) argues that institutional investors prefer share repurchase rather than dividend. This is mainly due to tax reasons. On average is capital gain taxed at a lower rate than dividend in most European countries (Carroll et al. 2012). In Sweden on the other hand, capital gains and dividend are taxed the same level. However, institutions are exempt from taxation on capital gains (39 kap. 14§ IL). In USA, institutional investors pay ordinary income tax on dividend pay-outs whereas a selling of a stock is taxed as a capital gain. Furthermore can capital gains be deferred, while the dividend pay-outs are non-deferrable. Hence, institutional investors that want to maximize their after-tax capital gain may prefer share repurchase to dividend pay-out. Therefore the same argument about good firms and bad firms can be made when it comes to share repurchase.

## 2.6 Management ownership

As mentioned, the separation of ownership and control may lead to a conflict of interest between shareholders and management. Thus, incur costs of monitoring. In order to align the interest of owners and managers, compensation programmes, including stocks and stock options, can be used (Jensen and Meckling, 1976). Thus, the larger the management ownership in the firm is, in terms of stock holding and stock options, the more motivated the managers are to pursue profitable projects, avoid empire building and maximize the value of the firm (Ali et al. 2007).

To what extent the agency costs are reduced by pay-out policies is examined by Fenn and Liang (2000), who studied the impact of pay-out policy as a function of managerial ownership.

They claim that the alignment of interest between managers and shareholders can be improved by pay-out policies. However, they are arguing that managers are less likely to use dividend pay-outs, as part of shareholder compensation, when having own ownership in the firm. The reason for this is that managerial stock holdings and stock options are strongly negative affected by a dividend pay-out. Since share repurchase does not affect the price of the share negatively and might even put an upward pressure on the share price. This way of distributing cash is therefore more preferable from a managerial point of view.

Fenn and Liang (2000) state that there is a positive relation between managerial ownership and share repurchase. The study further confirms that share repurchase is commonly used as a complement or even substitute to dividend pay-outs.

## 2.7 Share repurchase as a way of signalling

The information asymmetry between managers and the market can impose difficulties for the firm to communicate information that should have been reflected in the market price of the firm. In order to bridge this informational gap the firm can use “signals” that the market are able to respond to. Depending on how credible these signals are the more will the market adjust towards the true value. The credibility is basically referred to as how hard the signal is to mimic, thus the cost of making a false signal (Grullon and Ikenberry, 2000). Miller and Rock (1985) are arguing that managers that are expecting a higher future cash flow also are more willing to engage in shareholder compensation, either as dividend or a share repurchase. In contrast, Grullon (2000) stating that a significant part of the repurchasing firms have declining earnings. As a result of that, Grullon and Ikenberry (2000) concludes that repurchasing firms rather suffers from decreasing profitability but at the same time they establish that firms, especially in mature industries, use share repurchase as a way of shrinking the firms asset base. Which in some ways is a necessary value creating strategy.

The same way management can offset some off the information asymmetry concerning future cash flows by signalling, the same way they can try to influence the firms’ intrinsic value, if this is not corresponding with managements view (Grullon and Ikenberry, 2000). Ikenberry et al. (1995) studied the excess abnormal return for 1200 repurchases on the market. Their study confirmed the theory of firms conducting share repurchases being undervalued at the time for the repurchase.

Ikenberry et al. (1995) also examines to what extent the share repurchase can explain an undervaluation by using a book to market ratio as a proxy for the miss-valuation. Common for both studies is that they imply that managers' seems to use repurchase when they believe that the stock is undervalued.

Furthermore, the studies indicates that the market is underreacting to the signals that a repurchase would imply, thus the abnormal returns does not fully correspond with the measured undervaluation (Grullon and Ikenberry, 2000).

## 2.8 Optimal Leverage via Agency Theory

According to Easterbrook (1984) and Jensen (1986) there are various ways agency costs can be mitigated. Excess cash can for example be reduced by increasing the level of debt or by changing the pay-out policy. Ogden et. al. (2003) discusses two different effects of debt with respect to optimal leverage. One effect is the negative influence of agency cost of debt. The agency cost of debt arises because lenders have different motives compare to managers and shareholders. For example, the managers, who are supposed to act in the interest of the shareholders, take on a risky project to benefit the shareholders and increase the value of the firm. The lenders on the other hand are typically interested in less risky investments. By engage in risky projects, managers can reduce the value of the lenders claim on the firms' asset. This is called expropriations of creditors' wealth by shareholders. Ultimately, the more risky projects, financed by debt, the more expensive will the debt be (Ogden et. al. 2003).

According to Ogden et. al. (2003) debt has a disciplinary effect on management. With debt financing, the firm has to use some of the cash generated from the operations to pay creditors. The free cash flow will then be reduced as well as management's ability for empire building. Hence, an increased level of debt can enhance shareholder level. Jung et al. (1996) argues that, based on these two debt-effects, there is an optimal capital structure for each firm. The agency costs associated with managerial discretion is a decreasing function of leverage while the agency costs of debt is an increasing function of debt. The optimal capital structure is when these two effects are offsetting each other. Ultimately an increase in debt can help mitigating the agency costs associated with the principal - agent problem.

## 2.9 Distribution of excess cash

To mitigate the agency cost of free cash flow firms can distribute the excess cash via a dividend pay-out or a share repurchase (Jensen 1986). When comparing dividend pay-outs to share repurchase the latter can be seen as the less costly alternative to the firm. Brav et al. (2003) state that managers try to avoid cutting dividends. In his survey he find that over 94 % of the managers trying to avoid dividend cuts and over 65 % of the managers would raise external funds before cutting dividends. Denis et al. (1994) explain this by the fact that dividend cuts are costly for the firm in the sense that the market has a strong negative reaction to dividend cuts.

Previous studies that have examined the relation between excess cash and share repurchase find evidence that are consistent with the agency theory. For example, Lie (2000) finds that there is a significant correlation between share repurchase and excess cash, firms that initiate share repurchase programs have higher levels of cash compared to non-repurchasing firms.

## 2.10 Corporate governance and the ownership role

The Swedish governance system differs in some areas compare to the one-tier and two-tier Anglo-Saxon system. The differences is mainly concerning attitudes towards the role of owners, responsibilities between different governance organs and the division of power. Angblad et. al. (2001) found that the corporate governance system in Sweden has a strong focus to align the interest between managers and institutional owners. The framework in the Swedish governance system allows for strong ownership powers, which is further enhanced by the fact that dual-class shares are used. This allows for long-term institutional investors to exercise their power to a larger extent. The governance system and the use of dual-class shares has some drawback in terms of protection of minority rights. In order to balance the ownership powers of institutional investors a new “Swedish companies act” was introduced in 2006 (Swedish Corporate Governance Board). The act consists of various legal obligations in order to protect minority investors. Apart from the “Swedish companies act” the Swedish stock market is seen as very transparent and has high social pressure which preventing high power owners to exploit minority shareholders (Barca & Becht 2001). Sweden is also characterized by a relatively concentrated ownership structure. This is seen as an important part in the Swedish governance system.

The owners of Swedish listed firms are usually dominated by a few major shareholders. Such shareholders are generally expected to take responsibility for the company they invest in by having long-term investment horizons. Compare to the Swedish stock market, the stock market in UK and US are generally characterized by a much more dispersed ownership structure (Lekvall, 2009).

## 2.11 Summery of Previous Findings

Table one presents empirical studies that examine the relationship between share repurchase and the factors that are investigated in this study. Most of these studies look at share repurchase from an agency theory perspective and explain share repurchase using this theory as a framework. However, the tax-effect is also something that plays and important role in the decision-making regarding pay-out policies. The ownership structure in relation to share repurchases is in most cases explained by the fact that institutional investors as well as managers have strong economic incentives to distribute excess-cash via share repurchases. Other factors that are connected to share repurchase usually find support in signalling and information asymmetry models.

