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The Accruals Anomaly in Sweden



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Sammanfattning

Uppsatsens titel:	The accruals anomaly in Sweden
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Fem nyckelord:	Accruals, Anomalier, Hedge, Överavkastning, Irrationalitet
Syfte:	Undersöka om investerare på den svenska marknaden tar hänsyn till att accrualskomponenten av företags vinster säger mindre om framtida vinster jämfört med kassaflödeskomponenten.
Metod:	Vi använder pool data för att undersöka de prediktiva värdena hos företagsresultatets olika komponenter. Ett Mishkintest på paneldata används för att undersöka om investerare tar hänsyn till de olika prediktiva värdena hos kassaflöde och "accruals". Vi använder slutligen hedge portföljer för att kvantifiera våra resultat.
Teoretiska perspektiv:	Effektiva marknads hypotesen, Hypotesen om rationella förväntningar.
Empiri:	Poster från balansräkning samt avkastningsdata är hämtad från Thomson Datastream.
Resultat:	Accrualskomponenten av ett företags vinster säger mindre om framtida vinster jämfört med kassaflödet från den löpande verksamheten. Investerare i Sverige tar inte hänsyn till detta fullt ut. Detta innebär att genom att skapa anpassade portföljer baserad på hur mycket av vinsten som inte består av kassaflödet från den löpande verksamheten, kan man generera överavkastning.

Abstract

Title:	The accruals anomaly in Sweden
Seminar date:	2007-06-04
Course:	Corporate Finance - Master Thesis BUS860, D-level, 10 p
Authors:	Hedda Giaever, Tobias Gabrielsson
Advisor:	Maria Gårdängen
Key words:	Accruals, Anomalies, Hedge, Abnormal return, Irrationality
Purpose:	To establish whether investors take account of the different predictive values of cash flows and accruals regarding future earnings.
Methodology:	Pooled data regressions are used to investigate whether the accruals component of a firm's earnings is less persistent than the cash flow from operations component. We use a rational expectations test to establish if investors fail to incorporate the information given in the different components of the earnings. To quantify our results, we compose a hedge where we try to exploit the irrationality in investor behaviour.
Theoretical perspectives:	Efficient market hypothesis, rational expectations hypothesis.
Empirical foundation:	Return and balance sheet data is taken from Thomson DataStream
Conclusions:	The accrual component of a firm's current earnings is less persistent than the cash flow from operations component, meaning that they say less about future earnings. Investors fail to fully recognize this which creates an environment for earning abnormal return on the Swedish stock market.

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1 Introduction

“In chapter one we give a short background to the problem before highlighting what we aim to investigate as well as the purpose of our study. Further we motivate why this is relevant and discuss the limitations of our research before presenting the outline of our thesis”

1.1 Background

In studies of the stock market, the efficient market hypothesis, first introduced by Fama (1972), is often assumed. Investors are supposedly not able to continuously earn abnormal return since the stock prices should reflect all available information. More recent studies have discussed whether such efficiency exists on different markets. Montier (2002) have highlighted how investors tend to act irrational. One typical way of reacting on a statement is illustrated by the following example where a girl at a boarding school writes to her parents as follows:

“Dear Mum and Dad,

I am writing to tell you about some recent developments in my life. Since I last wrote, I have fallen deeply in love with the college caretaker. In fact our relationship has developed fast, and I am now pregnant. We aren't planning to marry yet, but I am looking forward to you meeting him soon. As a result of these changes in my life, I have decided to drop out of school. By the way, none of the above is actually true, I was merely setting the right tone to tell you I have failed by maths GCSE.”

The punch line is according to Montier (2002, p 17) that one should always look at the bottom line. On the contrary Sloan (1996), Pincus et al (2005) and LaFond (2005) have all found that investors should not only consider the bottom line when reacting on the reports. Their research has shown that different components of the reported earnings have different sustainability and give different measures of predictability. A rational investor should therefore not only review the bottom line of the report, but consider to what extent the earnings are consisting of value creating cash flows. LaFond (2005) have shown that you can earn abnormal returns on the Swedish market by exploiting the characteristics of these components.

1.2 Introduction to the problem

Earnings contain both a cash flow component as well as an accruals component, defined as earnings before interest and tax less operating cash flow. Accruals are therefore the changes in earnings due to investments in working capital and investments in fixed assets. More specific, accruals are the component of earnings that stems from other things than operative cash flow. Sloan (1996) found that the earnings-performance attributable to the accruals component of earnings is less persistent than earnings-performance attributable to the cash flow component of earnings. If this is the case then investors should evaluate the components of the earnings not only the bottom line, the result. By incorporating information given in the statement the rational investor should be in a better position for giving a value to the firm. Despite this, Bradshaw et al. (2001) found evidence that few sell side analysts incorporate information about accruals in their investment recommendations in the United States. This is consistent with the findings of Sloan (1996), the US stock market prices do not reflect the differences between cash flow components and accruals components in predicting future earnings. If such an anomaly exists then the informed investor should be able to exploit the behaviour. If investors tend to not review to what extent the earnings are consisting of accruals, then it might be possible to earn abnormal return of firms that have less accruals in their earnings compared to the mean. On the other hand, the return of stocks were the firm has a high amount of accruals should be expected to not meet expectations.

Following Sloan (1996) we outline a testable hypothesis to see if the persistence of accruals is different from the persistence of Cash Flow.

H₁: Accruals are less persistent than Cash flows when determining future earnings.

Further Sloan (1996) found that the US stock market prices do not reflect these differences in predictability of future earnings. We want to investigate whether such differences exist in Sweden and if the Swedish stock market reflects them. This leads to our second hypothesis.

H₂: Investors do not fully incorporate information contained in accruals and cash flows that has predictive power for future stock returns.

If stock prices do not reflect differences in cash flows and accruals as measures of future earnings, this can be exploited. By forming a portfolio where we take a long position in firms

that have a small amount of accruals in their reported earnings, and go short in firms with a large extent of accruals, we will investigate if it is possible to earn abnormal return. The third part of our study will quantify our second hypothesis by showing how much you could earn by exploiting the accruals anomaly.

1.3 Purpose

If one can find evidence that the stock prices on the Swedish stock exchange do not reflect all available information, then it would be possible to exploit this. The main purpose of our study is to see whether it is possible to earn abnormal return by exploiting the accruals anomaly on the Swedish stock exchange.

1.4 Motivation

Sloan (1996) found that one can make abnormal return by exploiting the accruals anomaly in the U.S. Pincus et al. (2005) tried to test whether the anomaly was present on a global scale. Within this study they investigated the Swedish stock market, but did not get significance in their results due to lack of observations. LaFond (2005) on the other hand found results that a zero-investment portfolio where one takes a long position in firms having low amounts of accruals and short sell firms with a higher extent of accruals give abnormal return in Sweden.

Our research adds to the current body of evidence on the Swedish market by using the Cash flow-statement method of measuring accruals, which according to Zach (2003) gives a less distorted measure of accruals due to the avoidance of disturbances given from divestitures and acquisitions.

We will be able to collect data from a more recent time-period than what both Pincus et al. (2005) and LaFond (2005) uses which gives us the possibility of investigating whether the market have reacted on their findings or if such abnormal profit is still attainable.

1.5 Limitations of the study

Our study includes only the Swedish stock market. We will not investigate any other markets. This means that our results are sensitive towards macroeconomic fluctuations in the Swedish market.

1.6 Outline

In the second chapter we will discuss the prior studies done within the area. We start by discussing the efficient market hypothesis to build the following discussion on. Further we briefly argue what actually creates value in a firm. Based on this we show why the accruals component of firms earnings should be handled differently when valuing companies. Finally we report what prior studies have found both in Sweden as well as in other countries.

In the third chapter the method used in our analysis is reported. First we argue why we have defined our variables the way we have. Next we aim to give a detailed description of how we have performed all three parts of our investigations. Finally some criticism regarding the different choices of data, measuring methods and eliminations are made.

In the fourth chapter our results from the regressions are presented and discussed. The validity of the models is presented by bringing forward the different tests performed to investigate whether underlying assumptions are fulfilled.

It is in the fifth chapter where the discussion regarding our results is offered. In the analysis we examine whether our regressions present evidence of the existence of a Swedish accruals anomaly and try to outline the different explanations for it. We also compare our results with earlier research and briefly discuss explanations of our findings.

In the final part, chapter 6, we summarize our findings and provide some ideas for future research.

2 Theory

“In this chapter we discuss the relevant theory that has been used to analyze the problem earlier, and theory related to other issues that are applicable to our case.”

2.1 The efficient market Hypothesis

According to Fama (1970) there are three forms of market efficiency. The weak form states that only historical information is reflected in the price. The semi strong efficient form of the EMH states that all public information at time t is reflected in the share price. According to the strong form of the efficient market hypothesis, all information known to anyone at time t is reflected in the share price. The strong form is seen as a logical completion of the set of possible hypothesis. The semi strong form is what is generally accepted as the form employed in the market. Accounting data is public information and should therefore be correctly reflected in the share price. One should not be able to use information that is public to gain abnormal returns.

2.2 What creates value in a firm?

What evidence exists in support for evaluation of the cash flow component of earnings and not the accruals component that should be considered when examining the present value of a firm? Graham et al. (1962) emphasize the importance of information in current earnings and its components for estimating the future earnings power of an enterprise. They argue that because accruals are less likely to recur in future periods earnings, current earnings should be adjusted for operating accruals including arbitrary reserves, unusual levels of depreciation and different inventory valuation methods.

Bernstein (1993) states that Cash flow from operations as a measure of performance is less subject to distortion than net income. This is mainly due to the fact that accruals are valued in a more subjective manner than what the cash flow is. This is why the cash flow from operations related to the net income often is reported as a measure of the quality of that income. If a firm report a high level of income and a low cash flow from operations, it is possible that this firm uses income recognition or expense accrual criteria that are suspect. As mentioned earlier the accruals and the cash flow component of earnings have different persistence. If investors fail to recognize this it would mean that they for some reason neglect this information in their valuation.

2.3 The relation between stock returns, earnings and irrational investors

In Ball and Brown (1968) a positive contemporaneous association between stock returns and earnings was stated. This relation was generally attributed to the earnings ability to summarize value relevant information. A number of more recent studies have shown that investors do not correctly use available information in forecasting the future earnings performance¹. The studies discuss whether the association between earnings and stock return in part reflect investors who have a naive fixation on reported earnings, rather than earnings ability to summarize information relevant to value. This further motivates why more extensive work on the accruals anomaly in Sweden is needed.

2.4 The accruals anomaly

Sloan (1996) document significant abnormal returns related to the amount of accruals in the US. Firms with large negative accruals have positive subsequent returns, that are the accruals anomaly. Sloan uses a dataset of US firms from 1962 until 1991, he finds evidence that you can earn abnormal returns from a hedge portfolio sorted on accruals part of earnings.

