Abstract

This thesis investigate the phenomenon of post earnings-announcement drift where good (bad) interim reports are followed by an upward (downward) drift in stock price. The main question is whether the specific construction of the drift measure has any impact on the drift. The results show that reported earnings are more suited than earnings per share as a measure of earnings. Stock price is seen to affect the decile sorting in many of the measures and as such, using the standard deviation of past expected earnings is recommended. No definitive conclusion can be drawn about the model of unexpected earnings for the standardized unexpected earnings measure. Standardized unexpected earnings outperform earnings announcement returns in the size of drift.

Sammanfattning

Examensarbetet undersöker fenomenet "Post-Earnings Announcement Drift" där bra (dåliga) kvartalsrapporter följs av generell uppgång (nedgång) i aktiepris. Huvudfrågeställningen är om en specifik beräkningsmetod av måttet har någon inverkan på resultatet, d.v.s. storleken eller riktning på avkastningen. Resultatet visar att periodens resultat/vinst är mer lämpat i beräkningssyfte än vinst per aktie. Aktiepris visar sig ha en påverkan vid indelning av deciler i många fall, och att använda standarddeviationen som standardiserande nämnare är rekommenderat. Ingen slutgiltig slutsats kan dras rörande modellen för oväntad vinst i fallet då måttet baseras på ”Standardized Unexpected Earnings”-modellen. Nämnda modell beskriver däremot det undersökta fenomenet bättre om man ser till storleken av aktieprisutveckling.

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Abbreviations

AFR	Analyst Forecast Revision
BE/ME (BM)	Book Equity / Market Equity (Book-to-Market)
CAPM	Capital Asset Pricing Model
EAR	Earnings Announcement Return
EMH	Efficient Market Hypothesis
EPS	Earnings per Share
HML	High-minus-Low
OLS	Ordinary Least Squares
P/E	Price per Earnings
PEAD	Post Earnings-Announcement Drift
ROE	Return on Equity
SMB	Small-minus-Big
SUE	Standardized Unexpected Earnings
UMD	Up-minus-Down

Contents

1. Introduction

The introduction serves to present the reader with the purpose of this thesis, as well as background as to why this is a current and interesting topic to investigate.

1.1 Background

Ever since the efficient market hypothesis (EMH) was introduced by Eugene Fama (Fama, 1970), it has been highly debated. In the efficient market, all available information is incorporated and reflected in the asset price and thus traded at a fair value. As such, prices will adjust to any new information in an efficient market with the implication that there are no under- or overvalued assets on the market. Since the market has access to the same information, no investor is more likely to outperform another. While it has been shown that fund managers do not outperform the market (Jensen, 1967), (Malkiel, 1995) and (Gruber, 1996), the opposite has also shown to be true (Otten & Bams, 2000). This tells an inconclusive story about whether the market is efficient or not. Furthermore, other anomalies have been brought to light that indicate a less efficient market. Different measures of size such as market capitalization and book-to-market has been introduced by (Fama & French, 1993) to enhance the capital asset pricing model (CAPM), to take into account these size explanatory variables. Since the introduction of the French-Fama three factor model, it has further been enhanced by (Carhart, 1997), and yet again by French and Fama (Fama & French, 2015), by introducing further explanatory variables, creating a five factor model to explain variations in cross sectional return.

Another irksome phenomenon is the apparent evidence of momentum effects. Earnings momentum or post earnings announcement drift (PEAD) was discovered as early as 1968 where it was shown that companies with positive (negative) earnings news exhibit an upward (downward) drift in the stock price for up to six months (Ball & Brown, 1968). The PEAD phenomenon is not limited to US markets alone, but have been discovered in European markets such as the U.K. (Hew, et al., 1996) and Spain (Forner & Sanabria, 2010) as well. However, PEAD does not seem to be a natural occurring event in all markets, e.g. Belgium (van Huffel, et al., 1996) and Poland (Szyszka, 2001) exhibit no or little sign of earnings momentum. The drift in stock price and slow adjustment following interim/annual reports indicate a less efficient market, posing a trouble for the followers of the EMH.

There is also evidence of price momentum (Jegadeesh & Titman, 1993) where past good (bad) performance in stock return indicate a continued good (bad) performance. Whether or not price momentum and earnings momentum are entangled is up for debate. Both Jegadeesh95 and Chordia2005 agree that the both measures of momentum have different explaining power, the latter however claims that earnings momentum subsumes price momentum. The price momentum has also been noted on several European markets (Rouwenhorst, 1998), amongst them is the Swedish one.

Setterberg (Setterberg, 2007) sums it up neatly; earlier studies suggest an efficient Swedish market, based on several studies with different approaches, only to be challenged by later studies. The first study (Forsgårdh & Hertzen, 1975) examines the Swedish market and its response to earnings information in the 60’s and 70’s, with little sign of a drift but rather a price correction during the day of the report. This is in line with an efficient market. Later research (Liljeblom, 1989) had similar results; investigation into whether analyst forecasts of EPS could generate abnormal returns showed a quick adjustment on the day of the report. However as time progress, research into accounting information such as Return on Equity (ROE), Book-to-Market (BE/ME) and Price per Earning (P/E) has shown evidence of inefficiency and trading strategies yielding abnormal returns in multiple studies (Skogsvik, 2002), (Skogsvik & Skogsvik, 2005) and (Novak & Hamberg, 2010). Setterberg herself found PEAD, earnings momentum strategies yielding abnormal result as well as price momentum - all indicating an inefficient market.

A valid question to ask based on the above mentioned definition of EHM and different momentum effects is thus, how can this phenomenon occur? There are two distinguished possibilities as to why PEAD exists. The first possibility concerns a flawed research methodology and misspecification of the CAPM, as suggested by Ball (Ball, 1978), due to evidence of abnormal returns in portfolios based on earnings even in the presence of an efficient market. The evidence is corroborated by a later study by Ball, et al. (Ball, et al., 1993). A second option would be the more obvious one; the market is actually not efficient in the sense of adjusting to new information. Different reasons for this market friction has been suggested, such as liquidity and trading cost ((Battalio & Mendenhall, 2007), (Chordia, et al., 2009)). However, the liquidity issue concerning PEAD is a recent area of study currently under scrutiny, and that trading strategies involving momentum are ineffective when taking the cost of trading into consideration has been debunked by Asness, et al. (Asness, et al., 2014). Using data over live trades, they show that momentum strategies can indeed yield positive results by applying real world strategies, as opposed to estimating costs based on daily stock data.

As misspecification of the CAPM has been ruled out, only the option of an inefficient market as a source of the drift still remains. Therefore, studying the different momentums and comparing the different ways of measuring them is of interest in order to untangle the cause of the drift, and its impact on market efficiency. An overwhelming amount of PEAD studies have been carried out on the US market, with significant positive results. As the way of measure and the size of the drift have differed between studies, conflicting views regarding conclusions of profitability exists. Indeed, where a weak measure of drift will show insignificant after trading costs, a strong drift will not.

1.2 Purpose

This paper will therefore focus on one market (OMXS) to broaden the perspective. For one, few studies have been carried out on the Swedish market. Many different ways of measuring earnings surprise has been investigated, but few studies have pitted them against each other on one and the same sample, with one consistent methodology. Authors have often put their on touch upon the measure and no standardized measure is used. The difficulty in comparing different findings is obvious.

The main objective is compare the measures of earnings momentum to find what differentiates them, which are reliable and best suited for use. A secondary objection would be to confirm (or refute) the previous evidence of PEAD on the Swedish market. By tweaking a measure and comparing results the thesis hopes to shed light on the driving cause of the post-earnings drift (confirmed to exist), and thus market efficiency as a whole.

1.3 Thesis Disposition

The thesis will first, beyond the basic introduction of the subject, present different ways of assessing the news in interim/earnings reports and previous findings surrounding these. After familiarizing the reader with each measure, a brief overview previous methods of evaluating PEAD will be made before moving on to the thesis methodology. The reader will be carefully guided in the methods used in this thesis, as well as be presented with sample selection methodology. The results from the aforementioned tests are reported in the aptly named section Results, followed by a discussion and conclusion of the findings.

1.4 Delimitations

The thesis will not directly investigate the impact of size related components such as market capitalization, book-to-market or similar proxies for size. Size has been a large part of previous studies as an explanatory variable to abnormal returns, but would broaden the scope by too far. The study will focus on two of the three measure presented below, as a sizable amount of analyst forecasts are hard to come by for the intended sample.

2. Theory

This section gives a brief overview of different models describing stock returns, as well as the mathematical background of the regression technique used construct aforementioned models.

2.1 Regression

While regression is just a fancy way of expressing the act of fitting a line to data, it is still a most valuable tool. This brief introduction to regression will only discuss the simplest case of fitting a straight line to data - the linear model. With regression, we can model relationships between variables to be used for prediction and forecasting, or try to determine how one variable is influenced (depends on) one or more other variables. These are suitably named the dependent (response) variable and independent variables (covariates) respectively. It is important in science to back any statement with proof (or disproof). Regression is a way of quantifying relationships to assign scientific meaning. Before delving into the mathematical part, the reader might find a simple (fictitious) example useful for context.