*Table 1. Previous findings.*

<b>Authors</b>	<b>Area of study</b>	<b>Studied Period</b>	<b>Country</b>	<b>Main Findings</b>
Houcine, R (2013).	Share repurchase and ownership structure	2004-2008	France	Houcine finds that institutional investors affect firms repurchasing policies positively due to the fact that institutional investors have the ability influence managers to pay excess cash via share repurchase. Furthermore, he find a positive relationship between managerial ownership and share repurchase, which is explained by the fact that managers can increase their relative ownership in the firm when pursuing a share repurchase.

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Fenn and Liang (2000)	Pay-out policy and managerial ownership	1993-1997	USA	Fenn and Liang find that firms that use stocks and stock options as a way to compensate management are reluctant to use dividend as a way to distribute cash to shareholders. This is because managerial stock holdings and stock options are strongly negative affected by a dividend pay-out. Furthermore, they found a positive relationship between managerial ownership and share repurchase.
Ross et al. and	Pay-out policies and institutional ownership	2005-2010	USA	The use of share repurchase has increased. One possible reason for this is that institutional investors prefer share repurchase rather than dividend. This is mainly due to tax reasons. On average is capital gain taxed at a lower rate than dividend.
Grullon and Ikenberry (2000)	Share repurchase and value creation	1980-1999	USA	Grullon and Ikenberry (2000) find that firms use share repurchase as a way of shrinking the firms asset base. Which in some ways is a necessary value creating strategy.
Lie (2000)	Share repurchase and excess cash	1978-1993	USA	Lie (2000) finds that there is a significant positive correlation between share repurchase and excess cash, firms that initiate share repurchase programs have higher levels of cash compared to non-repurchasing firms.
D'Mello and Shroff	Share repurchase in relation to undervaluation	1970-1989	USA	Their findings support the theory that share repurchase can be used to signal undervaluation. By using earnings-based valuation models they found that the majority of the firms that announced share repurchases was indeed undervalued

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Some criticism can be directed to the pervious findings mentioned above. One source of criticism that can be directed to studies that investigate the relationship between the valuation of the firm and share repurchase is that these studies are using earnings-based valuation models.

It is hard to determine how accurate these earnings-based valuations models are and by using this type of valuations model one give room for further errors, which could cause biased estimations. Another problem related to this is that different studies use different metrics to measure the undervaluation. This could potentially cause contradictory estimates. The fact that some studies also cover a long period of time could be a problem. For example, information disclosure and auditing principals' might change over a time, which can lead to measurement errors.

Some studies use alternative measures for share repurchases compare to the ratio-based measurement that this study uses. For example, Houcine (2013) measures the net repurchase in absolute numbers. By doing so he does not account for the fact the different companies have different amount of share outstanding, which could ultimately lead to biased estimates.

## 3 Methodology

*In this section the methodology of the thesis will be discussed. Firstly, the nature of the thesis will be presented followed by the sample selection and data collection. The last part of this section will be a presentation of the different steps that has been taken in order to come up with a reliable result.*

### 3.1 Research Approach

The data set in this study consists of eleven years of historical numerical data from the Swedish Large Cap index. Hence, it is natural to apply a quantitative approach in order to answer the research question. The quantitative research approach is a research approach where the quantification of the data and analysis is central. Compare to the qualitative research the process of measurement is important in a quantitative study (Bryman & Bell, 2011). The result in a quantitative study can often be seen as the truth with some limitation to the data sample. The measurement of the numerical data provides a good fundamental connection between the data and the analysis in the thesis. Hence, the most applicable approach to use in this study is a quantitative one.

In addition to a quantitative approach, this study will also take on a deductive approach. The deductive approach starts with the theory and goes on with analysing the data based on existing theories and previous studies. The idea of a deductive approach is to analyse the data and draw conclusions that will either weaken or strengthen the theory. Compared to the inductive approach, the deductive approach has some drawbacks. The first drawback is that new theories or findings can be published before the researcher's findings are published. The second drawback is that the data used in the study may be irrelevant to the theory. This will only be apparent when the data is collected and the theory is applied.

The last drawback is that the data might not be suitable for the purpose of the research (Bryman & Bell, 2011). The drawbacks could potentially cause problems during the thesis process. Therefore, the following comments should be taken in to consideration. (1) Considering the time period of which this thesis is conducted, it is unlikely that any new findings or theories will affect the conclusions. (2) The data collection is made after studying various theories related to the research subject.

(3) The independent variables in the thesis are chosen carefully in order to fulfil the purpose of the thesis. A more in depth explanation of each variable will follow later on in this chapter.

## 3.2 Data

The data in this study is mainly collected from three different sources, NASDAQ OMX webpage, Datastream and Standard & Poor's Capital IQ. The amount of shares that has been repurchased and sold has been collected from NASDAQ OMX webpage. The independent variables used in this study have been gathered from Datastream and Standard & Poor's Capital IQ. *Debt*, *Market Value*, *Dividend Yield*, *Cash Holdings*, *Assets Value* and *Market Value* have been sourced from Datastream. *Management Ownership*, *Institutional Ownership* and *Return on Asset* have been sourced from Capital IQ. In a few cases where data was not available on either of the data sources annual reports was used as a complement. The values for all the independent variables are sourced as per the opening values for the execution year of potential share repurchases. For example, the Return on Asset (ROA) closing value for 2005 are compared to share repurchases made in year 2006. In some cases the collected data has been used to calculate the independent variables, for example cash and total assets have been used to calculate the cash to total asset ratio. The collected data covers companies that are listed on Stockholm NASDAQ OMX Large Cap as of first of April 2015. Companies that have been listed less than one year prior 1<sup>st</sup> of April 2015 are excluded from the sample due to limitations of data available. The total sample consists of 72 companies but in accordance with the data limitations is two companies excluded leaving 70 companies within the sample. By using this selection approach, where data is systematically removed and not randomly chosen, may result in inaccurate results due to that selection bias that occur. The time period for collected data ranges from the 1<sup>st</sup> of January 2004 to 31<sup>st</sup> of December 2014. For those companies that were listed later than 2004 the listing date is used as the first date for data collection. Companies that have been removed from the Large Cap, due to bankruptcy, delisting etc., during the chosen time period are not reflected in the study. That causes a survival bias that further can affect the results of the study. Considering a perfect data sample with no missing values, the sample would consist of 803 observations. After adjusting for listings done at the Stockholm NASDAQ OMX Large Cap list under 2014 and for companies listed later than 2004 the sample consists of 70 companies and 721 observations.

Hence, there are 78 missing observations. The companies that are included in and excluded from the sample are stated in appendix, exhibit 9 and 10, respectively.

### 3.3 Regression Model

In this research both time series and cross sectional data is used. The data consists of multiple firms obtained over multiple time periods. Hence, a panel data approach is most applicable in this study.

#### 3.3.1 Panel data

The data used in this study contains both cross sectional and time series data and is treated as panel data. The cross sectional data represents the companies included in the sample and the time series represents a maximum of eleven years. Since there are missing values in the time dimension the data is of unbalanced character. Panel data is preferable thus it provides more reliable results than a pooled data, through increased number of degrees of freedom and as far as it is possible mitigates the problem with multicollinearity. Furthermore, the panel data gives the advantage to control for fixed and random effects caused by omitted variables. Panel data is expressed by the following equation

$$\text{Equation 1: } y_{it} = \alpha + \beta x_{it} + u_{it}$$

where  $y_{it}$  represents the dependent variable,  $\alpha$  represents the intercept of the equation and  $\beta$  is the coefficient of the independent variable  $x$ . (Brooks, 2008)

Diagnostic tests are performed in accordance with the assumptions of the classic linear regression model before conducting the regression. (Brooks 2008) The results of these tests will be presented in chapter four.

#### 3.3.2 Pooled model

In a pooled regression, all data, both cross sectional and time series data would be pooled into one column of data and expressed in one single equation. A pooled regression is estimated by a regular Ordinary Least Square (OLS) regression. Using a pooled regression is the easiest way of dealing with panel data, however it involves some limitations.