Several studies have confirmed the implications of current period accruals in the future return both in the US and in other markets.²

2.4.1 The accruals anomaly in Sweden

Pincus et al. (2005) investigated how accruals are related to returns in Sweden. They use GVIC³ data from 1994-2002. The authors found that the operating cash flows are underweighted, implying that the stock price do not fully reflect the operating cash flows value, as a measurement of future earnings. Further, they did not find any significance in their test of whether investors overweighting the persistence of accruals in Sweden.

LaFond (2005) on the other hand found results that a zero-investment portfolio where one go long in firms having low amounts of accruals and go short in firms with high extent of accruals give abnormal return in Sweden. He uses market data from DataStream Advance 4.0 and accounting data from World Scope found in the same program. The study finds significant returns for a hedge portfolio formed on information on accruals in Sweden. He tries to find common factors for global accruals anomalies and finds that correlation between

¹ Ou and Penman (1989); Bernard and Thomas (1990); Hand (1990); Maines and Hand (1996); Sloan (1996)

² Beneish and Vargus (2002); Bradshaw et al. (2001); Barth and Hutton (2004); Chan et al. (2004); Collins and Hribar (2000); Collins et al. (2003); Desai et al (2004); Pincus et al. (2005); Richardson et al. (2005); Thomas and Zhang (2002)

global accrual returns are extremely low and interprets this as that the accruals anomaly relates to different things in different countries.

LaFond (2005) and Pincus et al. (2005) studies show different results. This could be due to LaFond's use of more observations and a longer dataset or because of the different methodologies employed. LaFond (2005) uses a three factor model to look for abnormal returns. Pincus et al. (2005) find no significance for returns on a hedge portfolio formed on accruals in Sweden on the 5% level, but they do state that if the number of observations was increased from 777 to 1615 it would be likely to find significance on the 5% level. Although the two studies give different results at first glance, we can see that the latter study probably would have found significance if they had used the same amount of observations as LaFond (2005) did.

2.4.2 Alternative explanations of the accruals anomaly

Lehavy and Sloan (2004) found that extreme accruals are correlated with events that most likely increase the investor's recognition of these firms. Merton (1987) has developed an asset pricing model assuming that investors hold only those stocks with which they are familiar. Combining these models one could propose that the increased recognition of a firm caused by for example changes in investments and accessing external markets could lead to abnormal return due to increased recognition and not because of the differences between the accruals- and the cash flows consistency with future value growth. The events that lead to recognition are correlated with higher levels of accruals and this could lead to spurious results.

Khan (2005) found that a four-factor asset pricing model captures the anomalous returns related to accruals within the US. This model is consistent with the theory that the accruals anomaly actually show upon increased risk. Four factors were found that captured the return that was attributed to accruals in other studies. The factors were: news about future expected returns and dividends on the market portfolio, the difference between return on small and big enterprises and the difference between high and low book to market firms.

³ Accounting data from Global Vantage Industrial/Commercial database

Beaver (2002) suggests that the accrual anomaly is a value-glamour anomaly⁴ in disguise. When Desai et al. (2004) investigates this they find that if more traditional measures for value-glamour effects (such as book-to market or earning-to-price) are used, the accruals anomaly appears distinct from the value-glamour effects in returns. Thus researchers continue to document the empirical fact that current period accruals have implications for future periods' returns.

Bradford et al. (2000) studied auditors and sell side analysts to see if they incorporated the information about future earnings that is associated with high accruals. Their evidence adds to earlier evidence that investors do not incorporate information about accruals. They look at both earnings forecasts from analysts and audit opinions. They find high forecast errors for earnings forecasts with unusually high accruals that are consistent with the notion that investors do not incorporate information about accruals. They find no evidence about a higher degree of modified audit opinions in firms with high accruals. Hence auditors too have problems communicating the implications of high accruals in earnings.

Zach (2003) looks deeper into different explanations for the accruals anomaly. He finds evidence of a higher degree of mergers and acquisitions, initial public offerings and seasoned equity offerings than average in the top accrual decile, that is the decile with the highest amount of accruals. In the bottom accrual decile he finds a higher degree of restructurings than usual. After excluding these corporate events from his hedge portfolio he finds that the return decreases with 25%. Employing a method that takes care of the returns associated with book to market lowers the hedge portfolio with 20%.

Pincus et al. (2005) looks at five different explanations for the accruals anomaly. Value/glamour, earnings management, bankruptcy risk, less reliably measured accrual components and limits to arbitrage. Their results suggest that earnings management by means of accrual manipulation and limits to arbitrage explain parts of the presence of the accruals anomaly. Limits to arbitrage often involve that obstacles to the rational pricing of accruals are costly to remove. More importantly, it does not explain why the accruals anomaly occurs in the first place or why researchers have found the anomaly to be present at some but not all markets.

⁴ Value/glamour anomaly is the notion that the return on high market to book stocks (glamour) and low market to book stocks (Value) tend to revert to the mean and that this could be exploited.

Hirshleifer et al. (2006) raises an alternative explanation for the accruals anomaly. They form a hypothesis that the stock market is inefficient and that investors fail to separate earnings stems from cash flow from operations and earnings that stems from cash flow from accruals. The same authors use a factor mimicking portfolio to find out if the accruals anomaly is consistent with mispricing or risk. When they form a factor mimicking portfolio on the accrual characteristic itself they find that the Sharpe ratio increases with 27%, that is the reward in relation to risk has a substantial increase. This implies that investors do not fully realize the implications of accruals on earnings and that you can increase your reward to risk ratio by taking account of the accruals anomaly.

LaFond (2005) does not find international factors that could predict the accrual anomaly over all markets. He found evidence that the accrual anomaly is a global anomaly. The author finds evidence of the accruals anomaly in both countries with code and common law, countries with wide uses of accounting standards and with different amounts of shareholder protection. He also finds that the accruals anomaly is different from the value/glamour anomaly. He uncovers evidence that the accrual anomaly cannot be explained by factors such as countries allowing specific accounting methods such as LIFO or FIFO⁵, on different amounts of managerial discretion i.e. earnings management. The accrual anomaly cannot be explained by the firm's information environment and the ownership structure of the firm.

Sloan (1996) raises the explanation that investors fixate on earnings and supports this with references to empirical research on capital markets, behavioural and experimental research⁶. He concludes that in cases where stock prices do not fully implement the implicit valuation coming from the accruals component this could be due to non-trivial acquisition and processing costs from this strategy which make arbitrage too costly. It is interesting to see if advances in data processing and data acquisition have made this anomaly disappear.

Pincus et al. (2005) have looked at a number of characteristics of the Swedish stock market that they considered being proxies for market efficiency. It is among other things, outside investor rights, legal enforcements, importance of equity markets, ownership concentration, insider trading existence and insider trading enforcement. They find that Sweden rank on average relatively good on most of these proxies.

⁵ Last In First Out (LIFO) and First In First Out (FIFO)

⁶ Hand (1990); Abdel-khalik and Keller (1979); Bloomfield and Libby (1995)

2.4.3 Risk based explanations for returns

Fama and French (1993) have shown that among other things, book to market and market value often can be used as measures of firm risk, and therefore might be used to explain future returns. The implications for book to market ratios are: high book to market⁷ companies is related to higher returns than low book to market companies. High market value companies have on average lower returns than low market value companies. Basu (1977) have shown evidence that high price to earnings companies have lower expected returns than low price to earnings companies.

⁷ We have used a switched ratio in our descriptives, high book to market corresponds to low market to book

3 Methodology

“In the third chapter we describe and motivate how we have measured the needed variables, and how we have performed our regressions. The tests performed to validate our results are also discussed.”

3.1 Reliability, validity and investigations of our references

3.1.1 Reliability and validity

We want to ensure that we are measuring what we intend to measure and that our data is trustworthy. Because we are using a quantitative approach, the statistical representations are of great importance. The data we have used is therefore analyzed before any computations and regressions are based upon them. The data which is manually manipulated is reviewed both graphically and by statistic measures. This makes our results more reliable.

It is not sufficient to have reliable data in our study. To ensure that our hypotheses are answered correctly, we must verify that our data is valid. To have high validity implies that we investigate what we aim to answer. By following previous work done within the area, some independent of each other, we motivate why our results are valid. By applying the same methods and estimation as well known researchers, whose work has been carefully investigated, we believe that we can answer the main questions raised in this paper.

We have included ten years of yearly observations for 472 different firms. With the knowledge that we have collected a variety of different measures, it is obvious that the amount of data has been quite extensive. We have used Microsoft Excel to manipulate this data, which opens up the possibility of incorrect treatment of some observations. We have tried to avoid this type of human mistakes by controlling the number of observations before and after manipulations, as well as other descriptive statistics as mean, symmetry and quartiles.

The data given by Thomsons DataStream is reviewed by thousands of user every day and the firm is one of the biggest and most acknowledged within their industry. Because of this we consider the numbers given as trustworthy.

3.1.2 Sample data

We use observations from DataStream's World Scope database. We have excluded all financial firms from our observations due to the fact that their reported earnings as well as cash flows from operations differ dramatically from other firms. The financial firms are identified by reviewing DataStreams own list "Financial firms." This elimination make our study more compatible with Sloan (1996), Pincus et al (2005) and LaFond (2005) since they all chose to make the same reductions in their study.

We extract our data by searching for all firms that have observations from 1996 and onward for at least two consecutive years and are listed on the Stockholm stock exchange. Further we use only those companies that have accounting data from the World Scope database. We eliminate firms without information and firm years where we do not have information on all variables, earnings, cash flow from operations, total assets and return index. The data is later manipulated using excel to make it accessible for Eviews and matlab.

We have decided to use yearly observations, since quarterly observations tend to fluctuate more due to differences in seasonality and accounting principles. The data is collected from the second of May each year, or the following bank day. Information about the previous year given in annual reports for all listed Swedish firms should be public by this date.

We chose to include newly listed firms in our calculations. This means that a firm will be included in our weighted portfolio if it was ranked in the extreme portfolios given by the numbers of the first public annual report. A problem occurs when firms get delisted. Sloan (1996) discuss this subject in his article, and specially focus on the possibility of firms going into bankruptcy having a larger component of accruals in its earnings, giving the high-accrual portfolio larger risk. A solution to this problem is to include the firms that went into distress in our results. It would be wrong to exclude these firms from our calculations, considering we want to investigate whether this strategy of exploiting investors' behaviour could lead to abnormal return. It is unlikely that we could forecast which firms would have high levels of accruals due to high bankruptcy risk, therefore it is not possible to exclude these firms.

3.2 Analytical approach and methodology

This is a quantitative study divided into three parts. First we investigate whether the accruals component and the cash flow component of the earnings contribute with different

predictability regarding following year's earnings. Secondly we examine whether the stock prices reflect these differences. Finally we study if it is possible to earn abnormal return by following a zero-investment strategy where we go long in firms having a small amount of accruals in their earnings and go short in firms having a large amount of accruals in their earnings.