A government has measured the level of crime and the level of education in ten of its cities and plotted crime against level of education as seen in Figure 1 below. Crime is seen to decline with increased education. Crime acts as a dependent variable whereas education serves as the sole independent variable. Using regression one can estimate the equation for the straight line also shown in Figure 1. This can be used to predict the level of crime for a given a certain level of education.

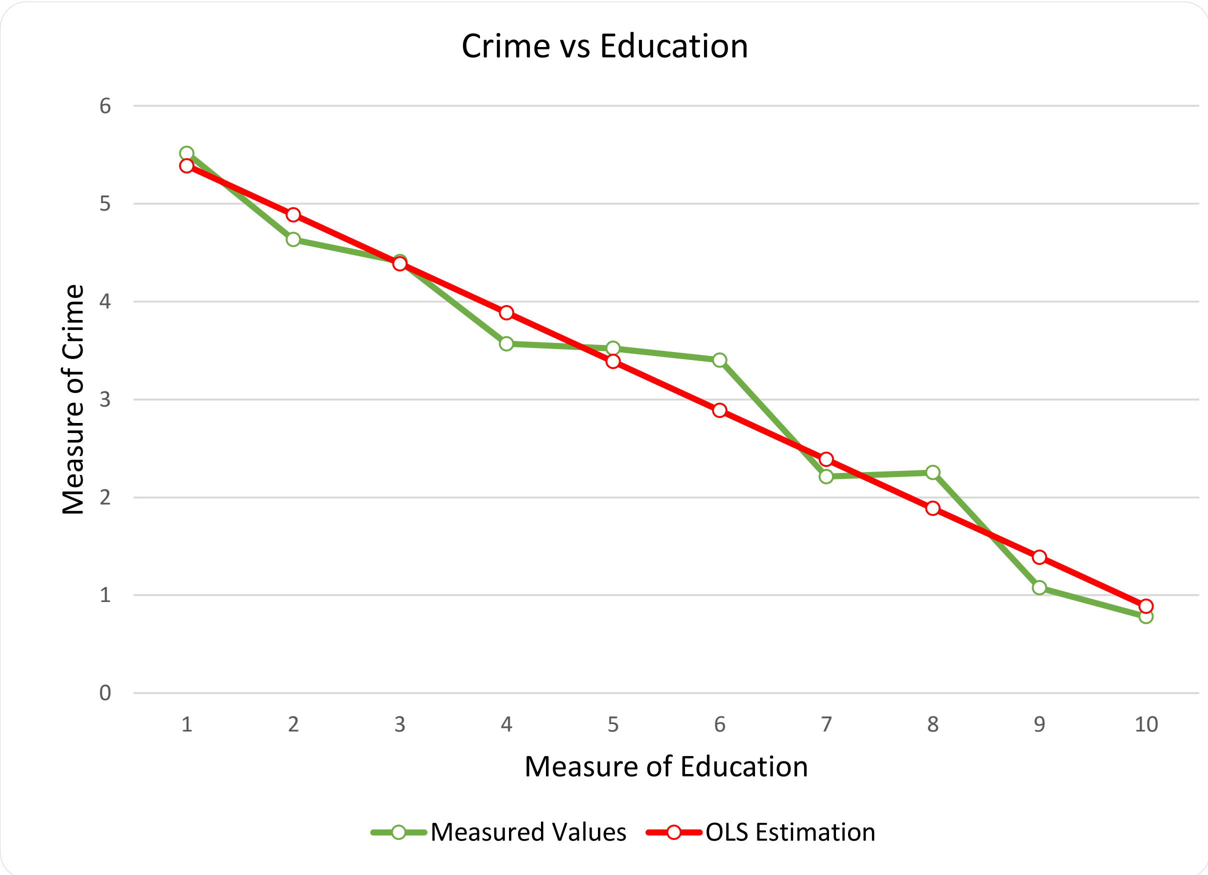

***Figure 1**. Example of line fitted to data using OLS method of regression.*

Someone suggests that education is not the sole factor, but that the rate of unemployment effects the level of crime as well, and possibly population as well. By incorporating these into the regression, a more nuanced model can be used to predict the level of crime in any city given the input parameters. The extended model now have three independent variables.

The general model can be extended to include any number of covariates and is specified as

$$y_i = \sum_{j=0}^{k} x_{ij}\beta_j + \varepsilon_i \quad (1)$$

where:

y_i	= dependent variable
x_{ij}	= covariates where $x_{i0} = 1$ (intercept included)
β_j	= regression coefficients
ε_i	= error term/residual, often assumed to belong to $N(0,\sigma)$

The coefficients and the residual will be denoted by $\hat{\beta}_j$ and $\hat{\varepsilon}_i$ respectively, when talking about the estimated values of the parameters as opposed to the true and unknown values. The most common way of fitting the line to the data sample is to use the method of Ordinary Least Squares (OLS) that minimize the residual sum of squares:

$$SSE = \sum_{i=1}^{N} \hat{\varepsilon}_i^2 \quad (2)$$

By solving (1.1) for $\hat{\varepsilon}_i$ and inserting the results into (1.2) expression (1.3) takes the form

$$SSE = \sum_{i=1}^{N} \left(y_i - \sum_{j=0}^{k} x_{ij}\beta_j \right)^2 \quad (3)$$

Thus, minimizing (2) is the same as minimizing (3). Simply put, since the expression is quadratic it will have a (global) minimum found by differentiating with respect to $\hat{\beta}_j$:

$$\frac{\partial SSE}{\partial \beta_j} = 0 \Leftrightarrow \sum_{i=1}^{N} \left(-2x_{ij}y_i + 2x_{ij} \sum_{j=0}^{k} x_{ij}\beta_j \right) = 0 \quad (4)$$

The solving the resulting system of k equation for β_j will yield the estimate $\hat{\beta}_j$ which minimize the residual sum of squares. This OLS estimator is the best linear unbiased estimator in the sense that it minimise the variances of the individual β_j estimates. However, the best fit is not necessarily a good fit.

The R^2 statistic is often used as a measure of goodness of fit for the fitted line. Introducing more explanatory variables will always increase R^2 and as such is not suitable to use as a comparison between a model and its extended/reduced counterpart. Adjusting R^2 to the number of newly introduced covariates allows for a comparison between models – the model with the largest adjusted R^2 is usually better. Whole R^2 lies between 0 and 1, adjusted R^2 may also take negative values due to the way it is calculated:

$$R^2 = \frac{Var\left(x\hat{\beta}\right)}{Var(y)} \quad (5)$$

$$R^2_{adjusted} = 1 - \left(1 - R^2\right)\frac{n-1}{n-p-1} \qquad (6)$$

where

$Var(X)$ = the variance of X

n = the sample size

p = number of covariates (excluding the intercept)

Now that the reader is familiarized and equipped with the tools of regression, more applied approaches will be reviewed in the following chapters.

2.2 One-factor model (CAPM)

The Capital Asset Pricing Model (CAPM) is one of the most well-known models in modern portfolio theory. Most of the credit has gone to William Sharpe (Sharpe, 1964) as he received the 1990 Nobel Prize in Economic Science for his contribution in developing a theory for pricing of financial asset. Three other economists (Lintner, 1965; Mossin, 1966; Treynor, 1962) developed essentially equivalent models during the mid-1960's, based on the framework by Harry Markowitz, another Nobel Prize laureate (incidentally shared with William Sharpe and Merton Miller 1990) for his contribution to the theory of portfolio management for individual wealth holders. Markowitz model (mean-variance model) first published 1952 required calculation of the covariance matrix for all assets which was a cumbersome amount of calculation needed; for n assets a total of $n(n-1)/2$ calculations are needed. Instead, a simplified model would be preferred. Enter CAPM.

CAPM is a univariate model in the sense that the expected excess return (risk premium) for an asset is proportional to only one other variable - the excess market return (market premium). Before going into details a couple of (naïve) assumptions have to be made. First off, all investors are assumed to be rational and risk adverse with access to the same information. The markets are assumed frictionless with no taxes, transaction or illiquidity issues. Furthermore, everyone has the same view of expected return and covariance which is also the only thing investors' care about – maximizing expected return given a certain level of risk (volatility). Short selling and holding any fractions of an asset is also allowed. So is also borrowing and lending at the risk-free rate. Given these conditions, the market is in an obvious equilibrium: if any asset were under-priced, everyone would invest in it and effectively raising the price by the supply-demand relationship. Over-priced assets would be sold in a similar fashion until an equilibrium price is reached. This implies that the marginal utility is constant.