The pooled regression assumes the average of all variables and the relationship between them to be constant over time and within the cross sections.

Furthermore, the pooled regression does not account for correlation between the error term,  $u_{it}$ , and the independent variable,  $x_{it}$ , causing heterogeneity in the data. Hence, the regression can lead to severe biased estimates. (Brooks, 2008)

### 3.3.3 Fixed effects model

Due to the limitations of the pooled regression and the risk of getting biased estimates the fixed effect model and random effect model is used in order to deal with these limitations. The fixed effect model decomposes the disturbance term,  $u_{it}$ , into a unit specific effect,  $\mu_i$ , and a reminder disturbance,  $v_{it}$ . The reminder disturbance varies over time and between the cross sectional unit and captures everything that is unexplained about the dependent variable,  $y_{it}$ .

$$\begin{aligned} \text{Equation 2: } y_{it} &= \alpha + \beta x_{it} + \mu_i + v_{it} \\ u_{it} &= \mu_i + v_{it} \end{aligned}$$

In accordance to above notation will the fixed effect model make it possible for the intercepts to vary over the cross sections but not over time and at the same time keep both the cross sectional and time coefficients fixed. Hence, the fixed effect model will only control for variables that change cross sectional and that does not differ over time. (Brooks, 2008)

When the regression is performed with fixed effects in both the cross sectional and the time dimension it enables to test for heterogeneity within the data through a redundant fixed effect test. The redundant test measures the significance of heterogeneity and provides probability values, in terms F-stat and Chi-square, of rejecting the null-hypothesis of homogeneity. If the F-stat and Chi-square shows probability values that enables to reject the null-hypothesis for both cross-section and for period that means that there is heterogeneity in both dimensions that has to be accounted for in the data. (Brooks, 2008)

### 3.3.4 Random effects model

In addition to the fixed effect model there is a random effects model. Both the random and the fixed effect model purpose that there are different intercepts for each entity in the regression and that these intercepts are fixed over time and the relationship between the independent and dependent variables are assumed to be the same, both in period and cross-section. The random effect model is shown below.

$$\text{Equation 3: } y_{it} = \alpha + \beta x_{it} + \omega_{it}, \omega_{it} = \epsilon_i + v_{it}$$

The difference between the random and fixed effect model is that, in the random effect model the intercepts for each cross sectional unit is assumed to be the same both in the time dimension and the cross sectional dimension. In this model, an error term that varies cross sectional but not over time is also added. In order to generate efficient estimates a generalized least square procedure is used. Meaning that you demean all the variables with the weighted mean of y and x over time. By doing this one can ensure that there are no cross-correlations in the error term. Generally, since there are less parameters to be estimated in the random effects model this model saves degrees of freedom and is therefore more efficient than the fixed effects model. However, the random effect model is inconsistent if the null-hypothesis does not hold in contrast to the fixed effect model, which is independently consistent of the hypothesis. (Brooks, 2008)

*Table 2. Efficiency and Consistency*

	<i>H<sub>0</sub> is true</i>	<i>H<sub>1</sub> is true</i>
<i>Random Effect</i>	Efficient Consistent	Inconsistent
<i>Fixed Effect</i>	Inefficient Consistent	Consistent

As presented earlier, a redundant test, using fixed effect in both dimensions, is performed to see if there are any signs of heterogeneity in the regression. If the redundant test indicates that there is heterogeneity in any of the dimensions, a random- or a fixed effects model should be used in order to correct for the heterogeneity. To see if the random effect model is well specified a Hausman test is performed.

Since it is not possible to test for random effects in both dimensions simultaneously the Hausman test is performed two times; one of the tests is performed using random effect in the time dimension and one of the tests is performed using random effects in the cross-section dimension. If the null-hypothesis is rejected in either of the tests, one rejects the fact that random effects are well specified and fixed effects should be used instead. However, it is not optimal to do the effects-testing in each dimension separately. Therefore, one has to demean one of the dimension manually and then run the Hausman test using random effects in the other dimension. By doing so one can run the Hausman test for random effects in both dimensions simultaneously and hence yield a more reliable result. The result of the tests will be presented in the result chapter.

## 3.4 Variables

The two variables that this study will focus on are the percentage of managerial ownership and the percentage of institutional ownership in relation to share repurchase. The other variables of interest have been selected based on theoretical preferences and previous findings concerning the initiation of a share repurchase program. The variables will be described in the following section of this chapter. The regression equation that is used in the study is stated below:

*Equation 4:*

$$\begin{aligned} \text{Repurchase Amount}_{it} = & \\ & \alpha + \beta_1 \text{Institutional Ownership}_{it} + \beta_2 \text{Managerial Ownership}_{it} + \\ & \beta_3 \text{Cash Holdings}_{it} + \beta_4 \text{Return on Asset}_{it} + \beta_5 \text{Debt to Capital}_{it} + \\ & \beta_6 \text{Dividend Yield}_{it} + \beta_7 \text{Book to Market}_{it} + \beta_8 \text{Market Value}_{it} + u_{it} \end{aligned}$$

### 3.4.1 Dependent variable

As stated in the theory chapter there are many different reasons to why a firm buy back own shares. In order to capture the true amount of the repurchased shares the net repurchase is measured.

The net repurchase is measured as the number of repurchased stock during the year less the sold shares. Since the number of outstanding share differs between companies, a repurchase ratio will provide a more fair value than, for example, the actual number of repurchased shares. Hence, the number of repurchased shares is measured as a ratio of the total shares outstanding (net repurchase/total share outstanding).

### 3.4.2 Independent variables

The independent variables have been chosen based on theories and represent some of the most influential factors to initiate a share repurchase. The variables are selected in order to best explain market frictions such as agency cost, information asymmetry, investor clientele and optimal capital structure. In order to bring clarity to the results null-hypothesis are set up for all independent variables. These are stated below.

#### *Institutional Ownership*

Institutional investors play an important role in monitoring the firm and have the ability to exercise control over a firms activities depending on the concentration of the ownership, (Shleifer and Vishny, 1986). According to this, it is of interest to examine how the amount of institutional ownership is affecting a firm's decision to repurchase shares. Some studies indicate a positive relationship between these share repurchase and institutional ownership, which is explained by the favourable taxation of capital gain relative to dividend pay-out (Bartov et. al. 1998) (Ross et al. 2005). On the other hand is Jensen (1986) arguing that a high degree of institutional ownership leads to better monitoring and less information asymmetry, which implies less need of share repurchase as a way of bridge the information gap. Institutional ownership is expressed as the percentage of all shares held by institutions and is defined in accordance with the definitions stated by U.S Securities and Exchange Commission.

*H0: The degree of institutional ownership does not have any significant effect on the amount of shares repurchased.*

## *Managerial Ownership*

The agency theory states that economic incentives are used to mitigate costs associated with managers not handling in the interest of shareholders (Shliefer and Vishny, 1997). Previous research by Fenn and Liang (2000) argue that management incentives to buy back shares increase with the amount of shares owned by management due to the effect of an upward pressure on the share price. According to the agency theory and previous research it can intuitively be argued that managerial ownership has a significant impact on the amount of shares repurchased. The managerial ownership is measured as the percentage of shares outstanding owned by managers and executives in the firm.

*H0: The degree of managerial ownership does not have any significant effect on the amount of shares repurchased.*

## *Cash holding*

In accordance to the agency theory (Easterbrook 1984 & Jensen 1986) the agency cost of free cash flow is something that a firm can reduce by distributing excess cash to the shareholders. Several previous studies indicate that there is a correlation between cash holdings and share repurchase. Lie (2000) finds that cash holdings are positively correlated with share repurchase. Considering that the Swedish market is different in terms of ownership structure and, hence monitoring, this would mean that the cash holding variable could be less influential than previous studies show, which motivates the choice of including cash holdings in the regression model. The cash holding variable represents the firms' cash and cash equivalents as a percentage of the firms' size in terms of total assets. According to previous research, cash holdings and share repurchase is expected to positively correlate with each other. This is due to the fact that share repurchase can reduce the agency cost of free cash flow (Easterbrook, 1984 & Jensen, 1986).