3.2.1 How to measure Earnings

Earnings are defined as Earnings before interest and taxes, EBIT. This excludes non-recurring items such as extraordinary items, discontinued operations, special items and non-operating income. The non-recurring items are problematic because some programs do not support information necessary to decompose them into their underlying cash and accruals component. Exclusion of these items allows unambiguous assessments of the persistence of the cash and accruals components of income from continuing operations. Earnings are scaled by total average assets over the year.

$$\frac{Earnings_t}{\frac{1}{2} \times (TotalAssets_{t-1} + TotalAssets_t)}$$

3.2.2 How to measure Accruals

We chose to use the cash flow statement method for calculating accruals. This means that accruals are defined as the earnings before interest and taxes less the operating cash flows. According to Hribar and Collins (2002) the balance sheet method⁸ of calculating accruals can lead to errors in accrual estimation in case such as mergers or divestitures. In Sweden cash flow statements are required which implies that the cash flow statement approach is not just the simplest but also the most correct method to use.

Accruals are scaled by the sum of total average assets in the beginning of the year and in the end of the year, divided by two.

$$\frac{Accruals_t}{\frac{1}{2} \times (TotalAssets_{t-1} + TotalAssets_t)}$$

⁸ Balance sheet method: Accruals = (change in current assets-change in cash)-(change in current liabilities-change in dept including current liabilities-change in income taxes payable)-depreciation

3.2.3 How to measure Operating Cash Flow

Operating cash flow is scaled in the same manner as both earnings and accruals.

$$\frac{\text{OperatingCashFlow}_t}{\frac{1}{2} \times (\text{TotalAssets}_{t-1} + \text{TotalAssets}_t)}$$

3.2.4 How to measure returns

After forming portfolios on accrual ranking in each year we assessed the return of these portfolios within each year. The returns are calculated as a one year buy and hold from the Return Index (RI) in DataStream. In this index dividends are taken into consideration and reinvested in the stock.

$$(1) \text{ return}_t^{\text{Firm}} = \frac{RI_t^{\text{Firm}}}{RI_{t-1}^{\text{Firm}}} - 1$$

We use the Return Index (RI) for Affärsvärlden General Index to estimate the normal buy and hold return for the Swedish market. The Return is calculated in the same time interval as the portfolio returns.

$$(2) \text{ return}_t^{\text{Index}} = \frac{RI_t^{\text{Index}}}{RI_{t-1}^{\text{Index}}} - 1$$

3.2.5 Calculating Abnormal returns

We compute expected returns using the capital asset pricing method, CAPM. The time-series beta for each firm given at the 2nd quarter each year in our estimation period is computed by using DataStream's Expression Picker. The expression picker is linked to "Affärsvärldens generalindex" which include 273 firms listed on the Stockholm stock exchange. By doing this we get each firms loading towards the market portfolio consisting of the firms in the index. The beta is computed using 2 year daily historical info about correlation between the specific firm and the index. We use the 1-year Stockholm interbank offered rate (STIBOR) as the risk free interest rate.

Following the CAPM we get that

$$(3) E(r_{i,t}) = r_{f,t} + \beta_{i,t} \times (r_{m,t} - r_{f,t})$$

$$(4) \text{ abret}_{i,t} = r_{i,t} - E(r_{i,t})$$

To validate our expected return, we compute an alternative measure. A number of firm characteristics have been identified in the literature to capture risk priced by the market. These generally include firm size and book-to-market ratios. Zach (2003) found that size and book-to-market have the largest impact on the returns, and should therefore be good explanatory variables in expected return regression. Following Sloan (1996) and Zach (2003) we divide the listed firms into portfolios and compute a benchmark return which later is subtracted from the firm specific return to obtain the abnormal return. The benchmark portfolios are computed by dividing the listed firms into ten equally weighted groups ranked by their market value. The average return is then computed for these groups. To avoid problems with outliers, we eliminate the firms which have a return that differs with more than three standard deviations from the average mean of all the portfolios.

3.3 How does the accrual component of a firms cash flow affect the future earnings?

In order to test whether the accruals component and the cash flow component of earnings have different values as predictors of future earnings, we perform a combined cross-sectional and time-series multiple regressions on Swedish listed firms. To investigate how the persistence of earnings is, one could follow Freeman (1982) and estimate α_1 in equation (5) below. By separating earnings into the two components accruals and cash flow we investigate whether the persistence varies among the variables

$$(5) \text{ Earnings}_{t+1} = \alpha_0 + \alpha_1 \times \text{Earnings}_t + \varepsilon_t$$

$$(6) \text{ Earnings}_{t+1} = \gamma_0 + \gamma_1 \times \text{Accruals}_t + \gamma_2 \times \text{CashFlow}_t + \varepsilon_t .$$

If the regression show upon significant differences between γ_1 and γ_2 , then the hypothesis of different prediction value of earnings between the two components is shown.

The parameters are estimated by using the ordinary least squares method adjusted for pooled data. This estimation technique is based on the same assumptions as if the data was not pooled.

3.3.1 Significance of our coefficients

The t-statistics are used to determine whether the coefficients are significantly different from zero. Further we investigate whether the coefficients in front of accruals (γ_1) and cash flow

(γ_2) are significantly separate from each other. This is performed by an F-test with the null hypothesis of the coefficients being equal.

3.3.2 Reversion analysis

We divide the firms into three different portfolios according to their scaled magnitude of EBIT, Cash flow and accruals. The same methodology has been performed by Sloan (1996) to examine the time series properties of the respective series. We form portfolios every year from 1997 to 2006 and look at how the series react -3 and +3 years from the event year. We look at the linkage between the three variables and EBIT to get a better understanding of the time series.

3.3.3 Testing assumptions regarding the ordinary least square estimation

To assure that our results are valid we must investigate whether the assumptions underlying the ordinary least squares estimator, as proposed by Brooks (2003), is fulfilled. The assumptions underlying the pooled least squares are equal to those of the ordinary least squares. Brooks (2003).

Assumption 1: $E(u_i) = 0$. The expected residual is equal to zero

We have chosen to include an intercept, because of this the values of the residuals will be zero on average. Brooks (2003).

Assumption 2: $\text{var}(u_i) = \sigma^2 < \infty$. The variance is finite

To ensure that we do not suffer from heteroskedasticity in our data, we run Whites heteroskedasticity test, which test if the error terms are identically distributed with the same variance. If the ordinary least square is used in the presence of heteroskedasticity, then the standard errors could be wrong and conclusion drawn from the estimated coefficients could be wrong. According to Brooks (2003) we could include White's heteroskedasticity-consistent standard error estimates to solve the problem of conditional variance.

Assumption 3: $\text{cov}(u_i, u_j) = 0, i \neq j$. No autocovariance between the residuals

To make sure that we have no autocorrelation we investigate our residuals by studying them visually and performing a Durbin-Watson test, with the null hypothesis of no autocorrelation. The consequence of ignoring autocorrelation could be misinterpretation, in the same way as

when ignoring heteroskedasticity. When using time-series data, or in our case a combination of cross-sectional and time-series data, the possibility of autocorrelation is very high.

Assumption 4: The X_t are non-stochastic

An underlying assumption for OLS is that the regressors accruals and cash flow are deterministic and not stochastic. Fortunately the OLS-estimators are still unbiased if the regressors are stochastic provided that the dependent variables and the residuals are independent.

Assumption 5: $u_t \in N(0, \sigma^2)$. The residuals are normally distributed.

We look at the distribution of our observations in a histogram in addition to performing a Jarque-Bera test. Since we have a large number of observations a violation of the normality assumption is virtually inconsequential.

Assumption 6: Linearity

To use the ordinary least squares estimation technique requires that we have a linear relationship between our parameters. A shortcoming of the Eviews package is that there are no test for linearity in pooled data. We therefore study the squared residuals when including polynomials of the values. If the explanatory degree do not change dramatically than this implies that we have a linear relationship between the variables.

Assumption 7: No multicollinearity

If the variables in our regression, cash flow component and accruals component are highly correlated we get problems with multicollinearity. It is expected that we have some multicollinearity, which is investigated by studies of the correlation matrix.

3.4 Does the Stock price reflect differences in how accruals and cash flows affect future earnings?

3.4.1 Rational expectations hypothesis

We use the Mishkin (1983) procedure to test whether the stock prices reflect all information available regarding accruals and cash flow components. Market efficiency implies that abnormal returns are zero in expectation.

$$(7) E(r_{t+1} - E(r_{t+1} | \phi_t)) = 0$$

where:

- ϕ_t = the set of information available to the market at the end of period t,
- $E(\dots | \phi_t)$ = the objective expectation conditional on ϕ_t ,
- r_{t+1} = the return to holding a security during period t+1,
- r_{t-1} = the markets subjective expectation of the normal return for period t+1.

Further the model is generalized into:

$$(8) (r_{t+1} - E(r_{t+1} | \phi_t)) = \beta \times (X_{t+1} - X_{t+1}^\varepsilon) + \varepsilon_{t+1}$$

where:

- ε_t = a disturbance with the property that $E(\varepsilon_{t+1} | \phi_t) = 0$,
- X_t = a variable relevant to the pricing of the security in period t,
- X_{t+1}^ε = the rational forecast of X_{t+1} at time t $\left[\text{i.e., } X_{t+1}^\varepsilon = E(X_{t+1} | \phi_t) \right]$,
- β = a valuation multiplier.

If we combine equation (6) and (8) we get that

$$(9) (r_{t+1} - r_{t+1} | \phi_t) = \beta \times (Earnings_{t+1} - \gamma_0 - \gamma_1 \times Accruals_t - \gamma_2 \times CashFlow_t) + \varepsilon_{t+1}.$$

We use the equations in the same manner as Pincus et al. (2005) did which leads to the following system of equations:

$$(10) \text{EBIT}_t = \gamma_0 + \gamma_1 \times \text{Accrual}_{t-1} + \gamma_2 \times \text{Cashflow}_{t-1} + \eta_t$$

$$(11) \text{ABRET}_t = \beta \times (\text{EBIT}_t - \gamma_0^* - \gamma_1^* \times \text{ACC}_{t-1} - \gamma_2^* \times \text{CF}_{t-1}) + \varepsilon_t$$

where:

EBIT = earnings before interest and taxes,

CF = cash flow from operations,

ACC = accruals component of earnings,

ABRET = abnormal returns of firm.

We recognize equation (10) from our test of the first hypothesis. Since only unanticipated changes in the variables will have an effect on the abnormal return, market efficiency imposes two constraints, $\gamma_1 = \gamma_1^*$ and $\gamma_2 = \gamma_2^*$. If the test from the first step, where equation (6) is estimated, show differences between the two coefficients, then the same should be expected here. In other words, the hypothesis of market hypothesis does not hold if $\gamma_1^* = \gamma_2^*$.

Some assumptions about the correlation of the error term and the right-hand variables are necessary in order to identify the beta and gamma-coefficients. The usual assumption, used in previous empirical work (Sloan(1996), Pincus et al. (2005)) holds that the right-hand side variables are exogenous and uncorrelated with the error term. This implies that the least-squares estimation methods will generate consistent estimates of beta.