As such, the marginal utility of any asset in the portfolio can be modelled as

$$\mathbb{E}(r_i) - \alpha\sigma_{i,m} = k \qquad (7)$$

where:

$\mathbb{E}(r_i)$ = expected return for asset i

α = coefficient of risk aversion

$\sigma_{i,m}$ = covariance of market and asset i

k = constant

Assuming the risk-free rate is constant and letting $r_i = r_f$ in (7), k is found to be the risk-free interest as the covariance between a random variable (the market) and a constant (the risk-free rate) is zero. This is self-explanatory: if the marginal utility would be larger than the risk-free interest rate, one would borrow at the risk-free rate and buy the asset or vice versa. Letting $r_i = r_m$ gives equation (8) solvable for α.

$$\mathbb{E}(r_m) - \alpha\sigma_{m,m} = r_f \tag{8}$$

With obvious notation as mentioned above, solving for α yields

$$\alpha = \frac{\mathbb{E}(r_m) - r_f}{\sigma_{m,m}} \ . \tag{9}$$

Worth noting is that the covariance $\sigma_{m,m}$ is actually the variance of the market but the notation is kept to not confuse the reader. This is the well-known market price of risk. Inserting (9) into (7) with k given as the risk-free rate yields

$$\mathbb{E}(r_i) - \frac{\mathbb{E}(r_m) - r_f}{\sigma_{m,m}}\sigma_{i,m} = r_f \ . \tag{10}$$

Shuffling terms and substituting $\beta_i = \sigma_{i,m} / \sigma_{m,m}$ yields the famous CAPM equation:

$$\mathbb{E}(r_i) - r_f = \beta_i \left(\mathbb{E}(r_m) - r_f \right) \tag{11}$$

This is only one way to derive the CAPM equation, and hopefully the simplest for the reader to digest. The β_i's are in reality estimated by regression. As CAPM builds on the assumptions of EMH, any intercept in the regression model significantly different from zero poses trouble. Either EMH is misstated or investors are not rational in the CAPM-sense. In their 1993 paper, Eugene Fama and Kenneth French point out the empirical evidence contradicting the CAPM model as it fails to express the cross-sectional expected returns fully, i.e. the existence of an intercept (Jensen's Alpha). The way they attempt to enhance the model is described in the next section.

2.3 Multifactor Models

The next section gives a brief overview of existing multifactor models used in an effort to try and explain abnormal returns. There are several reasons to do this. It is a great way for academics to defend the EMH by (hopefully) proving that returns can be explained by the characteristics of the portfolio. Fund managers may use the models to try and pick stock that outperform the market based on characteristics of the stock. I.e., if stocks in a certain sector are indicated to outperform the market on average they might be look at as a good investment.

2.3.1 French-Fama Three Factor Model

As CAPM failed to explain cross-sectional returns fully, better models were needed. French and Fama found earlier research indicating a positive relationship between average return and factors such as Book Equity value (BE), Market Equity value (ME) and Price per Earnings (P/E). Armed with this information, they formulated the now well-known French-Fama three factor model (Fama & French, 1993). They introduced two new factors to the CAPM model to try and explain the fact that small cap stock generally outperformed large cap stocks, and that value stocks tend to outperform growth stocks. To mimic this, they divide their sample into two (**S**mall and **B**ig) based on size (market capitalization) with the median size as the break point. They divide the sample based on Book-to-Market (BE/ME) into three groups in a similar manner, with breakpoints for the bottom 30% (**L**ow), middle 40% (**M**iddle) and top 30% (**H**igh). They continue by forming portfolios based on the intersect between the above mentioned groups. The result is thus six portfolios (**S/L**, **S/M**, **S/H** and **B/L**, **B/M**,

B/**H**). These portfolios are compared pair-wise in an effort to exclude any interaction effect between market capitalization and Book-to-Market. The portfolio **SMB** (**S**mall **M**inus **B**ig) is formed by taking the mean return to the three small-stock portfolios (**S**/**L**, **S**/**M** and **S**/**H**) minus the mean return to the large-stock portfolios (**B**/**L**, **B**/**M** and **B**/**H**). The portfolio **HML** (**H**igh **M**inus **L**ow) is created in a similar manner by taking the high BE/ME (**S**/**H** and **B**/**H**) portfolios minus the low (**S**/**L** and **B**/**L**) BE/ME portfolios. The return to these portfolios are included in the CAPM equation to account for previously unexplained return. The new equation reads

$$r - r_f = \alpha + \beta_1 \left(r_m - r_f \right) + \beta_2 HML + \beta_3 SMB + \varepsilon \tag{12}$$

with obvious notation. The intercept is expected to be zero for the market to be efficient, just as for CAPM, with the interpretation that no abnormal return exists in an efficient market. The factors HML and SMB can be interpreted as risk premiums for investing in a stock with corresponding statistics. That is, if small stocks outperform big stocks then the SMB factor should be positive, and you receive a premium for the extra risk associated with small stocks. HML can be viewed in a similar way.

2.3.2 Carhart Four Factor Model

Carhart bases his model (Carhart, 1997) on the French-Fama three factor model and the findings of Jegadeesh-Titman (Jegadeesh & Titman, 1993). A further explanation of their findings is warranted as price momentum is only briefly mentioned in the background section of this thesis. The findings of their report implies that past good (bad) performance indicates continued positive (negative) returns. Jegadeesh-Titman find that abnormal returns can be made by ranking stocks on past performance over the last 3/6/9/12 months and taking long positions in the top decile (**W**inners) while taking short positions in the bottom decile (**L**osers). Carhart applies the same approach to create a zero-cost portfolio in the same manner as French and Fama does, to construct the new portfolio **WML** (**W**inners **M**inus **L**osers) to include in his model:

$$r - r_f = \alpha + \beta_1 \left(r_m - r_f \right) + \beta_2 HML + \beta_3 SMB + \beta_4 WML + \varepsilon \tag{13}$$

3. Measuring Earnings

It is intuitive that the financial wellbeing of a company have a positive correlation with its earnings – some argue that making a profit for the stock holders is the sole responsibility of a company. However, just the standalone earnings tell an inconclusive tale. It is not until compared with earlier earnings that a possible judgement on company performance can be made. There are several ways to calculate earnings surprise and measure its impact. The main idea is to look at a measure of current earnings and comparing it to past earnings. This does however not allow for comparison between different sized companies. I.e., an earnings of $1m for a small family run business might be a superb result, whereas the same earnings for a multinational corporation might be a disaster. Thus, some kind of adjustment for size must be made. Scaling is often done by dividing with a size-related component such as stock price, market capitalization or the like.

This essay will present three different measures and analyse their possible weaknesses and strengths. The main obvious drawback to any method relates to the quarterly nature of reporting earnings. Even if the data is good, the quarterly occurrence limit the size of the sample.

3.1 Standardized Unexpected Earnings (SUE)

The first measure pertain to earlier earnings announcements. Evidence of seasonality in earnings has been shown to exist and it has been confirm that a seasonal time series model perform equally well compared with more complex models in regards to earnings announcements (Foster, et al., 1984). As mentioned above it compares the current quarter earnings (per share) with expected earnings calculated by past performance (Foster, et al., 1984). It is then standardized by either the current share price or the standard deviation of past SUE.

The time series of standardized unexpected earnings is modelled as

$$SUE = \frac{X_{i,q} - \mathbb{E}\left[X_{i,q}\right]}{d_i}, \tag{14}$$

where :

$X_{i,q}$ = earnings (per share) for company i in quarter q

q =current quarter

d_i = standardizing denominator, either share price on announcement day or the standard deviation of past expected earnings.

However, there is no real consensus as to how to model the expected value. Some prefer to model it as an auto regressive time series over the past eight most recent quarters (Setterberg, 2011; Foster, et al., 1984; Bernard & Thomas, 1989) to estimate the coefficients, whereas others simply use the most recent earnings for the same quarter, i.e. one year prior (Jegadeesh, et al., 1995; Chordia & Shivakumar, 2006; Battalio & Mendelhall, 2008). One study even uses the average of the 8 most recent earnings as a proxy. The model for expected value by auto regression, by same quarter from previous year and by rolling 8 quarter mean are modelled as

$$\mathbb{E}_{AR}\left[X_{i,q}\right] = X_{i,q-4} + \alpha_i + \beta_i\left(X_{i,q-4} - X_{i,q-8}\right) + \varepsilon_i \ , \tag{15}$$

$$\mathbb{E}_{\text{Pre}}\left[X_{i,q}\right] = X_{i,q-4} \tag{16}$$

and

$$\mathbb{E}_{\text{Pre8}}\left[X_{i,q}\right] = X_{i,q-4} + \frac{1}{8}\sum_{n=1}^{8}\left(X_{i,q-n} - X_{i,q-n-4}\right) \tag{17}$$

respectively. The SUE calculated with the above expected values will be referred to as SUE_1, SUE_2, and SUE_3 respectively.