*H0: The degree of cash holdings does not have any significant effect on the amount of shares repurchased.*

## *ROA*

According to the Cash Flow Hypothesis, share repurchase can be used with the intention to reduce information asymmetry of increased future cash flows, and thereby impact the market value positive. Grullon (2000) argues for the use of share repurchase as a strategy for firms to increase their profitability on assets. Thus, firms that have conducted a share repurchase indicate signs of higher ROA. ROA is used in order to measure the firms' profitability and is expressed as Net Income divided by total assets. ROA is used as a proxy for the firms' profitability and is included as an independent variable in order to test the effect of management signalling theory (Barkov et al. 1998).

*H0: ROA does not have any significant effect on the amount of shares repurchased.*

## *Debt to Capital*

According to Jung et al. (1996) each firm has an optimal capital structure. Share repurchase can be used as a tool to tune the capital structure of the firm. Since a share repurchase leads to an increase in leverage of the firm without changing the market value of capital.

Therefore it can be argued that firms with low debt to capital ratio use share repurchase as a way to increase their leverage. The debt to capital variable is calculated as the total value of interest bearing debt divided by the total capital.

*H0: The amount of debt does not have any significant effect on the amount of shares repurchased.*

## *Dividend yield*

Many studies, among them Ross et al. (2005), presents evidence of an increase in share repurchase while dividend payments have decreased. Hence, share repurchase can be seen as a substitute to dividends. The management flexibility and tax effects play an important role in this trend. Allen et. al. (2000) argues that marginal tax difference on capital gains will affect corporate decisions based on the stakeholders' preferences. The reason why this variable is

interesting to look at is because a lot of the Swedish Large Cap companies have institutional owners in both US and Europe where tax on dividend payments are higher than on capital gain. Furthermore, Swedish institutions are not subject to taxation on capital gains. Because of capital gain tax advantage and because share repurchase can be seen as a substitute to dividend payments this variable is expected to be negatively correlated with the dependent variable. The dividend variable is simply the dividend yield.

*H0: The dividend yield does not have any significant effect on the amount of shares repurchased.*

### *Book to market*

The ratio works as a proxy in order to identify any potential under- overvaluation of the firm and captures the effect of signalling hypothesis. Previous studies show sign of undervaluation as a factor for initiate a share repurchase (Ikenberry et. al. 1995) (Bartov et al. 1998). Book to market measures the firms' book value of equity in relation to its market capitalization.

*H0: The book to market ratio does not have any significant effect on the amount of shares repurchased.*

### *Market Value*

Gryglewicz (2004) argues that the size of the firm determines the company's share repurchase policy. Where smaller firms, which are assumed to have higher information asymmetry than large firms, tend to repurchase shares to a higher extent in order to reduce the information asymmetry. Allen et al. (2002) further states that dividend pay-out should be avoided by firms with high degrees of information asymmetry. Which could imply of a negative relationship between share repurchase and dividend pay-out. Market value is used as a proxy for firm size and is measured as the consolidated value of all common shares outstanding.

*H0: The market value does not have any significant effect on the amount of shares repurchased.*

## 3.5 Descriptive statistic

To get an overview of the data a descriptive statistic test is performed. Statistics such as, mean, skewness, kurtosis and Jarque-Bera are presented in the result chapter. According to the Jarque-Bera test, is the data assumed to be normally distributed if the probability value takes on a value higher than 0.05 (at a 5% significance level). However, the non-normality is considered not an issue as long as the sample is sufficiently large (Brooks 2008). A sufficiently large sample is not exactly specified but some argues that if the number of observations is above 30 the non-normality is not an issue. If the descriptive test also indicated extreme kurtosis or skewness, meaning “flat tails” is observed, logged values can be used to deal with this problem.

### 3.5.1 Multicollinearity

In order to produce a reliable result using OLS estimation the assumption of non-multicollinearity must hold. This means that there must be no relationship between the independent variables.

If the independent variables are correlated with each other it could cause biased estimates. Generally, there will be some correlation between the variables that does not cause any severe problem to the estimates.

However, if the correlation is too high the, i.e. larger than 0.8, the precision in the variables will be affected (Brooks 2008). In the result chapter the result of the correlation matrix is presented.

### 3.5.2 Linearity or non-linearity

To test whether a linear or a non-linear regression model is appropriate to use a RESET test is performed. The RESET test indicates if a straight line could explain the relationship between the dependent variable and the independent variable(s) or not. If it is not possible to reject the null-hypothesis there is no apparent non-linearity. To deal with a potential non-linearity problem one can use logged values. The result of the RESET test is presented in the result chapter.

### 3.5.3 Heteroscedasticity

According to the second assumption in OLS model, the variance of the error terms has to be constant. If there is sign of heteroscedasticity then the estimate of the regression can be biased. In order to control for heteroscedasticity a White test is performed. If the null-hypothesis of homoscedasticity cannot be rejected one has to control for heteroscedasticity. The result of the White test is presented in the result chapter.

### 3.5.4 Autocorrelation

Autocorrelation implies that the correlation between the error terms, in both the cross sectional and period dimension, is non-zero. Autocorrelation can lead to that wrong interpretation whether or not the independent variable is affecting the dependent variable. Thus, leading to higher probability of type I and II error. In order to test that the assumption is not violated a Durbin-Watson test can be performed. A value of the Durbin-Watson test close to 0 and 4 indicates positive and negative autocorrelation, respectively. To be able to conclude no evidence of autocorrelation the stats of Durbin-Watson should indicate a value within the critical range of 1.57 – 2.43. (Brooks, 2008)

### 3.5.5 Testing for endogeneity

To be able to produce unbiased estimates in a regression the assumption of non-stochastic estimates must hold. If this assumption holds the variable is considered to be an exogenous variable. Meaning that the variable is statistically independent of the stochastic error terms in the model. In cases where this assumption does not hold the variable is an endogenous variable, i.e. correlated with the stochastic error term. This is caused by unobserved elements hidden in the error term. Endogeneity can also be caused by reversed causality which refers to when the independent variable is affected by the dependent variable. The endogeneity problem can lead to wrong interpretation of the variables, i.e. rejecting a hypothesis that is in fact true, type I error, or fail to reject a hypothesis that is in fact false, type II error. (Brooks, 2008).

Based on the theory and the relationship between the variables one can suspect that there might be endogenous variables within the data. Intuitively one can argue for that there might be an endogeneity problem caused by the variables that are directly affected by changes in asset base and book value of equity. Hence, “*Cash to Assets*”, “*Book to Market*”, *Market Value* and “*ROA*” can be variables causing reversed causality. To check whether or not “*Cash to Assets*”, “*Book to Market*”, *Market Value* and “*ROA*” is endogenous a Hausman test is performed using an instrumental variable (IV). In order to be a valid IV, the IV has to fulfil two requirements (Brooks, 2008):

- 1) The IV has to be relevant – e.g IV must be correlated with the endogenous variable.
- 2) The IV must be exogenous – e.g IV must be uncorrelated with the error term.

To test for the endogeneity problem, for the variables that intuitively could be argued as exogenous “*Cash to Assets*”, “*Book to Market*”, *Market Value* and “*ROA*”, a variable measuring the total asset value is introduced. By running a regression with the potential endogenous variables as dependent variable and include one new variable “*asset value*” as an independent variable it is possible to determine if “*asset value*” is fulfilling the requirements as IV. If the IV is significant it is valid since it is relevant and therefore corresponds to the first assumption. It is not possible to test the second requirement since the error term is unobserved. Instead of test the second requirement one can look at the correlation matrix; if the correlation between the IV and the dependent variable is zero or close to zero the second requirement is assumed to be fulfilled. To make sure that the IV model works it has to be identified or over identified.