We use a likelihood ratio test of the constrained and the unconstrained system to test the rationality $\gamma_1 = \gamma_1^*$ and $\gamma_2 = \gamma_2^*$. In the constrained system the coefficients are the same in both equations. In the unconstrained they are allowed to vary.

It might seem natural to use the maximum likelihood with full information when estimating the coefficients. But to use the maximum likelihood estimation in Eviews is impossible since we seek to estimate two parameters, which Eviews does not have the package to handle. In addition it doesn't allow us to impose the covariance restrictions to make a desirable degree of

freedom correction. In contrast the non-linear least squares procedure implements the covariance restriction and degrees-of-freedom correction. The procedure is as follows

The variance-covariance matrixes, $\hat{\Sigma}$ is given by:

$$(13) \quad \hat{\Sigma}^c = \begin{bmatrix} \frac{SSR_{11}^c}{n} & 0 \\ 0 & \frac{SSR_{12}^c}{n} \end{bmatrix},$$

$$(14) \quad \hat{\Sigma}^u = \begin{bmatrix} \frac{SSR_{11}^u}{n} & 0 \\ 0 & \frac{SSR_{12}^u}{n} \end{bmatrix}$$

where

SSR_{11} = the sum of the squared residuals of equation (11),

SSR_{12} = sum of the squared residuals of equation (12),

n = the number of observations.

Given an initial estimate for the variance-covariance matrix of the residuals, $\hat{\Sigma}$, Eviews estimate the system with nonlinear least squares (GLS). Given the particular diagonal form of the estimated variance-covariance matrix, $\hat{\Sigma}$, the GLS is equivalent to nonlinear weighted least squares, with the weights

$$(15) \quad w_i = \sqrt{\frac{SSR_6}{SSR_7}}$$

The variance-covariance matrix $\hat{\Sigma}$, is continuously updated using this method. Because the system is triangular, the procedure will converge to maximum-likelihood estimates.

The resulting likelihood ratio statistics

$$(16) \quad -2 \log \left[\frac{L^c(\hat{\Sigma}^c)}{L^u(\hat{\Sigma}^u)} \right] = n \log \left(\frac{\det(\hat{\Sigma}^c)}{\det(\hat{\Sigma}^u)} \right),$$

is asymptotically distributed as $\chi^2(q)$, where

q = the number of constraints, which is equal to 2 in our case,

L^c = the maximum likelihood of the constrained system,

L^u = the maximum likelihood of the unconstrained system,

$\hat{\Sigma}^c$ = the resulting variance-covariance matrix for the constrained system,

$\hat{\Sigma}^u$ = the resulting variance-covariance matrix for the unconstrained system,

$\det(\hat{\Sigma})$ = the determinant of $\hat{\Sigma}$.

3.4.2 Other problems using panel data

For the econometric analysis of panel data, we can not assume that the observations are independently distributed across time. In order for OLS to produce consistent estimators we would have to assume that some unobserved effect represented by a constant varying across firms, is uncorrelated with the regressor. We can combine the residual for each period and firm with the unobserved effect in what we call the composite error. This must be uncorrelated with the regressor for OLS to consistently estimate the coefficient. Therefore, even if we assume that the residual is uncorrelated with the explanatory factor, OLS would compute biased and inconsistent estimates if the unobserved effect is correlated with the factor. This resulting bias in the OLS, the heterogeneity bias is really just bias caused from omitting a time-constant variable according to Wooldridge (2002). Eviews handles this by including two residuals where one is consistent over time, but we also need to work with another method to estimate the coefficients.

3.4.3 Testing assumptions regarding the weighted least squares equation

Due to the biasedness of the OLS-estimator we use a different estimator, the weighted least squares. This is a heteroskedasticity-robust estimator and by applying the WLS we follow Mishkin's (1983) methodology which makes our results comparable to Sloan (1996) according to Wooldridge (2003).

When using the weighted least squares estimators, we minimize the weighted sum of squared residuals. Each residual is weighted according to the theory that observations with higher error variance should have less influence on the regression. The weights are therefore defined as the square of the difference between the diagonal elements of the variance-covariance matrix. When we have averages of data across groups, then the weights needed for WLS arise naturally from the underlying econometric model. When we do not have this, then the heteroskedasticity function must be estimated. We use the Eviews-package when estimating our coefficients which have features for computing the weighted least squares, with correct weights.

The assumptions under WLS are similar to the ones for the OLS estimator in the other parts.

3.5 Exploiting the accruals anomaly by forming a hedge

We form a portfolio where we take a long position in firms having a low accrual component in their reported earnings and taking a short position in firms having high accruals, by following these three steps:

- 1) Rank firms after the level of accruals in the reported earnings for each year in our time period.
- 2) Divide the firms into 10 equally weighted portfolios for each year
- 3) Compute the abnormal return for all of the low-accrual and high-accruals portfolios for all the years during the evaluated period.

The return of the hedge portfolio is later calculated as:

$$(17) \quad return_t^{Hedge} = -1 \times return_t^{HAD} + 1 \times return_t^{LAD}$$

where:

HAD = high accruals decile,

LAD = low accruals decile.

Abnormal returns for the portfolios are calculated using both CAPM and size adjusted return.

3.6 Criticism of forming portfolios

There might be risk measures in our extreme portfolios that influence the return, for instance firm size, total sales etc. We compute abnormal return by including either a time-varying beta for each firm or a reduction based on the market value⁹. Both risk measures are limited and the size-measure one does not take into consideration the cross covariance between the firms which can influence the risk of the complete portfolio. It is not likely that the risk of our complete portfolio is equal to the sum of the risk of each firm when it is measured solely based on firm size. It is on the other hand probable that the construction of the portfolio would construct some risk reduction. Risk measured with beta on the other hand considers the covariance with the market portfolio, which make the risk of the portfolio equal to the sum of the individual betas of the firms included.

Francis and Smith (2004) has shown that a firm specific estimate of the persistence of the cash flow and accrual component of earnings yields a result that cash flow and accruals are equally persistent. If this is true, the first stage of the Mishkin (1983) test is misspecified since it measures the persistence of the components on a cross sectional level.

Finally we also recognize problems regarding weighting our portfolio. The number of firms listed in Sweden has changed and in addition to problems with firms getting delisted, firms also get listed. We still would like to perform event studies each year by taking the described zero-investment strategies each year with new portfolios. This means that a firm would be included first if it was ranged in the extreme portfolios after the first annual report.

⁹ See section 3.2.5 Calculating abnormal return.

4 Descriptive statistics

“In this chapter we present the results from the regressions performed to test our hypotheses. The tests performed to evaluate and validate our conclusions are also declared and discussed.”

4.1 How the accruals component of a firms cash flow affect the future earnings

In this section we present the results from testing the first hypothesis:

H₁: Accruals are less persistent than cash flows when determining future earnings.

When using pooled ordinary least square estimation we get the regression shown in table 1. We see that the coefficients are all significantly different from zero.

Table 1
Testing the relation of accruals and cash flow to accruals

$$Earnings_{t+1} = \gamma_0 + \gamma_1 \times Accruals_t + \gamma_2 \times CashFlow_t + \varepsilon_t$$

Variable	Coefficient	Std. Error	t-statistics	Probability
γ_0	-0,015913	0,004734	-3,361585	0,0008
γ_1	0,328757	0,050703	6,483992	0,0000
γ_2	0,86195	0,047648	18,09013	0,0000

Characteristics: Earnings is the earnings from operating activities before interest, taxation, depreciation and amortization. Accruals is measured as the earnings as defined above, less cash flow from operations. Cash Flow is given by the reported cash flow from operating activities.

Comment: Results from ordinary least squares regression with Whites diagonal standard errors and covariance, of future earnings performance on the accruals and cash flow from operations component of current earnings performance. The table shows that the accruals component and the cash flow component of a firm's earnings the current year have different values regarding predicting next periods earnings.

More interesting is that the coefficient in front of the accruals component is significantly lower than the coefficient in front of the cash flow component. This is shown by investigation of the coefficient confidence intervals tested with F-statistics, shown in table 2.

Table 2
Persistence testing of cash flows and accruals

$$H_0 : \gamma_1 = \gamma_2$$

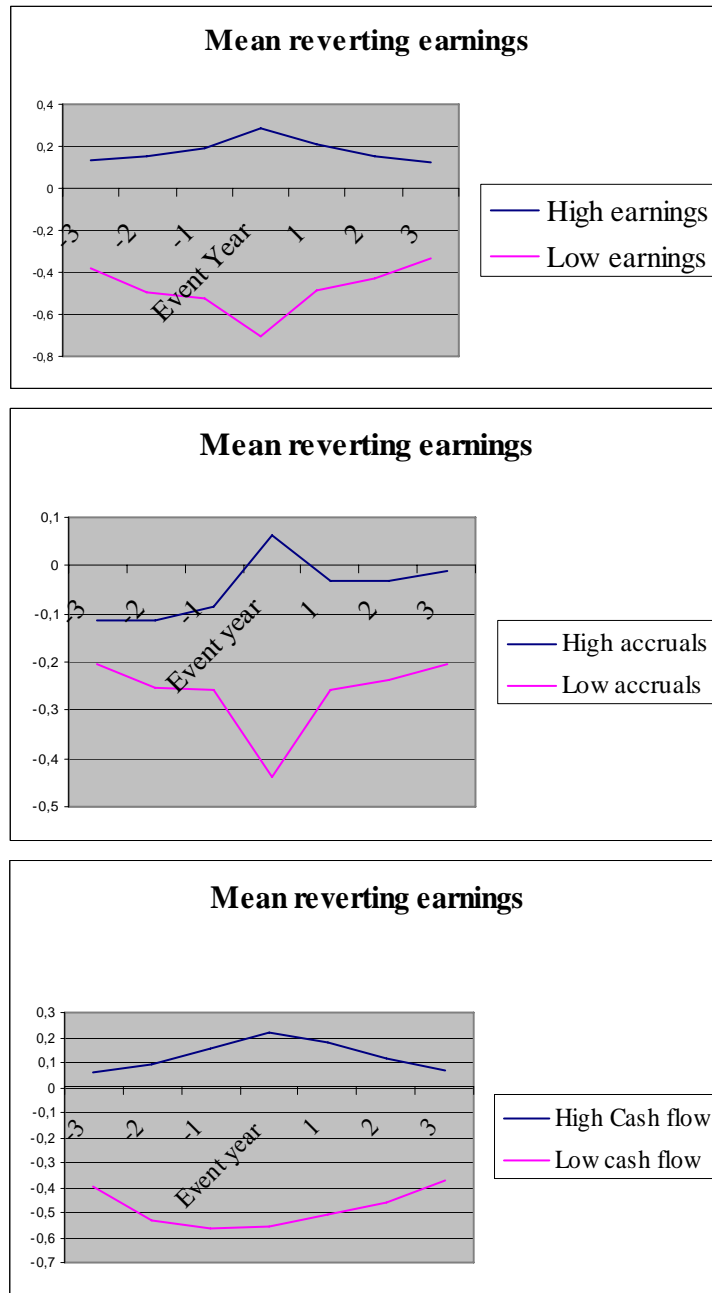
$$H_1 : \gamma_1 < \gamma_2$$

Restriction	Value	Standard error
$-\gamma_1 + \gamma_2 = 0$	0,344671	0,042218
Test Statistics	Value	Probability
F-statistics	66,65193	0,00000
Chi-square	66,65193	0,00000

Comment: Results from testing whether the accruals component is less persistent than the cash flow component of a firm's earnings. The table shows that the accruals component of earnings is significantly less persistent than the cash flow component of firms earnings.