The means of standardizing the measure, the denominator, is also chosen at will by the authors. While most use the standard deviation of the eight most recent SUEs, standardizing by the stock price also occurs (Battalio & Mendenhall, 2007). Furthermore, both raw earnings (Setterberg, 2011; Foster, et al., 1984; Chordia & Shivakumar, 2006; Brandt, et al., 2008) as well as earnings per share (Jegadeesh, et al., 1995; Battalio & Mendelhall, 2008) is commonly used in reports and articles. All aforementioned methods have yielded significant result for their respective samples, however the size of the drift differs.

This way of measuring earnings news encompass both past performance through its time series approach, as well as the implicit market expectation since last quarter’s earnings announcement. However, SUE only looks at earnings explicitly which does not necessarily reflect all the information delivered to the market in an interim report.

3.2 Analyst Forecast Revision (AFR)

Jegadeesh (Jegadeesh, et al., 1995) introduced a measure based on changes in analyst forecasts, which may or may not be revised every month. As such, Jegadessh use the six month moving average of the past six months normalized by price of the stock the previous month.

$$AFR = \sum_{j=0}^{6} \frac{f_{i,t-j} - f_{i,t-j-1}}{p_{i,t-j-1}} \tag{18}$$

where:

$f_{i,t}$ = the mean IBES analyst forecast for firm i's earnings in month t

$P_{i,t}$ = the stock price of firm i in month t

The AFR measure allows for a more dynamic approach to measuring expected earnings. If the economy as a whole is in a downward trend, a lower earnings per share predicted by SUE is not necessarily unexpected by analysts, or the market as a whole. As such, the expected (in the SUE sense) downward trend following bad news might not occur. The measure is however vulnerable to human influence, either in the appearance of human (forecasting) error or even attempted market manipulation. Despite these possibilities, some consider AFR more economically relevant (Battalio & Mendenhall, 2007).

3.3 Earnings Announcement Returns (EAR)

The last measure to be introduced is a cross-sectional measure based on asset return centred on the date of the report. This return is usually normalized by some kind of benchmark, by either size or market return. The size control measure often used is the benchmark size and book-to-market Fama-French portfolio. The EAR for company i is calculated as

$$EAR_{i,q} = \prod_{j=t-1}^{t+1} \left(1 + R_{i,j}\right) - \prod_{j=t-1}^{t+1} \left(1 + B_j\right) \tag{19}$$

where:

$R_{i,j}$ = Return for stock i on day j, $j = 0$ being the day of the earnings report

B_j = Return for benchmark market or Fama-French portfolio to which stock i belongs, sorted on market capitalization or book-to-market.

Research done indicate that earnings on the US market tend to be announce while the market is closed, evenly distributed between after market close and before opening call (deHaan, et al., 2015).

3.4 Measuring drift – Buy and Hold

Most papers mentioned in this thesis follow some variation of Ball & Brown's approach: division of data into deciles ranging from 1 (*Low*) to 10 (*High*) based on a measure of unexpected earnings (Ball & Brown, 1968). This is done for every month where more than 15-40 earnings are reported. From these deciles, three Buy-and-Hold portfolios are formed and evaluated over a 6-12 month period time. These portfolios are formed on the first trading in the month following the reports. The first two portfolios contain stocks from decile 1 and decile 10 respectively, while the last portfolio is formed by taking a long position in the decile 10 portfolio, and a short position in the decile 1 portfolio.

Using SUE to rank stocks, Jegadeesh, et al. reports at net return of 7.5% to the zero-cost portfolio over a twelve month holding period. Similar results are reported by Chordia & Shivakumar (7.47%), Brandt

& Kishore (6.18%), Bernard, et al. (6.3%). Using EAR to rank stocks again yields similar results; Jegadeesh, et al. reports a return of 8.3% while Brandt & Kishore reports 7.55%. In the same manner, ranking stocks based on the AFR measure, the zero-cost portfolio yield 9.7% over 12 months.

The decile sorting system can also be using to control for other influencing factors by sorting on two more variables, e.g., Jegadeesh, et al. does multiple two-way sort (Price momentum/SUE, Price momentum/Ear et.c.) to control for relation. This is done by sorting one measure into *X* quantiles, and sorting those quantiles on the other measure into *Y*. This yields *XY* portfolios to compare. This is the same method as constructing FF-size portfolios.

3.5 Measuring Drift – Regression

Results are also controlled in regressions, either investigating a singular measure in the CAPM setting or regressing one or more measure on to preceding six month return. The latter is done in order to discern relations between measures – whether they influence each other, is part of or completely subsumes the other. Often size related components such as book-to-market or market capitalization is included to account for size related influences.

4. Sample and Methodology

This section provides insight into the methods used to construct and evaluate the findings of the thesis.

4.1 Method

This paper follows previous methods. Multiple approaches are used in evaluating the drift. The first method involves forming zero-hedge portfolios based on a PEAD-measure. At the beginning of every month, companies who released earnings announcements the previous month are ranked into ten deciles from decile 1 (*Low*) to decile 10 (*High*), based on the given PEAD measure. This is done to prevent look-ahead bias. Portfolio formation at time t, of decile D containing N number of stocks is done accordingly:

$$H_D^t = \frac{1}{N}\sum_{i=1}^{N} h_i \qquad (20)$$

where

h_i = the value weight for stock i at formation time t, $\frac{1}{P_{i,t}}$

$P_{i,t}$ = the price of stock i at formation time t, belonging to decile D

This is set up to normalize the value of the portfolio value. The value of the portfolio at time T is thus

$$V_{D,\mathrm{T}}^t = \frac{1}{N}\sum_{i=1}^{N} h_i P_{i,\mathrm{T}}\ , \qquad (21)$$

with obvious notation as mentioned above. The return for the portfolio containing stock from decile D during period $\left[t,T\right]$ is thus

$$R_{D,t,T} = \frac{V_{D,\mathrm{T}}^t}{V_{D,\mathrm{t}}^t} - 1 = \frac{1}{N}\sum_{i=1}^{N}\left(\frac{P_{i,T}}{P_{i,\mathrm{t}}} - 1\right)\ . \qquad (22)$$

According to the above scheme, two portfolios are formed consisting of value-weighted long positions in stocks from the decile 10 (*High*) and short positions in decile 1 (*Low*), reflecting good earnings and bad earnings news respectively. By using value weights, a zero-cost or hedge-portfolio is formed in the sense that the cost of taking long positions is covered by the proceeds of the short positions. Using the market return as a measure of expected return, the abnormal returns are calculated as the difference between the zero-cost portfolio and the market return. This Buy-and-Hold strategy is then evaluated over a period of 12 months. This procedure is repeated for the various measures of earnings surprise.

The second analysis is done in a CAPM setting; the excess monthly portfolio return is regressed on an intersect (CAPM-α), and the excess monthly market return as independent variable. Excess return is defined as asset return minus the risk free return. Just as Setterberg, the one month Swedish Treasury Bill will serve as the risk free return whereas the return to OMXS30I index is used as a proxy for overall market return. Thus, the regression is modelled as

$$R_{D,t} - R_{f,t} = \alpha + \beta\left(R_{M,t} - R_{f,t}\right) + \varepsilon \tag{23}$$

where:

$R_{D,t}$ = the return for decile D during month t

$R_{f,t}$ = the return for a 30 month Swedish Treasury Bill during month t

$R_{M,t}$ = the market return during month t

Thus, if the intercept is significantly different from zero then an efficient market anomaly and evidence post earnings-announcement drift has been detected.

4.2 Data and Sample Selection

The study has been carried out on parts of the Swedish market. All current companies listed on OMXS has been included in a first sort out. In total, 35 out of 286 unique companies were excluded due to lack of data concerning either earnings report date or earnings data. Thus, 251 out of 286 unique companies were included, with data from as early as 2007 to present date. The distribution over firms and quarters are seen in Table 1.

***Table 1**. Distribution of quarters and firms among the different segments of the OMXS.*

	Large Cap	Mid Cap	Small Cap	Total
Quarters	2066	1701	2415	6182
No firms	76	77	98	251

Table 1 shows a seemingly even distribution between the segments, with an average history of between 24-25 (about 6 years) historic quarterly data per firm.

Data has been collected from multiple sources. Stock and market history has been downloaded directly from NASDAQOMXNORDIC whereas release dates for earnings announcements were taken from SIX Edge. Earnings data were taken from DI with random samples checked against corresponding interim report and/or SIX Edge where applicable, to check for discrepancies. The DI data was seemingly consistent with the quality control.

The data compiled incorporate 10348 unique company quarters over the years 2007-2016. The different earnings measures have a significantly lower amount of data points due to the way each measure is calculated. I.e. the auto regressive method standardized by the eight quarter rolling standard deviation loses 16 observations per company. The first eight observations are used to calculate the first unexpected earnings. Also, the eight first unexpected earnings are used to standardize the measure. This method thus requires a long recorded history to be efficient in the data collection sense. Similar losses are observed in other measures as well. The full number of quarterly data for each measure is found in Table 2.