Meaning that the number of IVs has to be at least equal to the number of endogenous variables. (Brooks, 2008) Since the potential endogenous variables are tested one by one, this model is identified since number of IVs is equal to the number of endogenous variables. The results of the steps described above will be presented in the result-chapter.

### 3.6 Reliability and Validity

The overall method selection follows previous studies performed within the subject and is therefore to be considered as an approved way of addressing the research question, Houcine (2013), Skjeltop & Ødegaard (2004). The data used in the regression is collected from reliable sources and the sample is checked by comparing to company specific annual reports in order to ensure credibility. All statistical tests and the choice of regression model follow Brooks (2008) and are widely used in comparable studies. Theories used as fundamental framework in this study is based on foreign data, which could imply that these are not applicable for the market this study examines. Tax is an explanatory variable that is essential in previous studies, however some of the institutional investors might face different tax regulations. This study does not take the geographical location of the institutional investors into account, hence it could be hard to make any general assumptions regarding the tax effect. The variables in the study are selected based on theories concerning share repurchase and previous studies which have investigated the relevance and significance of these (Miller & Rock, 1985) (Ikenberry et al. 1995). The managerial ownership is capturing the direct ownership in terms of common shares owned by managers and executives and does not cover other incentives that are dependent on the share. This makes the managerial ownership most likely downward biased in the regression and can cause misinterpretations.

## 4 Results

Firstly in this chapter the result of all diagnostic tests will be presented. Secondly the empirical findings from the regression is presented. An in depth discussion of the finding will be held in chapter 5 analysis.

### 4.1 Diagnostic tests

#### *Normality test*

*Table 3. Descriptive statistics.*

<i>Variables</i>	<i>Skewness</i>	<i>Kurtosis</i>	<i>Jarque-Bera</i>	<i>Probability</i>
<i>Ln. Repurchase Amount %</i>	-2.683771	9.206118	2022.597	0.000000
<i>Ln. Manegerial Ownership %</i>	0.300863	2.119298	34.17872	0.000000
<i>Institutional Ownership %</i>	-0.118325	3.007846	1.684281	0.430788
<i>Ln. Debt to Capital</i>	-2.042748	10.50307	2192.661	0.000000
<i>Ln. Cash to Assets</i>	-1.777296	8.022161	1137.294	0.000000
<i>Ln. Book to Market</i>	0.678770	4.714015	143.6221	0.000000
<i>Dividend Yield</i>	0.113480	2.696623	4.312440	0.115762
<i>ROA</i>	-0.618194	16.84745	5806.466	0.000000
<i>Ln. Market Value</i>	0.258579	2.897435	8.350772	0.015369
<i>N:</i>	721			

According to exhibit one, in appendix, most of the variables suffer from non-normal distribution. In order to increase the significance of normal distribution following variables are logged; *Repurchase Amount*, *Management Ownership*, *Institutional Ownership*, *Debt to Capital*, *Cash to Assets* and *Book to Market*. The logged values, in the above table, are showing improved values for all normality measures in comparison to exhibit one. As can be seen in the table above the variables are skewed, and indicate asymmetry from normal distribution. Furthermore are the descriptive statistics showing significant kurtosis values, which indicates flat tails in all of the variables. The probability of Jarque-Bera specifies that the null-hypothesis of normal distribution is rejected on a 1 % level for all of the variables except “*Institutional Ownership*” and “*Dividend Yield*”. Hence, it is just “*Institutional Ownership*” and “*Dividend Yield*” that is significantly normally distributed.

Considering the large sample of 721 observations the non-normality for the majority of the variables is not considered an issue in this study.

### *Multicollinearity*

The problem of multicollinearity occurs when some of the independent variables have a correlation above  $\pm 0.8$ . As can be seen in the table below the highest (lowest) correlation is the correlation between book to market and debt to capital. The correlation between these variables is  $-0.446$ . Hence, no multicollinearity problem exists in the data set.

*Table 4. Correlation matrix.*

Variables	Ln. Repurchase Amount %	Ln. Managerial Ownership %	Institutional Ownership %	Ln. Debt to Capital	Ln. Cash to Assets	Ln. Book to Market	Dividend Yield	ROA	Ln. Market Value
Ln. Repurchase Amount %	1								
Ln. Managerial Ownership %	-0,0125	1							
Institutional Ownership %	-0,0648	-0,3932	1						
Ln. Debt to Capital	0,0040	0,0736	-0,0829	1					
Ln. Cash to Assets	0,0064	-0,1546	0,1782	-0,2797	1				
Ln. Book to Market	-0,0333	-0,0986	-0,1114	0,4462	-0,4534	1			
Dividend Yield	-0,0232	-0,2192	0,0119	0,1527	-0,0543	0,1736	1		
ROA	0,0181	0,1169	0,0184	-0,1989	0,1739	-0,3978	-0,0731	1	
Ln. Market Value	-0,0431	-0,4327	0,1069	-0,0414	-0,0162	-0,0409	0,2034	0,0314	1

### *Linearity or non-linearity*

The result from the RESET test is presented below. After logging some of the variables used in this study one can conclude that a linear relationship is appropriate. The F-statistic does not exceed the critical value and the probability is 0.482 it can be concluded that a linear model is appropriate to use in this study. The values in table four can be compared to the the RESET test made on only unlogged variables. This test indicated a non-linear relationship, which further implies that some variables should be logged.

*Table 5. RESET test.*

	Value	df	Probability
<i>t-statistic</i>	0.550053	711	0.5825
<i>F-statistic</i>	0.302558	(1, 711)	0.5825
<i>Likelihood ratio</i>	0.306748	1	0.5797

### *Heteroscedasticity test*

According to the table 5, presenting the outcome of a White test, the F-stat probability of 0.664 indicates that the null-hypothesis of homoscedasticity cannot be rejected. Hence, there is no sign of heteroscedasticity with in the data that has to be controlled for.

*Table 6. White test*

<i>F-statistic</i>	0.8968	<i>Prob. F(44.676)</i>	0.6635
<i>Obs*R-squared</i>	39.76478	<i>Prob. Chi-Square(44)</i>	0.6536
<i>Scaled explained SS</i>	159.9669	<i>Prob. Chi-Square(44)</i>	0

### *Autocorrelation*

According to table 7 the Durbin-Watson stat is 1.53 and indicating a weak positive autocorrelation. Since the value is considered to be close to the critical value of 1.57, indicating no evidence of autocorrelation, no adjustments are made and the assumption of no autocorrelation is assumed to hold further in the regression.

### *Endogeneity*

When testing the relevance of “Total Assets” as an IV it shows significant values on a 1 % level for all four variables “Cash to Assets”, “Book to Market”, Market Value and “ROA”. Hence, “Total Assets” is significantly valid to use as an instrumental variable in order to test for endogenous variables. The retrieved fitted values for the four potential endogenous variables, “Cash to Assets”, “Book to Market”, Market Value and “ROA” are only significant for “Book to Market”. Thus, “Book to Market” is the only variable that is statistically endogenous with a probability value of 0.006. Running a regression using the Two Stage Least Square method (TSLS) with “Total Asset” as the IV the regression will account for the endogeneity issue.

## *Heterogeneity*

In order to test for heterogeneity the regression is performed using fixed effects in both the cross sectional and time dimension and then a redundant test is performed. The results are presented below:

*Table 7. Redundant test*

<u>Redundant Fixed Effects Tests</u>			
<i>Test cross-section and period fixed effects</i>			
<i>Effects Test</i>	<i>Statistic</i>	<i>d.f.</i>	<i>Prob.</i>
<i>Cross-section F</i>	2.148859	-69.633	0
<i>Cross-section Chi-square</i>	151.735922	69	0
<i>Period F</i>	4.427768	-10.633	0
<i>Period Chi-square</i>	48.747484	10	0
<i>Cross-Section/Period F</i>	2.439488	-79.633	0
<i>Cross-Section/Period Chi-square</i>	191.630786	79	0

The F-stat and Chi-square are highly significant for both the cross sectional and the time dimension. Hence, the null-hypothesis of homogeneity is rejected for both cross section and period. The statistically significant heterogeneity limits the regression to be determined with either fixed or random effect since a standard pooled regression does not account for heterogeneity.