The difference in persistence between the accruals and the operating cash flow component is illustrated in figure 1. The figure provides time-series plots of earnings performance for firms in the extreme deciles when ranked by earnings, accruals and operating cash flow, all normalized with average total assets. The event year represent the year when the firms are ranked into the extreme deciles.

Figure 1
Time series properties of earnings, accruals and operating cash flow



Characteristics: Earnings are measured as earnings before interest and taxation, normalized with average total assets over the year. Accruals are measured as the earnings, as defined above, less the operating cash flow, normalized with average total assets over the year. Cash flow is measured as cash flow from operating activities, normalized with average total assets over the year. The event year is the year in which the firms are ranked and assigned in equal numbers to ten portfolios, based on the underlying variable.

Comment: All firms listed at the Swedish stock exchange, less financial firms, are ranked according to the three criteria earnings, accruals and cash flow from operations. For each year in the estimation period the firms are divided into ten portfolios. The average earnings for the extreme portfolios on each side is then estimated for a +- 3 years period. The figures show the average development of the earnings for these portfolios. The accruals portfolio shows a distinct mean reversion during the first year. This shows that the earnings from accruals are less persistent than earnings related to from cash flow. The graphs are averaged from all observation years.

In figure 1 we see that if we rank all firms included in our study each year after the normalized earnings and divide them into ten equally sized portfolios, then the average of the earnings of the extreme portfolios are mean reverting, this is to be expected. The mean reversion is slow and gradual and is not finished after the three years in the sample. If a firm has extremely high or low earnings one given year, compared to the average total assets of that firm, then it is expected that it will move towards an average in the future. What is illustrated in figure 1 is that this mean reversion of earnings is more aggressive if a firm has high amounts of accruals in its earnings, almost all mean reversion of the accruals portfolio takes place during the first year. The event-study of each portfolio based on the size of earnings the event year for an event window of plus, minus three years is shown in appendix 2. We use averages of portfolios based on extreme values of accruals, cash flows and earnings to estimate the mean reverting earnings.

4.1.1 Testing the OLS assumptions

By including an intercept in the estimated equation, the mean residual will automatically be equal to zero. To confirm that this indeed was the fact we computed a 99%-significance interval for the estimated residuals:

$$e_i = \langle -0.589120, 0.589123 \rangle.$$

This confirms that we do not suffer from bias in the error-terms, since we can not abandon the null hypothesis of the error terms being zero.

We performed a F-test to determine if there was significant difference in the coefficients. The results are shown in table 2. A corresponding Wald test showed the same results, shown in table 6, appendix 1. These test confirm that the components have different weights as predictors of future earnings, at a 99% significance level. More specific they show that the accruals component is less weighted in prediction of future earnings than cash flows with the same significance level.

We included White's heteroskedasticity-consistent standard error estimate to solve any problem of conditional variance in the time-series. The results are shown in table 1.

To make sure we did not have a case of autocorrelation we first did a visual inspection of our residuals which did not support the idea of serial correlation. To further confirm the hypothesis of no autocorrelation, we performed a Durbin-Watson test, shown in appendix 1. The Durbin Watson-test statistic was 1,96 which means that we can not reject the null hypothesis, which again imply that we have no evidence of autocorrelation.

The Jarque-Bera test, shown in table 6 appendix 1, implies that we can reject the null-hypothesis of normally distributed residuals. However, because of the large number of observations, 1536, a violation of this is virtually inconsequential. Brooks (2003).

The strongly significant White heteroskedasticity test show that we do not suffer from heteroskedasticity. The decreasing R-squared values when including the variables in squared terms provides evidence of linearity. Both values shown in Appendix 1, table 6.

We investigated the correlation matrix between the residuals to reject that we suffer from multicollinearity. The results are shown in appendix 1, table 7.

4.2 Does the stock price reflect differences in accrual-ratios?

In this section we present our results from testing the second hypothesis:

H₂: Investors do not fully incorporate information contained in accruals and cash flows that has predictive power for future stock returns.

The system of equations gave the results presented in table 3. From the table we see that we can abandon the hypothesis of market efficiency. The likelihood ratio of 19 imply that the market do not reflect the ratio of accruals and cash flow in a firm in the correct way. We can not draw any further conclusions on the coefficients due to lack of significance.

Table 3
WLS with CAPM abnormal returns

$$Earnings_{t+1} = \gamma_0 + \gamma_1 \times Accruals_t + \gamma_2 \times CashFlow_t + \varepsilon_t$$

$$Abreturn_{t+1} = \beta \times (Earnings_{t+1} - \gamma_0^* - \gamma_1^* \times Accruals_t - \gamma_2^* \times CashFlow_t) + \varepsilon_t$$

$$Abreturn_t = return_{i,t} - r_{f,t} - \beta_{i,t} \times (r_{m,t} - r_{f,t})$$

Unrestricted equation

Parameter	Estimate	Standard error	Probability
γ_1	0.379756	0.020376	0.0000
γ_1^*	0.163388	0.210547	0.4378
γ_2	0.853316	0.016973	0.0000
γ_2^*	0.148840	0.233705	0.524
β	0.664400	0.142494	0.0000

Restricted equation

Parameter	Estimate	Standard error	Probability
$\gamma_1 = \gamma_1^*$	0.377441	0.020952	0.0000
$\gamma_2 = \gamma_2^*$	0.846452	0.017455	0.0000
β	0.668550	0.142659	0.0000

Test of market efficiency: $\gamma_1 = \gamma_1^*$ and $\gamma_2 = \gamma_2^*$

Likelihood ratio statistics: 19.0136

Marginal significance level: 0.0001

Characteristics: Earnings are measured as earnings before interest and taxation, normalized with average total assets over the year. Accruals are measured as the earnings, as defined above, less the operating cash flow, normalized with average total assets over the year. Cash flow is measured as cash flow from operating activities, normalized with average total assets over the year. Abnormal return is measured as return for one year less expected return computed using the capital asset pricing model, with one-year Stockholm interbank offer rate as the risk free asset and time-series beta computed against "affärsvärdens generalindex." Test from nonlinear weighted least squares estimation of the stock price reaction to information in current earnings about future earnings. Abnormal return is estimated using CAPM

Comment: Abnormal return for all firms listed on the Stockholm stock exchange except from financial firms is computed for each year in the period 1997-2006, using the capital asset pricing formula. This is put as the dependent variable in a system equation together with the linear regression (1) where difference in persistence between accruals and cash flow is tested. The results show that we can abandon the hypothesis that the stock price reflect information given in earnings. In other words, the null hypothesis of market efficiency can be abandoned.

Table 4
WLS with market value abnormal returns

$$Earnings_{t+1} = \gamma_0 + \gamma_1 \times Accruals_t + \gamma_2 \times CashFlow_t + \varepsilon_t$$

$$Abreturn_{t+1} = \beta \times (Earnings_{t+1} - \gamma_0^* - \gamma_1^* \times Accruals_t - \gamma_2^* \times CashFlow_t) + \varepsilon_t$$

$$Abreturn_t = return_{i,t} - return_t^{benchmarkportfolio}$$

Unrestricted equation

Parameter	Estimate	Standard error	Probability
γ_1	0,374477	0,020821	0,0000
γ_1^*	0,394510	0,446768	0,3773
γ_2	0,847381	0,017406	0,0000
γ_2^*	1,384047	0,465292	0,0030
β	0,163876	0,074966	0,0289

Restricted equation

Parameter	Estimate	Standard error	Probability
$\gamma_1 = \gamma_1^*$	0,374491	0,020799	0,0000
$\gamma_2 = \gamma_2^*$	0,848461	0,017389	0,0000
β	0,166501	0,074972	0,0264

Test of market efficiency: $\gamma_1 = \gamma_1^*$ and $\gamma_2 = \gamma_2^*$

Likelihood ratio statistics: 3.0049

Marginal significance level: 0,2226

Characteristics: Test from nonlinear weighted least squares estimation of the stock price reaction to information in current earnings about future earnings. Abnormal return is estimated by subtracting the average return for firms with similar market value from the firm specific return. Earnings are measured as earnings before interest and taxation, normalized with average total assets over the year. Accruals are measured as the earnings, as defined above, less the operating cash flow, normalized with average total assets over the year. Cash flow is measured as cash flow from operating activities, normalized with average total assets over the year. Abnormal return is measured as return for one year less expected return. The expected return is computed as an average of a portfolio of firms with similar market value.

Comment: Abnormal return for all firms listed on the Stockholm stock exchange except from financial firms is computed for each year in the period 1997-2006, based on the market value of the firm. This is put as the dependent variable in a system equation together with the linear regression where difference in persistence between accruals and cash flow is proved. The results show that we can not abandon the hypothesis that stock prices reflect information given in earnings. In other words, we can not significantly show that the relationship between accruals and cash flow is different in the abnormal return equation.

From table 4 we can see that when measuring expected return by applying a benchmark value based on firm size, we can not abandon the hypothesis of the market pricing the accruals, and the cash flow component in a correct manner. We do recognize that the coefficient valuing the cash flow component in the second system equation is very high, but the high standard deviation of the component weighting the accruals component we can not draw any significant conclusions.

4.2.1 Assumptions for weighted least squares estimation

As mentioned earlier we include an intercept in the regression to make sure that the average of residuals is zero.

The assumption of no heteroskedastity is covered by using weighted least squares. According to Brooks (2003) weighted least squares models the heteroskedastity to obtain more efficient estimates.