Table 2. *Number of quarterly data points for each type of measure.*

	EPS	Earnings
$SUE_{1/p}$	1545	1418
$SUE_{2/p}$	1703	1588
$SUE_{3/p}$	1695	1580
$SUE_{1/s}$	496	422
$SUE_{2/s}$	1247	1152
$SUE_{3/s}$	1239	1144
EAR	9126	9126
EAR_{adj}	9501	9501

Table 2 shows descriptive statistics over the number of observations for each measure. Note that the EAR measures do not differentiate between EPS and earnings, as they are based on stock movement around the publish date of the interim report.

Losses also occur when ranking into deciles, as some months have very few reports (less than 10) which makes sorting into deciles ambiguous. The data for these months are therefore not included in the final portfolios.

4.3 Limitations

Due to limitations in data availability and gathering, size related component such as book-to-market and reliable market capitalization were not attainable. As size (value vs. growth) is indeed an interesting aspect according to earlier mentioned research, descriptive statistics will still be investigated. The data is furthermore limited to currently listed stock, lending itself to selection (survival) bias.

5. Results

Results to the different methods are presented in this chapter. Four different portfolios are formed per SUE-measure. These four portfolios are compared for each measure to show the different measure of earnings and denominator affect the SUE-measure. To make tables and figures more comprehensible, a shorthand notation has been used. The SUE-measures are noted as SUE_1, SUE_2 and SUE_3 to denote the models using an auto-regressive model, a single quarter and the rolling eight quarter mean respectively to calculate the expected earnings. P and S denoting "Price" and "Standard deviation" has been introduced to the subscript to distinguish between the use of price and standard deviation as the standardizing denominator. I.e. $SUE_{1/P}$ indicates that the auto-regressive approach has been used to calculate the expected earnings, and the unexpected earnings has been standardized by the stock price.

5.1 Buy-and-Hold Strategy

In total, 14 types of PEAD (High minus Low) portfolios were formed. Six used raw earnings as a measure of earnings (PEAD/Earnings) and six used earnings per share (PEAD/EPS). The last two used market return over the report date with one of them being standardized by the market return for the index to which the stock belonged (Small/Mid/Large cap). The statistics are displayed in Table 3 below. In a pair-wise comparison of standardization, all six types PEAD/Earnings portfolios outperformed index more often than the PEAD/EPS type portfolios. Not totally unexpectedly, standardizing a PEAD/EPS portfolio by price yields a significantly worse return compared to the same standardization of a PEAD/Earnings portfolio. Only one type of SUE-portfolio outperformed the market over 50% of the time. Both type of EAR portfolios returned roughly equivalent numbers.

Table 3. *Performance data for the 12 month Buy-and-Hold strategy of a Zero-Cost portfolio.*

		EPS		**Earnings**	
Panel A		Outperform	Adjusted return	Outperform	Adjusted Return
$SUE_{1/p}$	(20)	21,1%	-11,6%	35,0%	-0,1%
$SUE_{1/s}$	(6)	0,0%	-10,9%	16,7%	-8,3%
$SUE_{2/p}$	(24)	20,8%	-8,2%	41,7%	4,0%
$SUE_{2/s}$	(16)	25,0%	7,7%	37,5%	12,2%
$SUE_{3/p}$	(24)	37,5%	3,7%	54,2%	11,9%
$SUE_{3/s}$	(16)	18,8%	5,5%	31,3%	5,4%

Panel B		Outperform	Abnormal Return
EAR	(76)	55,3%	5,1%
EAR_{adj}	(76)	59,2%	6,5%

Table 3 shows data concerning different PEAD portfolios Buy-and-Hold return over a twelve months period. Panel A shows a side by side comparison between two different SUE measures. The first column indicate which type of SUE measure is employed, with the number of monthly portfolio formations in parenthesis. Outperform indicates how many of these monthly portfolios outperformed the market index over a twelve month holding period. Adjusted return is the mean cumulative return compared to the index, over the holding period. In similar manner, Panel B shows the same information for the EAR portfolios.

Disregarding the measures using the combination of EPS and price as denominator, as well as the measures with few observations, all PEAD-portfolios generate a positive adjusted mean except one, SUE3S using earnings. The seemingly mediocre raw mean returns from the PEAD portfolios pales in comparison with the long portfolio consisting of stocks belonging to decile 10 (*High*). Table 4 tells the full story below. This indicates that raw return to the *Low* portfolio is not necessarily low.

Table 4. *Performance data for the 12 month Buy-and-Hold strategy of a High portfolio.*

		EPS		Earnings	
Panel A		Outperform	Adjusted return	Outperform	Adjusted return
$SUE_{1/p}$	(20)	31,6%	-2,0%	60,0%	8,5%
$SUE_{1/s}$	(6)	50,0%	-3,7%	50,0%	0,3%
$SUE_{2/p}$	(24)	29,2%	-0,8%	50,0%	5,7%
$SUE_{2/s}$	(16)	62,5%	13,1%	93,8%	13,0%
$SUE_{3/p}$	(24)	54,2%	4,1%	62,5%	11,0%
$SUE_{3/s}$	(16)	56,3%	10,2%	68,8%	11,7%

Panel B		Outperform	Abnormal Return
EAR	(76)	46,0%	8,0%
EAR_{adj}	(76)	50,0%	8,2%

Table 4 shows data concerning different (High) portfolios Buy-and-Hold return over a twelve months period. Panel A shows a side by side comparison between two different SUE measures. The first column indicate which type of SUE measure is employed, with the number of monthly portfolio formations in parenthesis. Outperform indicates how many of these monthly portfolios outperformed the market index over a twelve month holding period. Adjusted return is the mean cumulative return compared to the index, over the holding period. In similar manner, Panel B shows the same information for the EAR portfolios.

Again, using EPS to calculate SUE yields worse results overall compared to raw earnings figures. However, SUE_2 and SUE_3 have a significant return compared to index when standardizing by the standard deviation of the rolling past eight quarters. The mentioned measures outperform the market in over 80% in all four cases. In the case of using raw earnings, they outperform the market 100% of the time in a holding period of 12 months. The two EAR measures show somewhat equivalent results, with the market adjusted measure slightly outperforming the non-adjusted measure. This arguably implies a size related component, since the stock return were adjusted for the return of the index to which they belonged (Large/Mid/Small). Using one and the same index return for all stocks would yield the same decile formation and in turn the same results as in the non-normalized EAR measure. Figure 2-5 present Buy-and-Hold 12 month return for SUE_1, SUE_2, SUE_3 and EAR respectively.

5.1.2 SUE_1 – Auto-Regression

One can clearly see the strong returns for the decile 1 (*Low*) not in line with previous research for the auto-regressive approach. This in turn explain the (relative to other studies) poor performance of the PEAD portfolio despite decile 10 (*High*) delivering solid returns. The low number of portfolios constructed for the bottom two graphs explains their poor performance as they largely cover the downwards trend of the market as a whole during 2015. Standardizing a measure using EPS by the stock price (as will be shown) also accounts for the bad performance in the top-left graph of Figure 2.

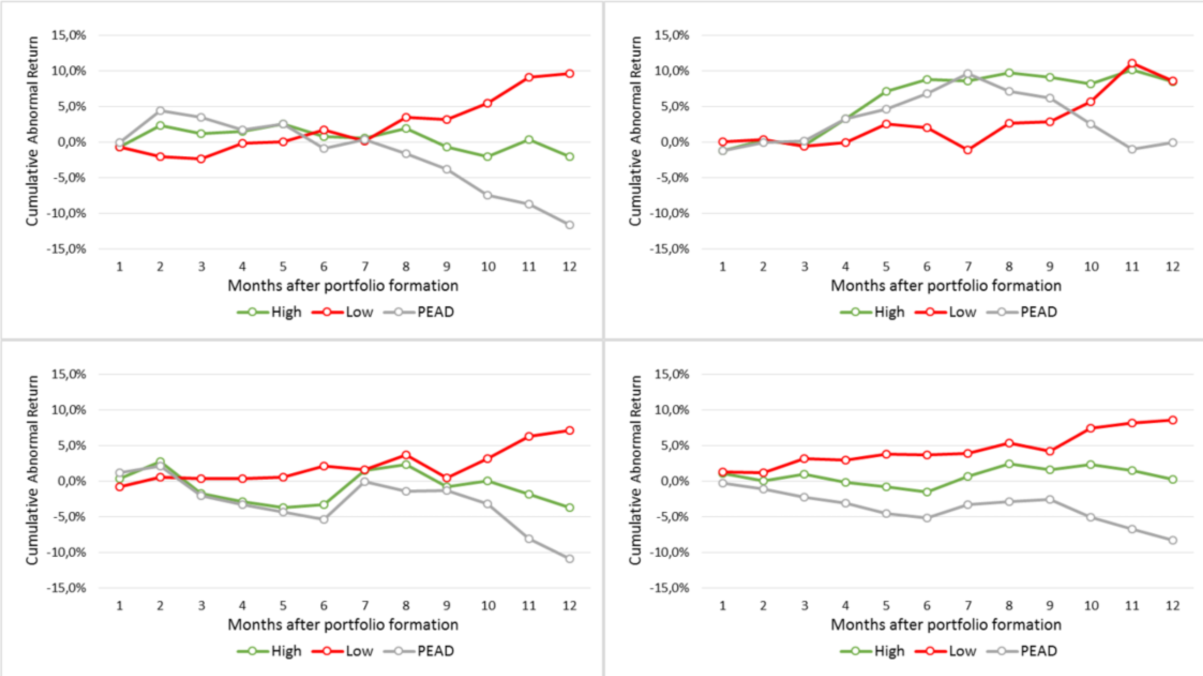

***Figure 2**. Buy-and-Hold returns for SUE_1. Top row used price as denominator while bottom row used standard deviation for the rolling eight quarters. Left hand side used EPS as a measure of earnings while the right hand side used raw reported earnings.*

***5.1.3** SUE_2 – Single Previous Quarter*

The combination of EPS and price as denominator shows aforementioned poor performance. The three other portfolios show a much better development, more in line with what is expected. However, the bottom two portfolios normalized by the standard deviation show an unwanted reversal in momentum after nine months which is discernable in Figure 3. Trying to fit a straight line, as is done with the regression, will thus not have a good fit. The non-linear properties of the Low portfolio returns are inherited by the PEAD-portfolio.