If random effect is well specified the model is generally more effective than fixed effect model in controlling for heterogeneity. Due to the fact there is heterogeneity in both dimensions and that e-views does not offers the ability to test for random effects in cross section and time dimension simultaneous is this done manually, using within transformation. Within transformation is used in order to conclude whether random or fixed effects is more efficient.

The Hausman tests fails with the random effect specification in both dimensions which indicates that it is unable to determine if the random effect is efficient, see exhibit 5 and 6. Since fixed effects is consistent under both hypothesis, the fixed effects model is chosen in both dimensions in order to control for heterogeneity. Hence, the higher efficiency if the null-hypothesis holds is ignored.

## 4.2 Interpretation of Regression Coefficients

Since both the dependent variable and some of the independent variables are log-transformed, one have to use both the log-linear and log-log methodology in order to interpret the results.

The log-linear model is used to interpret unlogged independent variables in relation to a logged dependent variable. To capture the unlogged effect of changes in X on Y one have to multiply the expected value of Y by  $e^\beta$ . Hence, one-unit change in X will affect Y by  $e^\beta$ .

The log-log model is used to interpret logged independent variables in relation to a logged dependent variable. This type relationship is commonly referred to as an elastic relationship. The interpretation of the coefficients is the same as in an unlogged model. Hence, one-unit change in X will cause an effect in Y equal to the coefficient.

*Table 8. TSLS Regression Result*

*Dependent Variable: Ln. Repurchase Amount %*

*Method: Panel Two-Stage Least Squares*

*Date: 05/21/15 Time: 17:18*

*Sample: 2004 2014*

*Periods included: 11*

*Cross-sections included: 70*

*Total panel (unbalanced) observations: 721*

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
<i>Ln. Manegerial Ownership %</i>	-0.232255	0.187533	-1.238476	0.2160
<i>Institutional Ownership %</i>	3.461447	2.245382	1.541585	0.1237
<i>Ln. Debt to Capital</i>	1.469688	0.733995	2.002314	0.0457
<i>Ln. Cash to Assets</i>	-0.599981	0.355665	-1.686929	0.0921
<i>Ln. Book to Market</i>	-15.28549	6.865133	-2.226539	0.0263
<i>Dividend Yield</i>	-35.28478	20.59053	-1.713641	0.0871
<i>ROA</i>	0.044358	0.031829	1.393620	0.1639
<i>Ln. Market Value</i>	-8.973222	3.786361	-2.369880	0.0181
<i>C</i>	152.0606	64.81549	2.346054	0.0193

*Cross-section fixed (dummy variables)*

*Period fixed (dummy variables)*

<i>R-squared</i>	-0.774796	<i>Mean dependent var</i>	-1.207755
<i>Adjusted R-squared</i>	-1.018725	<i>S.D. dependent var</i>	3.226138
<i>S.E. of regression</i>	4.583756	<i>Sum squared resid</i>	13299.85
<i>F-statistic</i>	2.528808	<i>Durbin-Watson stat</i>	1.532901
<i>Prob(F-statistic)</i>	0.000000	<i>Second-Stage SSR</i>	5560.960
<i>Instrument rank</i>	89	<i>Prob(J-statistic)</i>	0.000000

The above table displays the result of our regression. Three of the independent variables, institutional ownership, dividend yield and ROA are unlogged. In order to interpret these variables each unit increase in  $X_i$  has to be multiplied by  $e^\beta$ . The coefficients of these three variables will adopt the following values:

$$\text{Institutional ownership: } e^{3.461} = 31.849$$

$$\text{Dividend yield: } e^{-35.284} = 4.746E-16$$

$$\text{ROA: } e^{0.0443} = 1.045$$

The coefficient related to institutional ownership adopts a value of 31.848. This means that a one percentage increase in institutional ownership would cause an increase in repurchase amount by 31.849 %. Since the repurchase amount is stated as a ratio of the total shares outstanding it is important to stress that the increase of 31.849 % is a relative increase and not an absolute increase. The dividend yield coefficient adopts a negative value of 4.746E-16. Since the coefficient adopts such a small value it can be concluded that this variable have very limited impact in the dependent variable. ROA takes on a value of 1.045. Hence a percentage increase in ROA would have a positive effect on repurchase amount by 1.045%. However, neither of the coefficients are significant at the 5% significance level.

The interpretation of the logged variables is as follows. The management ownership coefficient is -0.232. Thus, a one-unit increase in managerial ownership would affect the repurchase ratio by -0.232 %. The debt to capital coefficient takes on a value of 1.469. Consequently an increase in the amount of debt relative to total capital would increase the repurchase amount ratio by 1.469 %. The cash to total asset coefficient is -0.599. Hence, an increase in cash in relation to total asset would negatively affect the dependent variable by 0.599 %. Both the book to market coefficient and the market value coefficient takes on quite large values in relations to the other coefficients. The values of these coefficients are -15.285 and -8.973 respectively. Thus, an increase in either book to market or market value would have a negative impact in the repurchase amount by 15.285 and 8.973 percentages respectively.

## 5 Analysis

*The following section comprises a discussion of the empirical results in relation to the theory and previous findings. Possible reasons for why the results in this study differs from what the theory and previous findings will be outlined.*

### 5.1 Institutional ownership

According to the regression result in table 6, the institutional ownership shows no significant impact on share repurchases. Even though the variable lack significance it can be argued that there is indication of large influence by institutions to what extent firms repurchase shares. The coefficient implies a 31.8 unit increase in repurchase amount when the institutional ownership increase by one-unit, and is thus the variable that indicates the largest impact on share repurchase. The high influence of institutions confirms Allen et. al. (2000) theory of concentrated ownerships ability to exercise control over managers. These results are also consistent with Bartov et. al. (1998) and Ross et al. (2005), who explains the positive relationship with institutional investors' tax-preference. Both in the US and in most European countries institutional investors prefer share repurchase to dividends. The favourable taxation of capital gains compare to dividend is applicable for Swedish institutions as well (39 kap. 14§ IL), since capital gains are tax-exempt while dividends are not. This further argues for a positive coefficient value. However, some of the institutional investors in the sample might be from other countries where different tax regulations are applied. Hence, it is hard to conclude that the tax motive is valid for all institutions included in the sample. The positive coefficient of institutional ownership contradicts Jensens (1986) view of reduced need of share repurchase when there is a concentrated ownership. Nevertheless the contradiction of Jensen's argumentation cannot be significantly determined. But the coefficient strongly indicates that the tax effects of a share repurchase is of greater value for institutions than the monitoring effect of share repurchase.

## 5.2 Managerial ownership

Previous research argues that high managerial exposure to the firm's market value, in terms of shares, options etc., works as a strong incentive for managers to engage in share repurchase since this tends to put an upward pressure on the share price (Fenn and Liang, 2000), hence a positive relationship is expected. In contrast, this study indicates a reversed relationship with a coefficient of -0.25, also there is a substantial lack of significance which makes it hard to make any general assumptions. The low significance and coefficient value can be a result of the fact that only actual shares owned by the management are accounted for. Hence are stock options and other adequate instruments used as incentives ignored in this study. It is most reasonable to believe that stock options etc. accounts for a considerable amount of managers total incentive program. Further it can be argued that firms with high levels of concentrated ownership are subject to a higher degree of monitoring. A study by Lekvall (2009) states that Sweden is categorized by relatively high concentration of ownership, hence manager's ability to engage in self-beneficial activities are reduced. Management ability to repurchase share in order to increase the value of their own stock options is therefore limited.