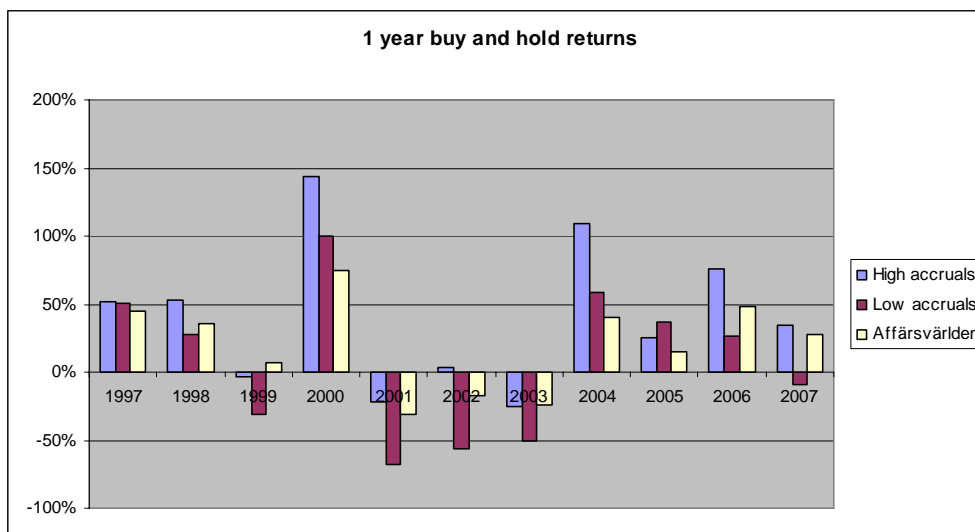
The null hypothesis of normal distribution of the residuals is abandoned by using the Jarque-Bera test, mostly due to high kurtosis. The Jarque-Bera statistics correspond to a 0.0000 probability of normality, shown in appendix 1. Since we have a large dataset the violation of the normality assumption is virtually inconsequential.

We look at a correlogram output of the residuals to make sure that there are no serial autocorrelation. The residuals show no probability of serial autocorrelation. The results is shown in appendix 1, table 9 and 10.

4.3 Can we earn abnormal return by exploiting the accruals anomaly?

In this section we present our results from the studies of the hedge created for each year.

Figure 2
One year raw buy and hold returns 1997-2007

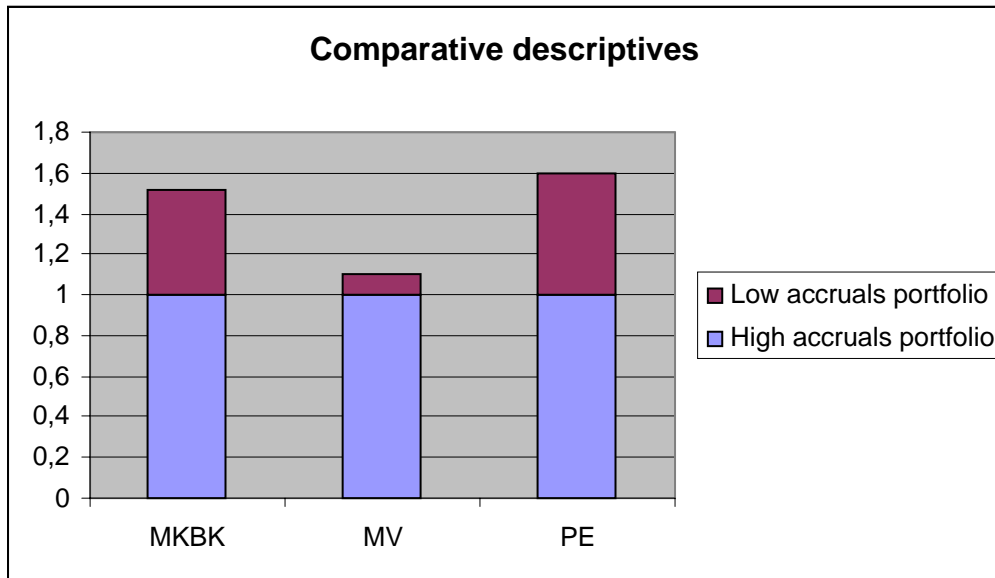


Characteristics: The firm specific return is calculated from the Return index observation from Thomson DataStream. Returns in each portfolio are later summed up to get a total return for each portfolio. The return for Affärsvärldens General index is also calculated from the Return index. The y axis shows returns while the x axis shows the year.

Comment: The Chart shows one year raw buy and hold returns for the Portfolio with high and low accruals and the corresponding return for Affärsvärldens generalindex. The high accruals portfolio consistently earns a higher return than the low accruals portfolio in all but one year.

It is hard to draw any conclusions from the table which do not show any consistent behaviour. The portfolio based on low accruals do seem to give a lower return than the one based on the high accruals firms. The high accruals firms beat index 10 out of 11 times where the low accruals only beats it 4.

Figure 3
Average descriptives in extreme portfolios



Characteristics: The chart shows average values for market to book, market value and price to earnings ratio for the two extreme decile portfolios. MKBK is the market-to-book ratio taken from Thomsons DataStream. MV is the market value taken from Thomsons DataStream PE is the price to earnings ratio taken from Thomsons DataStream The numbers are means from 1997-2006 with the high accruals portfolio depicted as 100% and the low accruals portfolio depicted as a percentage of the former. In this case the high accruals MKBK is displayed from 0 to 1 and the low accruals portfolio is displayed from 1 to 1,5.

Comment: The statistics for the low accruals portfolio is consistently lower than the high accruals portfolio. Market value shows the most significant difference.

Figure three show that the low accruals portfolio has lower market to book ratios, market value and average price to earnings ratio.

Table 5
EBIT, Cash flow, and accruals characteristics for the two extreme portfolios

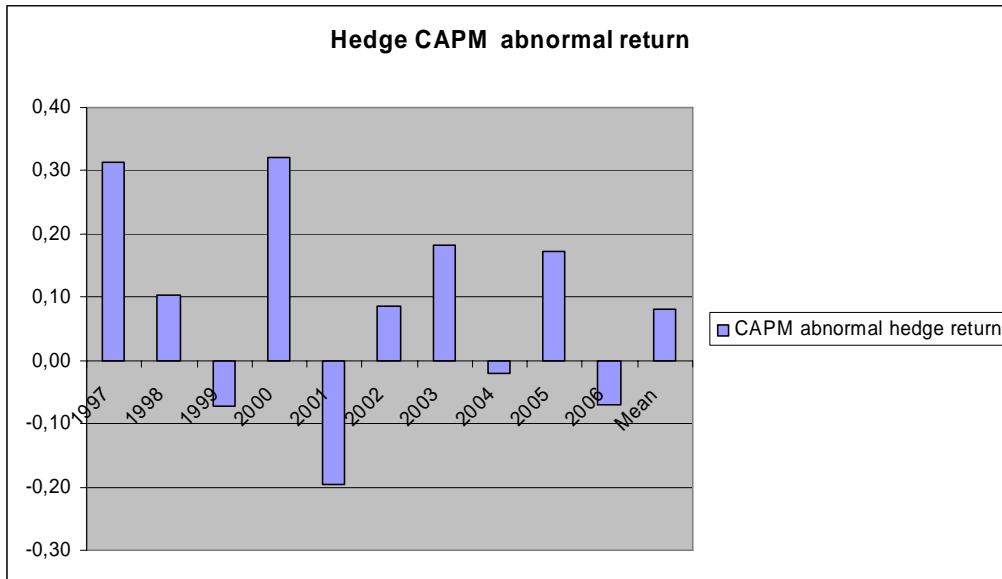
Earnings Component	Value
EBIT High accruals portfolio	-0,00806
EBIT Low accruals portfolio	-0,19681
Cash Flow High accruals portfolio	-0,00639
Cash Flow Low accruals portfolio	0,388575
Accruals High accruals portfolio	-0,00191
Accruals Low accruals portfolio	-0,94798

Characteristics: Earnings are measured as earnings before interest and taxation, normalized with average total assets over the year. Accruals are measured as the earnings, as defined above, less the operating cash flow, normalized with average total assets over the year. Cash flow is measured as cash flow from operating activities, normalized with average total assets over the year.

Comment: From the table we can conclude that the high accruals portfolio has close to zero averages on all components. The low accrual portfolio have on average much higher cash flow and much lower accruals than the high accrual portfolio which of course comes from the specification of accruals as EBIT less cash flow. What is more surprising is that earnings in the low accruals portfolio are negative on average.

Both portfolios independent on whether they are based on high or low amount of accruals show average negative EBIT. Despite this do the low accruals portfolio have positive average cash flow from operations.

Figure 4
Hedge CAPM abnormal returns

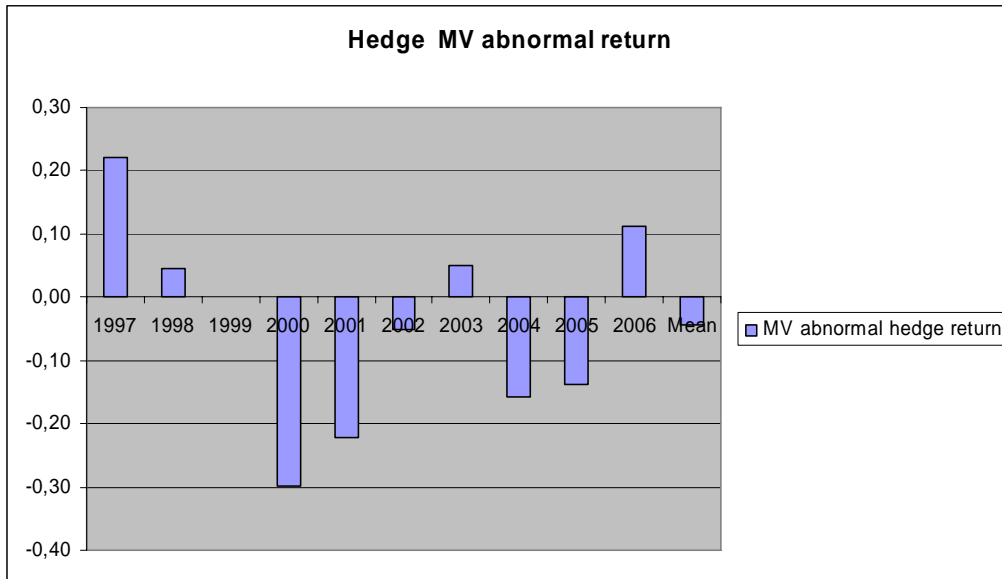


Characteristics: The chart shows abnormal returns for a hedge portfolio where you go long in a low accruals portfolio and short in a high accruals portfolio. The return from each year is calculated from the sum of the returns from the low and high accruals portfolio and is calculated by negative or positive 1 if you go short and long respectively. Abnormal returns are calculated on firm basis with CAPM. The y axis shows returns while the x axis shows the year.

Comment: Mean abnormal return from the hedge portfolio is 8%.

The figure shows the abnormal return for the hedge where we try to exploit the mispricing of the accruals component by holding firm with low amount of accruals and short selling firms with high levels of the component. The abnormal return is computed by applying the capital asset pricing method described in section three. The figure do not show any consistent behaviour but we do get a mean abnormal return of eight percent.

Figure 5
Hedge market value abnormal return



Characteristics: The chart shows abnormal returns for a hedge portfolio where you go long in a low accruals portfolio and short in a high accruals portfolio. The return from each year is calculated from the sum of the returns from the low and high accruals portfolio and is calculated by negative or positive 1 if you short and long respectively. Abnormal returns are calculated by subtracting size adjusted returns. The y axis shows returns while the x axis shows the year.

Comment: Mean abnormal return from the hedge portfolio is -4%.