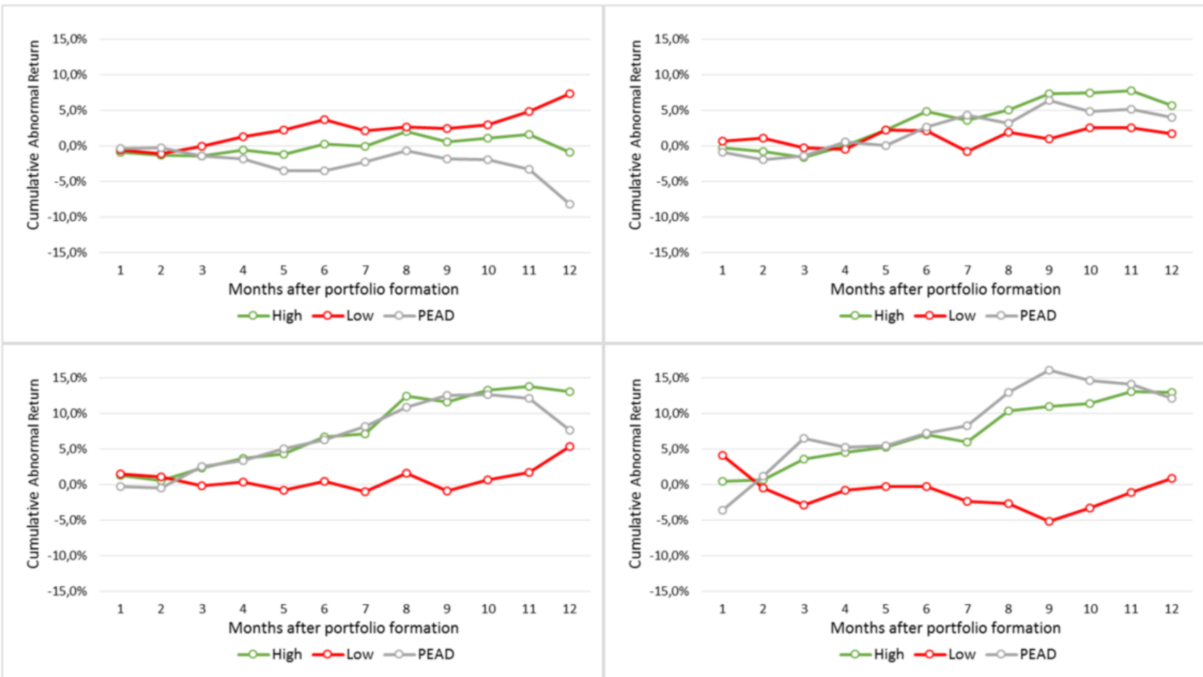

***Figure 3**. Buy-and-Hold returns for SUE_2. Top row used price as denominator while bottom row used standard deviation for the rolling eight quarters. Left hand side used EPS as a measure of earnings while the right hand side used raw reported earnings.*

5.1.4 SUE$_3$ – Rolling Eight Quarter Mean

These results are in line with SUE$_2$. The combination of EPS and price as denominator is yet again a poor match. While the abnormal return to the PEAD-portfolio is positive, the return to the High-portfolio is considerably worse when compared within the measure. See Figure 4 for the comparison. The Low portfolios using the standard deviation as denominator shows sign of non-linearity again as the trend reversal manifests at around month nine. When comparing SUE$_3$ with SUE$_2$ which is constructed in a similar way, the returns to High-portfolios are very similar with the former being more conservative in mean return over the holding period. This indicate that stocks with good past performance has a high likelihood of similar development in the future. The same is not necessarily true for the Low-portfolio.

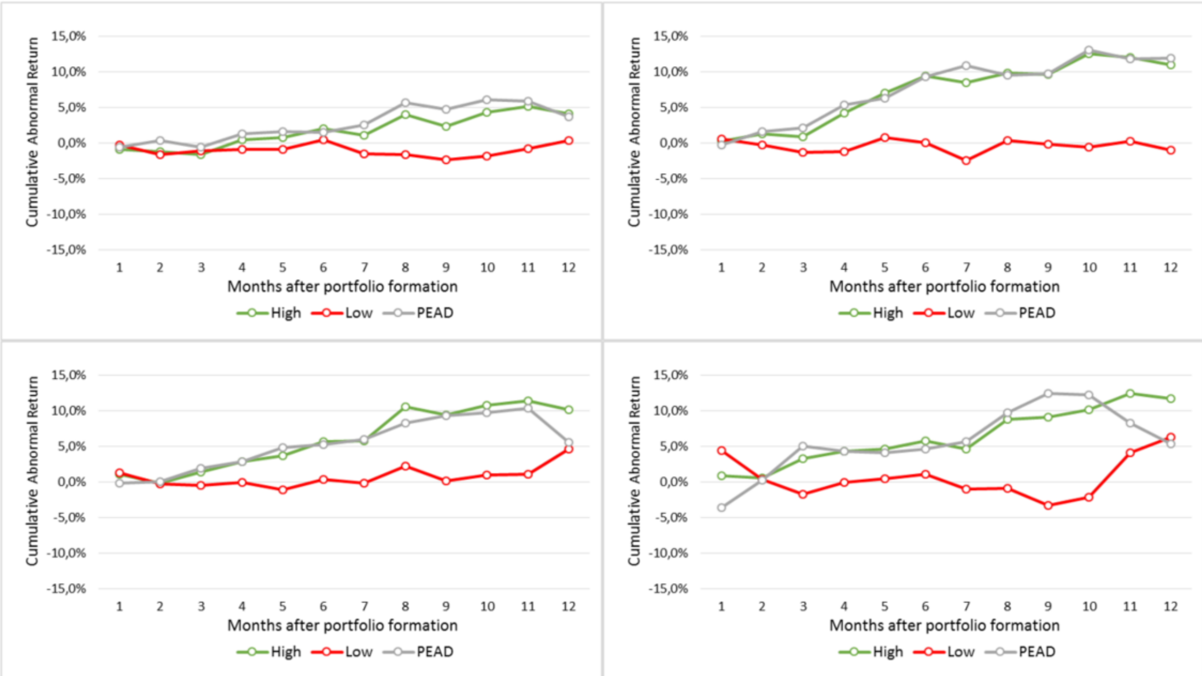

***Figure 4**. Buy-and-Hold returns for SUE$_3$. Top row used price as denominator while bottom row used standard deviation for the rolling eight quarters. Left hand side used EPS as a measure of earnings while the right hand side used raw reported earnings.*

5.1.4 EAR – Earnings Announcement Returns

The both measures of EAR are close to identical. Adjusting for return to the index to which the stock belongs does provide a slight drop in return for the Low-portfolio, which indicates that the poor performers are more sensitive to firm size. This in turn increase the return to the PEAD-portfolio as can be seen in Figure 5 on the next page. While the number of midcap stocks in the extreme deciles show roughly the same figures as those for the SUE-measures, large cap stocks are highly preferred over small cap stocks in comparison (Appendix A). This is the complete opposite of the French-Fama model which prefers small stocks over large. This deviation may account for the “low” abnormal return.