## 5.3 Cash

This study shows a small negative relation between the company's cash holding, expressed in percentage of total assets, and shares repurchased. The regression result is significant on a 10 % level and can therefore be considered weak when making general assumptions. The fact that coefficient adopts a negative value contradicts the intuitive argument. Theories within this area are seemingly consistent that a large amount of excess cash is positively related to share repurchase. The positive relationship is described by the fact that share repurchase can be used to mitigate agency cost of free cash flow (Easterbrook, 1984) (Jensen, 1986). In order to find a reasonable explanation to the negative relation the three main reasons for share repurchase are considered. Firstly, a way for management to bridge the information asymmetry through signals to the market. A negative relation could in that case indicate that firms use "fake" signals to a higher extent than earlier research shows. Generally are these signals costly both in terms of cash outflow but also in terms of decreased ability to engage in future investments.

Secondly, mitigating agency cost of free cash flow and restrict managers to invest in negative NPV projects.

As discussed earlier is Sweden characterized by concentrated ownership which could imply high degree of monitoring. Hence, the overinvestment problem is already controlled for. Lastly, repurchase is a way of tuning the company's capital structure. If the amount of cash holding is not a significant source of repurchase then it could indicate that firms instead are using debt to finance the share repurchase. By using debt to repurchase shares the debt relative to capital increases.

## 5.4 ROA

As can be seen in the result of the regression the ROA coefficient adopts a positive value of 1.05, meaning that when the ROA variable increases by one percentage the repurchase amount will increase by 1.05 %. The intuition regarding this variable is that the relationship would be negative. As the ROA goes down management can execute a share repurchase and by doing so increase the profitability measure again. The reason why this coefficient is positive could be explained by the fact that the asset base is actually reduced when a share repurchase is executed. Another possible explanation to this is that, when excess cash is reduced the overinvestment problem becomes less severe. Ultimately this leads to fewer investments in non-value crating projects and an increase in ROA. However, the coefficient is not significant and it is therefore hard to draw any definite conclusions.

## 5.5 Debt to capital

It is argued that each firm has an optimal capital structure and that share repurchase can be an effective tool to tune the capital structure in an optimal way. Jung et al. (1996) argues that the agency costs associated with managerial discretion is a decreasing function of leverage while the agency cost of debt is an increasing function of debt. The optimal capital structure is when these two effects are offsetting each other. The debt to capital coefficient takes on a value of 1.57 and it is significant at a 5 % significance level. Since each individual firm has its own optimal capital structure it is hard to draw any conclusion whether firms initiate a share repurchase to reach this level or not.

However, one can see that the debt to capital level has a significant positive impact on share repurchase amount. One possible explanation to this relationship is that the repurchases are financed with debt.

If management want to increase the level of debt without having any projects to invest in, an option could be to borrow money and distribute these to the shareholders via a share repurchase. By doing so, management would both signal undervaluation and reach a better capital structure. This way of signalling undervaluation would also be very costly to mimic, hence it would be a very strong signal to the market.

## 5.6 Dividend yield

The dividend yield variable is one of the unlogged variables hence in order to retrieve the true value of the coefficient it is recalculated. The value of the dividend yield coefficient is 4.75E-16 and significant at a 10 % level. The impact on share repurchase can therefore be seen as very limited. According to previous research (Fenn and Liang, 2000) share repurchase is commonly used as a complement or even a substitute to dividends. Allen et al. (2000) also find that, in comparison to dividends, the popularity of share repurchases has increased substantially. The very limited impact of this variable on the dependent variable would point in a direction were the share repurchase is used as a compliment rather than substitute to dividends. However, this conclusion is hard to make since the relation between institutional investors, who face tax advantage on capital gain in relation to dividend, is not examined in this study.

## 5.7 Book to market

The book to market coefficient is negative (-16.31) and significant at a 5 % level. The interpretation of the impact of this variable on share repurchase is, when the book to market ratio increase by one unit the share repurchase amount will decrease by 16.31 units. Since the book to market value is an indicator whether the stock is undervalued or not, this variable should intuitively have an impact on a firms' decision to repurchase their own shares. This is due because the initiation of a share repurchase can be seen as a signal of undervaluation (Ikenberry et al. 1995).

Hence, firms with low book to market value would be more likely to undertake a share repurchase program in order to adjust the stock price. The results in this study points in a direction that support their argumentation. As the book to market value increases firms tend to execute less share repurchases.

This is also in line with previous research (Brav et al. 2005) who finds empirical evidence that firms initiate share repurchases when the stock is considered undervalued. The book to market coefficient is significant and takes on a value of -16.31 which is relatively large compare to the other coefficients in the regression. Thus, it can be concluded that the value of the firm is a decisive factor when firms chose to execute a share repurchase.

## 5.8 Market value

The market value coefficient is negative (-9.56) and significant at a 5 % level. The negative impact on share repurchase indicates that as the market value, as a proxy for firm size, increase the less amount of shares are the firms repurchasing. According to the theory, market value will affect the level of information asymmetry between the firm and the market. The level of monitoring is usually better for larger firms. Hence, the information asymmetry problem is less severe for larger firm. This would imply that, in order to overcome the agency costs related to information asymmetry, larger firms would not use share repurchase to the same extent as smaller firms. Which the results in this study also indicates. Since the market value coefficient is negative, this would imply that as the firm is growing, in terms of market value, the share repurchase amount decreases. The fact that this study only investigates share repurchases made by firms on the NASDAQ OMX Large Cap put some limitations on the coefficient. Since the investigated firms are relatively equal in size the coefficient could have taken on a different, potentially larger value, if firms listed at other minor lists were incorporated in the study. Nevertheless, the coefficient is in fact significant at a 5% level and the impact is negative which support the argumentation made above.

## 6 Conclusion

*In this chapter the research questions are answered and a final conclusion regarding the empirical results is outlined. Furthermore, a proposal for future research is presented.*

The main purpose of this study is to examine to what extent different factors are affecting a firm's decision regarding share repurchase by answering the following questions: "Is there any relationship between managerial- and institutional ownership and Swedish companies share repurchase policies?", "Based on traditional finance theories and previous research, what other variables may effect a company's decision to initiate a share repurchase?" and "What could possibly explain a potential relationship?"

The findings in this study indicate that the ownership structure strongly influences the firm's decision of share repurchase policy. The managerial ownership shows a small negative relationship to share repurchase and is therefore indicating a reversed relationship compared to most of the previous findings. Since the significance is quite low no greater importance is attached to this variable. However, the main factor that seems to determine the amount of shares being repurchased is the size of the total institutional ownership. It is already concluded that the Swedish market is characterized by concentrated ownership, which most likely can explain the high impact of institutions. Not only is the institutional ownership indicating strong relationship to share repurchase it is also the variable presenting the highest coefficient value. Hence, representing the most essential factor in the study. Considering the positive relationship it can be argued that institutions seem to use their power to benefit on favourable taxation. The fact that managerial ownership has very low impact on share repurchase and that institutional ownership has a relatively high impact on share repurchase could also be explained by the characteristics of the Swedish governance system. Which has a strong focus to align the interest between managers and institutional owners.

Based on the result of this study it can be concluded that the variables that have a significant impact on the share repurchase amount is the book to market variable and the market value variable. Both these variables adopt a negative coefficient value, which is in line with previous findings and confirms the intuitive argumentation in this study. The negative relationship between book to market and share repurchase could be explained by the signalling hypothesis.

Further, this relationship implies that managers seem to believe that share repurchase is an effective tool to communicate an undervaluation of the firm. Whereas the negative relationship between market value and share repurchase could be explained by the fact that larger firms tend to be more highly monitored and therefore face a less severe information asymmetry problem. These firms are therefore in less need of using share repurchases as a way to bridge an information gap. None of the other variables shows any significant relationship to share repurchase, hence no general conclusions can be made regarding these variables.

Finally it can be concluded that the factors that seem to be influential on the share repurchase decision making are institutional ownership, book to market and market value.