Figure five shows like figure four the abnormal return of our hedge, but in this case when the excess return is computed by reviewing return of firms with similar size, described in chapter three.

5 Analysis

“The following part contains a discussion of the implication of our results. This includes discussion of whether the accruals anomaly exists on the Swedish market, possible explanations to why and whether it can be exploited.”

5.1 Summary of descriptive statistics

5.1.1 Results from testing H1

Our results from the first part of the regression tests showed that accruals are less persistent in future earnings than cash flow. The results were 0,328757 and 0,86195 respectively. Both coefficients show high significance, with probabilities of 0,0000. The model has a rather high R^2 statistic, 0,52, which shows that the model explains a high percent of the results considering that lagged Cash flows and accruals never can explain all of future earnings. We can show that the coefficients are significantly different from each other and that the accruals component is lower. All this shows that the predictive value of future earnings are much higher for cash flow than accruals.

From our reversion analysis we concluded that Accruals reverted almost entirely to the mean after one year while Cash flow and EBIT have a much smoother reversion and still have not reverted to the mean after three years. These findings add to earlier evidence in the accruals literature by showing the behaviour of accruals, EBIT and cash flow time series. The earnings from the low and high accrual portfolio are slightly positive for the high accrual portfolio and very negative for the low accrual portfolio. As can be seen from the individual earnings portfolios in the appendix, earnings were slightly lower in the years around 2000, which could explain the relatively low average earnings in the high earnings portfolio.

Consistently in all portfolios sorted on the three different components, is that the high decile extreme portfolios shows small earnings. The high accruals portfolio reverts slightly less than the low accruals portfolio. As suggested by our first step regression the portfolios sorted on cash flows shows a much smoother reversion than the other portfolios. This concludes that a company's cash flow is the better predictor of not only one year future earnings but also in consecutive years.

5.1.2 Results from testing H_2

In the second step we performed a system multiple regression using the Mishkin (1983) methodology. In the first part we used the capital asset pricing model to compute expected and abnormal returns, which was set as the dependent variable in the second equation. By doing this we found that we can abandon the hypothesis of an efficient market. Our results show that the price of the stock do not reflect the difference in persistence of the two components of earnings, accruals and cash flow, which we found in step 1. Still it is important to realize that we do not find significant coefficients for the accruals and the cash flow when estimating their relation to the abnormal returns, see table 3. What we can see from our results is that the coefficients in the abnormal return equation are more similar to each other compared to what they are in the model of the relationship between future earnings and the components. This would imply that the cash flow component might be under priced as well as the accruals component might be overvalued when compared to the cash flow component. Due to the non-significance of the estimates it is important to further investigate the mispricing in the hedge portfolio that is constructed in step 3. This is done by employing the results found in earlier studies by forming a hedge based on this theory of over valuation of the accruals component and undervaluation of the cash flow component.

To validate our results we computed an additional measure of expected return, using a matched market value portfolio as a benchmark. This gave us a system of equations showed in table 4. By applying this method we could not abandon the null hypothesis of an efficient market where the stock price reflect available info regarding the size of the accruals component compared to the cash flow component of a firms reported earnings. These results are therefore not contributing to our analysis, but increase the importance of analyzing the computed hedge where we try to exploit any potential mispricing. It is however interesting that the mean of the coefficient weighting the cash flow component in the second equation where abnormal return is linked to the accruals and cash flow components, is much higher compare to the one weighting the accruals component. The coefficient representing the cash flow component is significantly larger than the one weighting the accruals component on a 80% significance level. This means that investors might give more weight to the cash flow of a company than what is suggested by the first part of our study.

The non significance in our results might be caused by misspecification of our abnormal return. We compared our results from the two different estimation methods to validate our results. They did show upon large differences in some observations.

5.1.3 Results from designing a hedge

In the third part of our study we looked at returns from the two extreme decile portfolios. The portfolios differ from each other on some points, see figure 3 and table 5. The high accruals portfolio has an average market to book ratio of 10 vs. 5 in the low accruals portfolio. Market value for the high accruals portfolio is SEK 6,8 billion vs. SEK 800 million for the low accruals portfolio. The price to earnings ratio for the high and low accruals portfolios is 49 and 29 respectively. The descriptive ratios and returns for the two extreme portfolios give some indication that extreme accruals portfolios actually capture some other characteristics which could lead to abnormal returns, this will be investigated further down. Raw returns for the high accruals and low accruals portfolios are 28% and 8% respectively. When we look at abnormal returns calculated with CAPM the relations for returns are switched and the hedge portfolio which goes long in the low accruals portfolio and short in the high accruals portfolio earns an average return of 8%. The hedge portfolio calculated with size adjusted market value abnormal returns finds an average return of -4%.

None of the two hedge portfolios show much consistency in abnormal returns over the years, see figure 4 and 5. There are six positive and four negative years in the CAPM abnormal returns hedge and four positive and five negative in the MV abnormal returns. This is possibly a manifestation of some other risks that is captured in portfolios with extreme accruals in some years. CAPM showed an extremely high abnormal return during the year 2000 while market value showed an extremely low abnormal return. This could be due to the fact that many companies had returns that far exceeded their expected returns according to CAPM during the internet bubble. With market value based estimated abnormal returns we look at actual values for the period, which leads us to the conclusion that companies in the extreme accrual decile must have performed worse than their peers according to market value.

As discussed earlier the hedge returns must be put in relation to the Mishkin tests performed in stage 2. The Mishkin test performed on the CAPM abnormal returns don't give any suggestions as to how we should exploit the mispricing of investors since we do not have significance on the variables. The MV regressions do however suggest that since investors

overprice cash flows we should go long in the high accrual portfolio and short in the low accrual portfolio. This is due to the higher extent of cash flow in the low accrual portfolio. When investors overreact to these cash flows they will overprice the corresponding stocks and the stock price will later drop when the cash flows are not realized in the future. If we reverse the returns from figure 5 we see that we get a positive result, this is the result that will come from a hedge with a long position in the high accruals cash flow portfolio and a short position in the low accruals portfolio. The standard error on this variable is rather large at 0,46 which makes any conclusions somewhat far fetched, the earlier explanation should be seen as a possible explanation and not a fact.

5.2 Our results in relation to previous studies

We used the same linear model as Sloan (1996) and Pincus et al.(2005) when modelling the persistence of the cash flow component and the accruals component of a firms earnings. This makes our results comparable.

Sloan (1996) found that earnings the following year is best determined by 0,77 times the accruals component that given year plus 0,87 times the cash flow component the same year plus a constant and an error term. Our model of the Swedish market found that accruals are even less persistent, showed by the corresponding weighting factors of 0,33 versus 0,86. It is remarkable that while the persistent of the cash flow component is similar in the two studies, the accruals component seem to be less persistent in the Swedish market. Important to recognize is that while our study reflects the Swedish market in a ten year period between 1997 and 2006, Sloan (1996) investigated the US market during 1962 to 1992. The difference in our result might therefore be explained by changes in accruals persistence over time as well as markets. It is interesting to study why such changes might have occurred. Why are what we define as accruals in a firms earnings less persistent today in Sweden compared to earlier in the united states? Sloan (1996) defined accruals using the balance sheet method¹⁰, which according to Hribar and Collins (2002) might lead to errors in case such as mergers or divestitures. Because we exclude these effects by applying the “cash flow method”, it would be expected that we found higher consistency of accruals than when using the balance sheet method.

¹⁰ Balance sheet method: Accruals = (change in current assets-change in cash)-(change in current liabilities-change in dept including current liabilities-change in income taxes payable)-depreciation

Pincus et al. (2005) investigated the same relationship for Sweden through the period 1994-2002, defining accruals using the balance sheet method. Their studies also showed upon a higher persistence of the accruals component in future earnings than what we found. The difference is however small (0.33 in our study versus 0.36 in their). Worth noticing is that firms listed in Sweden during their estimation period showed less persistence in cash flows than what our results show. This can show upon a change in the market, and is likely considering the fact that the period between 2002 and 2006 has showed signs of a stronger economy and growth compared to the period 1994-1997, which we do not include in our report.

Sloan (1996) could by performing a system equation where he follows Mishkin (1983) in the same manner as we did, abandon the hypothesis of market efficiency. He found that accruals were over weighted in the market and that cash flow components were under weighted. In this system equation he calculated the abnormal return by subtracting the firm specific return by the size-matched market value portfolio return. We did unfortunately not find the same significance as Sloan (1996) in our study. When defining abnormal return in a similar way as Sloan (1996) we could not draw any major conclusions from our results. When we defined the abnormal return by applying the capital asset pricing method, we did find like Sloan (1996) that the market prices do not reflect the information about the earnings correctly. Pincus et al. (2005) found indications that accruals might be underweighted in Sweden, but did as us not find the significance to prove this. They suggest that even cash flows in Sweden are under valued, but also here without significance. These results correspond very well to our results when using CAPM to estimate abnormal returns.

Sloan (1996) found an average return of 11,2% to a size adjusted hedge portfolio between 1973 and 1991. The results are robust and show only two negative returns during the time period. Our size adjusted hedge portfolio shows none of the robustness of Sloan's (1996) results. There are a number of different properties of our study and Sloan's that makes a comparison not fully straight forward. We use the cash flow method to calculate accruals while Sloan (1996) uses the balance sheet method, and our time periods and countries included in our studies differs. Our studies on how investors look at the cash flow and accruals component of earnings, step 2, differs in their results. This suggests that a hedge portfolio constructed on accruals part of earnings should not give the same results.

LaFond (2005) uses another approach to calculating hedge returns which does not show the direct return an investor would get. The approach shows the return of the hedge portfolio that is attributable to accruals and not to some other risk measures as market value, market to book and market return. He finds evidence of a positive return on a portfolio constructed on accruals part of earnings on the Swedish market, but the return is only significant on the ten percent level and not as big as many other countries in the study. LaFond (2005) did not estimate the relation between cash flows and accruals to earnings that we did in step 2, which makes it impossible to draw any conclusions as to how his study of hedge portfolios is comparable to ours. Lafond's (2005) methodology takes care of some of the problems that we face with our extreme portfolios, that is the big difference in market value and market to book in the two portfolios. On the other hand his approach does not show the actual return an investor would have got while investing in a hedge portfolio constructed by accruals part of earnings.

Zach (2005) showed a result of 10,2 % to a hedge portfolio with size adjusted returns calculated on the American market between 1988 and 1999. For this result he used the cash flow method of estimating accruals. The return does have a similarity with Sloan's (1996) even though they are calculated for different time periods. This suggests that our difference in hedge returns does not stem from differences in estimation techniques. Cash flow vs. balance sheet, or difference in time periods. We do however have estimations from different countries.