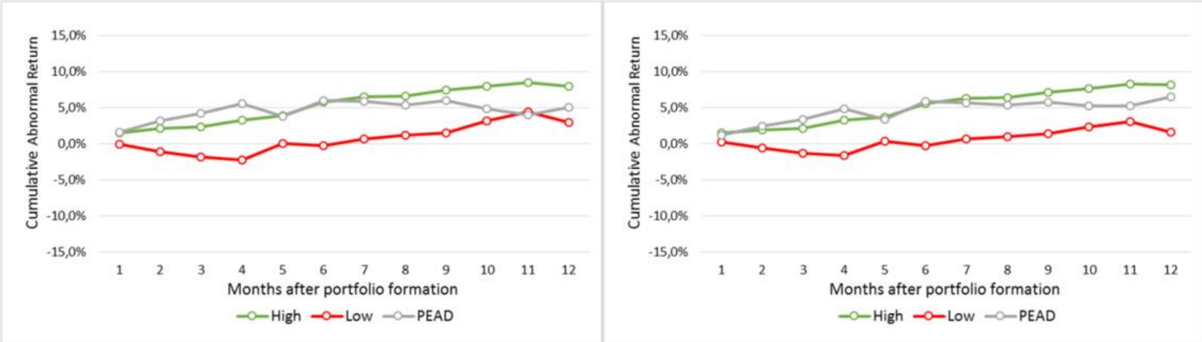

Figure 5. *Buy-and-Hold returns for EAR. The left plot shows return for the portfolios based on returns around the earnings announcement whereas the right plot shows the same minus the return to the index, to which the individual stocks in the portfolio belongs.*

Worth noting is the fact that returns are observed to decrease in month eleven for many of the portfolios, indicating a reversion in momentum. Recall that the portfolios are formed on the first of the month following the report month. Thus, month eleven in the table is twelve months after the first report and most likely a new interim report will either be due or already available. The EAR measure do not suffer the same fate. Another point of interest is that decile 10 (*High*) on average outperform decile 1 (*Low*) from the date of the report up until portfolio formation, in turn leading to an (on average) positive PEAD portfolio during the month of the report. While this is true for all measures, it is however not all that unexpected as these portfolios is made in foresight as they are only ranked the following month. The return to the market adjusted PEAD portfolios based on the SUE measure are not impressive with that fact in mind. Attention here should be focused on the EAR measure. The pre-formation return for these PEAD portfolios soar to above 20% - in less than a month. Seen from the day of the report, the days up until next month stands for about a third of the cumulative return one year later, whereas the same number for the SUE measures only reach 2-5%.

5.2 Regression

The regression results will be presented as follows. Since the expected value (15-17) for each SUE-measure can be calculated with both EPS and raw earnings, as well as standardized by both price and past standard deviation, a total of four portfolios are made for each way of calculating the expected value. To compare within the measure, all portfolios belonging to a certain way of calculating the expected value is presented in a single table with the leftmost part having used EPS and the rightmost part having used raw earnings. The panel A has been standardized by price whereas panel B is standardized by the rolling 8 quarter standard deviation. For the tables, 5% and 1% significance level are indicated by * and ** respectively.

5.2.1 SUE_1 – Auto-Regression

The regression is in line with what can be expected from the Buy-and-Hold results. All PEAD-portfolios come out with a negative mean monthly return, none of them significant. This is due to the return to the Low portfolio being the driving factor in generating (negative) return, i.e. the intercept for the short portfolio is greater than that for the long portfolio. There is an observable difference between the many of intercepts, both when comparing for earnings and comparing for denominators. The long positions in the High portfolio using the standard deviation as denominators show little difference, as does the intercept for the Low portfolio using price as denominator. Notable is the surprisingly low adjusted R^2 value for the regressions, which will be a trend in the coming regressions and also addressed in the discussion. Overall the model seems to favour raw earnings when calculating SUE.

Table 5. *SUE₁ regression results.*

		EPS			Earnings		
Panel A	$SUE_{1/P}$	Intercept	RMRF	R^2_{adj}	Intercept	RMRF	R^2_{adj}
Low	Coefficient	0,01142*	0,757**	0,121	0,01221	0,643**	0,049
	T-stat	2,24	5,68		1,81	3,67	
High	Coefficient	0,00365	0,648**	0,097	0,01134*	0,690**	0,099
	T-stat	0,74	5,03		2,22	5,21	
PEAD	Coefficient	-0,0083	-0,10	-0,003	-0,0014	0,047	-0,004
	T-stat	-1,29	-0,64		-0,18	0,22	

Panel B	$SUE_{1/\sigma}$	Intercept	RMRF	R^2_{adj}	Intercept	RMRF	R^2_{adj}
Low	Coefficient	0,01746*	0,319	0,044	0,01358*	0,523**	0,130
	T-stat	2,25	1,78		2,08	3,41	
High	Coefficient	0,00518	0,524*	0,097	0,00491	0,670**	0,230
	T-stat	0,56	2,46		0,81	4,71	
PEAD	Coefficient	-0,0123	0,204	0,000	-0,0086	0,145	-0,003
	T-stat	-1,39	1,00		-1,22	0,88	

*Table 5 shows the regression results for the SUE measure using an auto-regressive model to estimate unexpected returns. The risk adjusted return to each portfolio is regressed on an intercept and the risk adjusted market return (RMRF). Left hand side used EPS as a measure of earnings whereas the right hand side used raw earnings. Panel A shows results for SUE standardized by stock price at the date of the report. Panel B shows same results standardized by the standard deviation of the previous eight months. 5% and 1% significance level are indicated by * and ** respectively.*

5.2.2 SUE_2 – Single Previous Quarter

The regression results are yet again in line with the results from the Buy-and-Hold portfolios formed using SUE_2 for decile formation. Worth noting is the higher t-values as well as adjusted R^2. While they are still relatively low, they are higher than previous regressions. When comparing for denominators, the difference is obvious. However, when comparing between earnings measure used in calculating the SUE, there is little difference between the intercepts of the model with standard deviation as denominator. The model seems to be favouring EPS for both denominators in terms of fit, albeit standardizing by price shows a result inconsistent with most other findings in the sense that the Low portfolio outperforms the High.

Table 6. *SUE_2 regression results.*

		EPS			Earnings		
Panel A	$SUE_{2/P}$	Intercept	RMRF	R^2_{adj}	Intercept	RMRF	R^2_{adj}
Low	Coefficient	0,00774*	0,830**	0,195	0,00257	0,896**	0,174
	T-stat	1,99	8,41		0,57	7,84	
High	Coefficient	0,00116	0,828**	0,195	0,00685	0,788**	0,129
	T-stat	0,30	8,40		1,45	6,60	
PEAD	Coefficient	-0,0073	0,00	-0,003	0,00353	-0,10	-0,002
	T-stat	-1,42	0,00		0,56	-0,66	

Panel B	$SUE_{2/\sigma}$	Intercept	RMRF	R^2_{adj}	Intercept	RMRF	R^2_{adj}
Low	Coefficient	0,01315**	0,476**	0,090	0,01178	0,355	0,012
	T-stat	3,27	4,47		1,63	1,84	
High	Coefficient	0,01611**	0,652**	0,110	0,01630**	0,642**	0,160
	T-stat	3,25	4,97		4,15	6,11	
PEAD	Coefficient	0,00252	0,174	0,003	0,00408	0,285	0,004
	T-stat	0,47	1,23		0,51	1,34	

*Table 6 shows the regression results for the SUE measure using a single previous quarterl to estimate unexpected returns. The risk adjusted return to each portfolio is regressed on an intercept and the risk adjusted market return (RMRF). Left hand side used EPS as a measure of earnings whereas the right hand side used raw earnings. Panel A shows results for SUE standardized by stock price at the date of the report. Panel B shows same results standardized by the standard deviation of the previous eight months. . 5% and 1% significance level are indicated by * and ** respectively.*

5.2.3 SUE_3 – Rolling Eight Quarter Mean

Not unsurprisingly, the regression mostly delivers similar results as the SUE measure using a single previous quarter, both in terms of T-stats, adjusted R^2 and coefficients. Regressions results again confirm the Buy-and-Hold results, with the exception of the combination raw earnings/standard deviation. Where the Buy-and-Hold portfolio produces an abnormal return of 5% over 12 months, the regression forecasts a negative abnormal return of 1.8%. This can largely be attributed to the linear estimation of the seemingly nonlinear payoff to the shorting of the Low portfolio when composing the PEAD-portfolio. It is hard to deduce any preference in model as while raw earnings do indicate a more accurate model in the sense of T-stats, the Low portfolio is not giving a satisfying result at all when using standard deviation to normalize the measure.