## 6.1 Proposal for further research

This study is mainly focusing on the relationship between share repurchase and the institutional and managerial ownership. It is concluded that there is no significant relationship between managerial ownership and share repurchases. Moreover, the insignificant managerial ownership coefficient is negative, which indicates an opposite relationship compared to theories and previous studies. Since this study does not include management's stock option holdings the significance and the value of the coefficient could be questioned. Therefore, one suggestion for further research is to include the management stock option holding and by doing so improve the validity of the managerial ownership coefficient.

Furthermore, this study only includes companies listed on the Stockholm OMX Large Cap list. By including companies listed at other, minor lists, one could possibly make other conclusions regarding the information asymmetry in small versus large firms and the use of share repurchases. Hence, a research on the same topic with a wider sample would be of interest.

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## 8 Appendix

### 8.1 Exhibit 1. Descriptive statistics for unlogged variables.

<i>Variables</i>	<i>Skewness</i>	<i>Kurtosis</i>	<i>Jarque-Bera</i>	<i>Probability</i>
<i>Repurchase Amount %</i>	9.396641	103.4821	313930.3	0.000000
<i>Manegerial Ownership %</i>	2.987369	11.65071	3320.573	0.000000
<i>Institutional Ownership %</i>	-0.118325	3.007846	1.684281	0.430788
<i>Debt to Capital</i>	1.309864	4.188882	248.6372	0.000000
<i>Cash to Assets</i>	2.476540	11.33359	2823.369	0.000000
<i>Book to Market</i>	9.339856	142.4525	594702.7	0.000000
<i>Dividend Yield</i>	0.113480	2.696623	4.312440	0.115762
<i>ROA</i>	-0.618194	16.84745	5806.466	0.000000
<i>Market Value</i>	2.859483	11.47840	3142.055	0.000000
<i>N:</i>	721			

### 8.2 Exhibit 2. RESET test unlogged values.

	<i>Value</i>	<i>df</i>	<i>Probability</i>
<i>t-statistic</i>	4.508031	711	0
<i>F-statistic</i>	20.32234	(1, 711)	0
<i>Likelihood ratio</i>	20.31915	1	0

### 8.3 Exhibit 3. Testing validity of IV.

Dependent Variable: Ln. Book to Market

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
<i>Ln. Manegerial Ownership %</i>	-0.049016	0.010912	-4.492010	0.0000
<i>Institutional Ownership %</i>	-0.158731	0.145567	-1.090432	0.2759
<i>Ln. Debt to Capital</i>	0.140080	0.019655	7.127030	0.0000
<i>Ln. Cash to Assets</i>	-0.168716	0.015088	-11.18193	0.0000
<i>Dividend Yield</i>	4.808004	1.460901	3.291122	0.0010
<i>ROA</i>	-0.021477	0.002656	-8.087778	0.0000
<i>Ln. Market Value</i>	-0.233157	0.021524	-10.83250	0.0000
<i>ASSETS</i>	7.54E-10	3.88E-11	19.44183	0.0000
<i>C</i>	3.408249	0.351154	9.705856	0.0000
<i>R-squared</i>	0.630181	<i>Mean dependent var</i>		0.097662
<i>Adjusted R-squared</i>	0.626026	<i>S.D. dependent var</i>		1.049810
<i>S.E. of regression</i>	0.641995	<i>Akaike info criterion</i>		1.963931
<i>Sum squared resid</i>	293.4560	<i>Schwarz criterion</i>		2.021110
<i>Log likelihood</i>	-698.9971	<i>Hannan-Quinn criter.</i>		1.986004
<i>F-statistic</i>	151.6583	<i>Durbin-Watson stat</i>		0.696974
<i>Prob(F-statistic)</i>	0.000000			

## 8.4 Exhibit 4. Testing if “Book to Market” is exogenous.

*Dependent Variable: Ln. Repurchase Amount %*

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.</i>
<i>Ln. Manegerial Ownership %</i>	-0.157372	0.058025	-2.712115	0.0068
<i>Institutional Ownership %</i>	-1.993832	0.735228	-2.711857	0.0069
<i>Ln. Debt to Capital</i>	0.183835	0.112468	1.634547	0.1026
<i>Ln. Cash to Assets</i>	-0.132986	0.092220	-1.442049	0.1497
<i>Ln. Book to Market</i>	0.020041	0.187547	0.106860	0.9149
<i>Dividend Yield</i>	-2.172047	7.392833	-0.293804	0.7690
<i>ROA</i>	-0.007371	0.014911	-0.494329	0.6212
<i>Ln. Market Value</i>	-0.227725	0.105372	-2.161159	0.0310
<i>Retrieved Fitted Values</i>	-0.695084	0.318481	-2.182500	0.0294
<i>C</i>	2.764253	1.711888	1.614739	0.1068
<i>R-squared</i>	0.020659	<i>Mean dependent var</i>		-1.207755
<i>Adjusted R-squared</i>	0.008263	<i>S.D. dependent var</i>		3.226138
<i>S.E. of regression</i>	3.212782	<i>Akaike info criterion</i>		5.185924
<i>Sum squared resid</i>	7338.920	<i>Schwarz criterion</i>		5.249456
<i>Log likelihood</i>	-1859.526	<i>Hannan-Quinn criter.</i>		5.210449
<i>F-statistic</i>	1.666511	<i>Durbin-Watson stat</i>		1.425511
<i>Prob(F-statistic)</i>	0.093285			

## 8.5 Exhibit 5. Hausman test, Cross-section.

*Correlated Random Effects - Hausman Test*

*Test cross-section random effects*

<i>Test Summary</i>	<i>Chi-Sq. Statistic</i>	<i>Chi-Sq. d.f.</i>	<i>Prob.</i>
<i>Cross-section random</i>	13.630619	8	0.0919

## 8.6 Exhibit 6. Hausman test, Period dimension.

*Correlated Random Effects - Hausman Test*

*Test period random effects*

<i>Test Summary</i>	<i>Chi-Sq. Statistic</i>	<i>Chi-Sq. d.f.</i>	<i>Prob.</i>
<i>Period random</i>	11.463530	8	0.1768

8.7 Exhibit 7. Hausman test, Cross-section,, using within transformation.

Correlated Random Effects - Hausman Test

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	7	1.0000

\* Cross-section test variance is invalid. Hausman statistic set to zero.

\*\* WARNING: estimated cross-section random effects variance is zero.

8.8 Exhibit 8. Hausman test, Period dimension, using within transformation.

Correlated Random Effects - Hausman Test

Test period random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Period random	0.000000	7	1.0000

\* Period test variance is invalid. Hausman statistic set to zero.

\*\* WARNING: estimated period random effects variance is zero.

## 8.9 *Exhibit 9. Companies included in the sample.*

AAK	Kinnevik
ABB	Latour
Africa Oil Corp.	Loomis
Alfa Laval	Lundberg
AAK	Lundin Mining Corporation SDB
ABB	Lundin Petroleum
Africa Oil Corp.	Meda
Alfa Laval	Melker Schörling
Autoliv SDB	Millicom International Cellular SDB
Axfood	MTG
Axis	NCC
Fastigheter Balder	Nibe Industrier
Betsson	Nobia
BillerudKorsnäs	Nordea Bank
Boliden	Oriflame Cosmetics SDB
Castellum	Peab
Electrolux	Ratos
Elekta	SAAB
EnQuest PLC	Sandvik
Ericsson	SCA
Fabege	SEB
Getinge	Securitas
H&M	Skanska
Handelsbanken	SKF
Hexagon	SSAB
Hexpol	Stora Enso
Holmen	Swedbank
Hufvudstaden	Swedish Match
Husqvarna	Swedish Orphan Biovitrum
ICA Gruppen	Tele2
Industrivärden	TeliaSonera
Indutrade	Tieto
Intrum Justitia	Trelleborg
Investor	Wallenstam
JM	Volvo

8.10 *Exhibit 10. Companies listed on NASDAQ OMX Large Cap not included in the sample.*

Com Hem Holding

Lifco