5.3 Other explanations for the accrual anomaly

There is an absence of stability in hedge returns, which implies that there could be another explanation of the abnormal returns to the hedge portfolios than the accruals anomaly. The low accruals portfolio has much higher market value than the high accruals portfolio. Market value has been brought forward by Fama and French (1993) as a proxy for risk where low market value companies earn a higher raw return than high market value companies. This contradicts the higher return in the high accrual portfolio which is shown in figure 2 since this portfolio has a much higher market value on average than the low accruals portfolio. The abnormal returns are then calculated from the returns from a portfolio with similar market values to the observed company. Applying this method will offset the bias from high/low market value companies. We do not however get more stable results from this methodology which makes it hard to draw any further conclusions.

The market to book ratio for the low accrual portfolio is lower than the corresponding market to book for the high accrual portfolio. Fama and French (1993) have shown that low book to market/high market to book firms have more volatile returns. This also contradicts the higher returns found in the high accruals portfolio shown in figure 2. Basu (1977) have shown that low PE companies earn higher returns than high PE companies. The high accruals portfolio has high PE values and should hence display low returns. As for the other two risk proxies the results contradicts theory.

Lehavy and Sloan (2004) has brought forward evidence that a high level of accruals are correlated with events that will be acknowledged by media and shareholders, and therefore increase the recognition of the stock. Such events often increase the media coverage of a company, and as Merton (1987) suggests, such increased visibility might give some “extra” return due to increased investor interest. With our definition of accruals, in comparison to the one Sloan (1996) used, such events should be excluded from our results. By using the cash flow definition of accruals we exclude the large accruals companies that are related to mergers and acquisitions, seasoned equity offers, divestitures and comparable events. Our approach should therefore make our results somewhat more reliable than the ones Sloan (1996) did find. Even after these events are sorted out there might be some characteristics of high accruals companies that make them prone to get more attention from the media, which we do not capture in this thesis.

5.4 Behavioural explanations to the anomaly

Bradshaw et al. (2001) found evidence that few sell side analysts incorporate information about accruals in their investment recommendations in the United States. At the same time Pincus et al. (2005) showed evidence that the US stock market rank well regarding efficiency compared to other markets. So on one side there is evidence that the market prices do not reflect all available info where on the other side there is the argument that the market fulfils most of the proxies for market efficiency, implying that all public information should be reflected in the share price. This is of course contradicting and leads us to believe that Pincus et al. (2005) did not incorporate all proxies necessary in their tests of the efficiency of the market. On the other hand it makes it very interesting to evaluate why just this anomaly could exist, considering that the researchers found that the market fulfil many requirements suggesting that it is semi-efficient. Pincus et al. (2005) found that Sweden rank on average relatively good on most proxies regarding market efficiency implying that most anomalies

should be short lived on the Stockholm stock exchange. No studies like the one Bradshaw et al. (2001) performed regarding whether investors actually do incorporate the accruals component of earnings, have been performed in Sweden. Still it is not unreasonable to draw the conclusion that all Swedish professional investors do not investigate the components either, considering that our results imply that the stock price do not reflect the ratios between accruals and cash flow from operations correctly. This therefore raises questions regarding why the accruals anomaly do exist.

The lower persistence of accruals can be explained by higher fluctuations in them over time. Time varying accruals might be a result of firms smoothing the operating cash flow over time, and therefore in a larger extent use the accruals component to explain changes in earnings, compared to earlier. Pincus et al (2005) found that this kind of earnings management as well as limits to arbitrage explain parts of the presence of the accruals anomaly. Limits to arbitrage often involve that obstacles to the rational pricing of accruals are costly to remove. To change this might be costly, thus such change in behaviour would demand change in routines as well as awareness which again is time consuming. Bradshaw et al. (2001) found that auditors and investors generally do not incorporate the information regarding accruals portfolios, the accruals anomaly might therefore exist due to the costs of changing this behaviour.

There is a possibility that investors only look specifically at the components of earnings when they show an extreme result. However since the extreme decile portfolios that are sorted on accruals all have extreme result, a hedge formed after this strategy would not produce abnormal return if extreme accruals companies suffered extra scrutiny from investors.

Since the main purpose of this paper is to investigate whether the anomaly exist and not address questions regarding why, we leave further investigation and discussion to future researchers.

5.5 Risk in our portfolio

As mentioned in the part that covers other explanations for the accruals anomaly our two portfolios have different values on some classic risk measures like market value and market to book. Bankruptcy risk could be considered as a risk that is more common in the extreme portfolios, but Pincus et al. (2005) showed that this risk had no significance in explaining the accruals anomaly. We haven't performed the tests necessary to look at this so we cannot draw any further conclusions.

The two methods of estimating abnormal returns have different approaches that make the results hard to compare. In the case of the size adjusted returns that are more widespread in the accruals literature we look at what returns were actually realized by a portfolio of firms with the same market value as the respective company. In the case of CAPM expected results we use the market model that is used in event studies to calculate the expected return to every company according to the Beta value and the corresponding risk free and market return for that year. As we have mentioned earlier authors like LaFond (2003) have used three factor models that better capture the special risks, market value and market to book, that are common in the extreme portfolios the approach is however much more time consuming and could not be performed for our study. CAPM does not capture risks attributed in market values and market to book and would therefore undervalue the expected return for the companies in the extreme portfolios.

6 Conclusion

“In the sixth chapter we provide a summary of our results and the major implications of them. We also briefly discuss interesting areas for future research.”

Our first hypothesis was that the accruals component of earnings is less persistent than the cash flow component of earnings. We did a pooled least squares estimation which gave a result that the accruals component is significantly lower than the cash flow component at 0,33 and 0,86 respectively. This gives a clear indication for us to accept our first hypothesis.

The second hypothesis was designed to find out if investors on the Swedish market put different weights on the accruals and cash flow component than what is implied by the relation in the first hypothesis. We tested our second hypothesis by employing two different ways of calculating abnormal returns.

In the first test of the second hypothesis we used the capital asset pricing model to estimate abnormal returns. In this test we could reject market efficiency in the sense that the likelihood ratio test suggested that the coefficients in the two equations was significantly different. We find that the prices do not reflect the relation suggested from the first step, but we can not draw any conclusions about in which direction they differ since the coefficients did not show significance (table 3). Our results suggest that the cash flow component might be under priced as well as the accruals component might be overvalued when compared to the cash flow component in Sweden, both coefficients are however without significance. The non significance of our results may be caused by a possible misspecification of our abnormal returns. We can accept our second hypothesis when we use CAPM abnormal returns with the exception that we do not have significance on the coefficients.

When we looked at size adjusted returns with market value, the results from the likelihood ratio test suggested that the coefficients were not significantly different. The coefficient for the cash flow component was much higher than what was implied by the results from the first hypothesis and showed significance (table 4). We used the size adjusted returns to get two different estimates of abnormal returns. Both differ much in their estimates which does not give any clear suggestions as to which method is the most usable. We have to reject our

second hypothesis when we use size adjusted abnormal returns due to the results from the LR test.

The third step of our study was designed to quantify and give further insights into the results from the second hypothesis. We constructed hedge portfolios on both abnormal returns from CAPM and size adjusted returns. The hedge portfolio on CAPM earned an average return of 8%. When we looked at size adjusted returns we found an average return of -4%. The two results show very different estimates and this is due to our different estimations of abnormal returns. Since the two hedge portfolios show very different results it is hard to draw any clear conclusions. We can however say that the results from the size adjusted hedge is in line with the significance of an over priced cash flow, since this would lead to a higher return for the high accruals portfolio which could explain the negative result of the hedge portfolio.

We do not have significance on the variables in the CAPM regression. They did however both show under pricing of the two components which would lead to a positive result of a hedge.

Our result indicate that one can earn abnormal return by buying stocks with low amounts of accruals and short selling stocks with high amount of accruals. We strongly recommend investors to investigate to what extent the earnings of a firm is consisting of operating cash flow and to keep in mind that the part that the accrual component is less persistent.

The big difference in returns suggests that there is a misspecification in our abnormal returns estimations and therefore we suggest that further research in this area should look closer into the estimation of abnormal returns. The absence of stability in hedge returns for the two estimations suggests that the accrual anomaly in Sweden could be due to something that is captured by extreme accruals portfolios in some years. We would therefore suggest that further research should look into the different explanations of the accruals anomaly.

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Appendix 1: Testing assumptions underlying the regressions

Table 6
OLS assumptions

OLS assumptions for step 1	Test statistic	Probability
Wald test of $-\gamma_1 + \gamma_2 = 0$	66,66	0,0000
Whites test	861,0723	0,0000
Jarque Bera	90,51204	0,0000
R-squared	54, 3228	
R-squared with acc ²	48,37317	
R-squared with cf ² and acc ²	24,02640	

Characteristics: The table show test statistics and probabilities of the test performed in the OLS assumptions Wald test with null hypothesis that the coefficients are not equal. Whites test with the null hypothesis that we have zero heteroskedasticity. The Jarque-Bera test has a null hypothesis of zero normality.

Comment: The wald test show that the coefficients in the first regressions are not equal. Whites test show that we have zero heteroskedasticity. The Jarque Bera test show that we have zero normality. This does not make a significant difference since we have a large number, 1536, of observations.

Table 7
Jarque Bera statistics

WLS assumptions for step 2	Test statistic	Probability
Jarque Bera resid01	181378	0,0000
Jarque Bera resid02	61526629	0,0000

Characteristics: The Jarque-Bera test has a null hypothesis of zero normality.

Comment: The Jarque Bera test show that we have zero normality. This does not make a significant difference since we have a large number, 2484, of observations.

Table 8
Correlation matrix with the coefficients from regression 1

	γ_0	γ_1	γ_2
γ_0	1,00	0,18	0,13
γ_1	0,18	1,00	0,00
γ_2	0,13	0,00	1,00

Characteristics: We use the covariance matrix output from Eviews and divide every coefficient by the standard deviation of the two correlated coefficients.

Comments: None of the coefficients show significant correlation.

Table 9
Correlation matrix from WLS unrestricted regression with CAPM abnormal returns

	γ_0	γ_2	γ_1	β
γ_0	1,000	-0,010	0,130	0,001
γ_1	-0,010	1,000	-0,006	0,001
γ_2	0,130	-0,006	1,000	-0,003
β	0,001	0,001	-0,003	1,000

Characteristics: We use the covariance matrix output from Eviews and divide every coefficient by the standard deviation of the two correlated coefficients.

Comments: None of the coefficients show significant correlation.

Table 10
Correlation matrix from GLS restricted regression with CAPM abnormal returns

	γ_0	γ_2	γ_1	β	γ_2^*	γ_1^*
γ_0	1,000	-0,010	0,130	0,001	0,000	0,013
γ_2	-0,010	1,000	-0,005	0,000	0,000	0,000
γ_1	0,130	-0,005	1,000	0,000	0,000	0,002
β	0,001	0,000	0,000	1,000	0,652	0,190
γ_2^*	0,000	0,000	0,000	0,652	1,000	0,113
γ_1^*	0,013	0,000	0,002	0,190	0,113	1,000

Characteristics We use the covariance matrix output from Eviews and divide every coefficient by the standard deviation of the two correlated coefficients.

Comments: None of the coefficients show significant correlation.

Appendix 2: Event-study of mean reverting earnings