Table 7. *SUE_3 regression results.*

		EPS			Earnings		
Panel A	$SUE_{3/P}$	Intercept	RMRF	R^2_{adj}	Intercept	RMRF	R^2_{adj}
Low	Coefficient	0,00135	0,903**	0,224	0,00045	0,885**	0,174
	T-stat	0,35	9,16		0,10	7,83	
High	Coefficient	0,00560	0,794**	0,182	0,01167**	0,719**	0,132
	T-stat	1,45	8,06		2,75	6,68	
PEAD	Coefficient	0,00349	-0,10	-0,001	0,01046	-0,16	0,001
	T-stat	0,69	-0,83		1,74	-1,08	

Panel B	$SUE_{3/\sigma}$	Intercept	RMRF	R^2_{adj}	Intercept	RMRF	R^2_{adj}
Low	Coefficient	0,01055*	0,597**	0,130	0,01731*	0,292	0,004
	T-stat	2,54	5,44		2,10	1,33	
High	Coefficient	0,01414**	0,641**	0,106	0,01615**	0,592**	0,154
	T-stat	2,84	4,86		4,36	5,98	
PEAD	Coefficient	0,00314	0,042	-0,005	-0,0015	0,298	0,003
	T-stat	0,60	0,31		-0,18	1,29	

Table 7 shows the regression results for the SUE measure using the mean of the previous eight months rolling to estimate unexpected returns. The risk adjusted return to each portfolio is regressed on an intercept and the risk adjusted market return (RMRF). Left hand side used EPS as a measure of earnings whereas the right hand side used raw earnings. Panel A shows results for SUE standardized by stock price at the date of the report. Panel B *shows same results standardized by the standard deviation of the previous eight months. . 5% and 1% significance level are indicated by * and ** respectively.*

5.2.4 Earnings Announcement Returns

The regression deviate from the results of the Buy-and-Hold strategy. While the return to the High portfolio is only slightly inflated, the return to the Low portfolio is exaggerated and brings down the average return to the PEAD portfolio. The EAR measure estimates an abnormal return of 1.9% over twelve months whereas the adjusted EAR estimates an abnormal return of 3.1% over the same period. The higher estimate for the latter is due to the Low portfolio performance, completely in line with the Buy-and-Hold strategy which also forecasts a lower abnormal return to the worst decile. The lack of significance to the intercepts as well as low adjusted R^2 will be addressed in the discussion.

Table 8. *EAR regression results.*

		EAR			**EAR_{adj}**		
		Inc	RMRF	R^2_{adj}	Inc	RMRF	R^2_{adj}
Low	Coefficient	0,00509	0,453**	0,088	0,00430	0,462**	0,092
	T-stat	1,69	8,11		1,44	8,31	
High	Coefficient	0,00776**	0,432**	0,087	0,00801**	0,416**	0,082
	T-stat	2,69	8,06		2,80	7,81	
PEAD	Coefficient	0,00154	-0,01	-0,001	0,00258	-0,03	-0,001
	T-stat	0,52	-0,24		0,88	-0,71	

*Table 8 shows the regression results for the EAR. The risk adjusted return to each portfolio is regressed on an intercept and the risk adjusted market return (RMRF). Left hand side used the raw return around the report date whereas it was adjusted by the return to index to which the individual stock belongs. 5% and 1% significance level are indicated by * and ** respectively.*

6. Discussion

6.1 Reliability

While the results are a bit mixed they do not speak against the post-earnings announcement drift phenomenon on the Swedish market. The most disheartening part of the result is the lack of significance to parts of the regressions. While this is indeed an issue, part of it can be explained. The main issue is the actual deciles. With too few companies reporting in a single month, the return to the portfolios based on the deciles will be increasingly dependent on a handful of companies. Incorporating more companies into each decile would make the mean return more balanced and give a fairer portrayal of the portfolio returns, as opposed to let one or two companies dominate the return. An example of extreme returns is Fingerprint Cards (FING) with an extreme increase in stock price during 2015 from 35.5 SEK to 591 SEK. Other stock with extreme stock movement includes Nordic Mines (NOMI) in the end of 2015 and Precise Biometrics (PREC) among others.

Setterberg combat small deciles by forming the portfolios after each quarter instead of after each month. As her sample consisted of data for 140 companies the portfolios should consist of roughly 14 stock each. This allows for only one portfolio formation instead of up to three for each quarter. There is thus a trade-off between number of stock in the portfolio and the number of portfolio formations. Information loss for the companies reporting early in the quarter is also a by-product of quarterly portfolio formation. E.g. a company reporting in January will lose out on two months of returns as opposed to one reporting in the end of March as the portfolios for this quarter are formed on the first of April. The reversal pattern shown at month eleven will obviously have a negative impact on the portfolio overall for companies reporting early in the quarter.

A larger sample-size in regards to the number of companies included would allow for monthly portfolio formation with decent sized deciles. This was indeed the aim for this study albeit a surprisingly large part of the sample was discarded in part due to missing stock and/or quarterly data. Any attempt to increase decile size by using quarterly portfolio assignment had little effect on the significance of the regression results – the reduction in the number of portfolio formations offset any gain in decile size. A valid question then is, does the number of firms per decile even matter? When adjusting the number of deciles to 5 (quintiles) the significance of the regression were in the same order as those of Setterberg. This means that larger deciles in terms of number of stocks included play an important role. The reason to stick with the deciles rather than quantiles is to preserve the size of the drift as quintiles make the extreme deciles less extreme. There is thus no reason to outright discard the findings of the regression despite the low significance as the results are to be used for comparison within the sample.

The final issue to be address is the survival bias afflicting the sample as only currently listed stocks are included. The repercussion on the lowest decile might have a positive impact on the returns generated by the Low-portfolio. Firms in this decile have negative interim reports and are inherently at a higher risk of bankruptcy. One might also speculate that poorly run companies which have since been delisted because of either violations to listing requirements or other reasons have occur with higher frequency in this bottom decile. As such, the lowest decile is most likely to be affected by this bias which should, in theory, have an overall positive effect on the PEAD-portfolio. This is assuming the decreased return to the Low-portfolio (in which the investor is short) out-weights the impact of fatal outcomes such as bankruptcy to firms in this decile.

6.2 Preferred Measure

As for the question of preferred measure the answer is not an obvious one. The combination EPS/Price seems to underperform regardless of the model used to calculate unexpected returns. One might argue that EPS takes company size into consideration as large company may have a larger number of outstanding shares than a small company, thus making a comparison of EPS between two different sized companies more valuable than comparing their raw earnings. The price may also proxy for size as large firms often, but not necessarily always, have a higher stock price than a small firm. Assume that EPS accounts for firm size; EPS is roughly similar for small and big firm alike, and that stock price is indeed, on average, higher for a large firm. Recall that SUE is the unexpected earnings divided by a normalizing denominator. Sorting this way thus penalize big firms in the process of ranking them based on SUE. Evidence of this can be found in the full tables displaying return for all deciles in appendix B-D. There is a clear bias and the best performing decile for this combination (EPS/price) is actually decile 2 and/or decile 3.

With focus still on price, the first two models of SUE using raw earnings as a measure also fall victim to the size-bias. While not detectable on the PEAD-graphs (Figure 2-5) the table of full returns (Appendix B-D) clearly show a bias of sorting well-performing stock into low deciles. The only remaining SUE-measure standardized by price is the model using the rolling eight quarter average to estimate unexpected earnings. It performs remarkably well. It is in fact the only PEAD-portfolio to outperform the market more than 50% of the time.

As for EPS versus raw earnings in a pair-wise comparison, raw earnings outperform EPS in adjusted return as well as percentage of time the respective portfolio outperforms the market. The variance of the return to portfolios based on raw earnings is also significantly lower which is good as a lower volatility implies a safer investment. The regressions results support these claims as well for the models not yet discounted as "bad". It also supports earlier results of size effects on return models such as the French-Fama model and inclusion of French-Fama factors in the SUE-regression as done by Setterberg. Earlier findings of size as a way to account for abnormal returns indicate that the earlier assumption of EPS as a size proxy should indeed lower the abnormal return for the SUE models, which is exactly what the results show. While explaining the abnormal return is indeed the aim of many studies, EPS simply is not a good enough proxy compared to the French-Fama factors. Using both EPS to calculate the measure and the French-Fama factors in the regression to try to explain the size-return component is not only counterintuitive, it is also counterproductive.

Left are thus three SUE-measures: $SUE_{2/s}$, $SUE_{3/s}$ and $SUE_{3/p}$, all of which use raw earnings. Looking at both measures normalized by the standard deviation the unwanted occurrence of a trend reversal is obvious for the Low portfolio. Of the two $SUE_{2/s}$ is the preferred one as not only does it outperform the market a higher number of times, it also delivers a better abnormal return. The strong trend reversal in $SUE_{3/s}$ also lower the accuracy of the regression; it actually predicts a negative abnormal return to the PEAD portfolio, contradicting the Buy-and-Hold strategy.

While EAR-measures have significantly lower variance of return, the average abnormal return is lower than that of the SUE counterpart in contradiction to the results of Brandt, et al.

6.3 PEAD as Investment Strategy

As shown in this thesis, measuring drift is not a difficult endeavour. All data used is available without the purchase of datasets for the private investor and calculations are trivial. The method is therefore suitable for any private investor wanting to investigate the PEAD-phenomenon on their own.

Any investing is done at the discretion of the investor and historic returns are in no way an insurance of guaranteed future returns. Ignoring the Low portfolio and focusing on the High portfolio seems to be a good start for stock selection. This has multiple advantages as the High portfolio is the driving force behind the return to the PEAD-portfolio. It also a lower variance. The main advantage is not having to short stocks which comes with greater risk than a long position because of borrowing costs, margin interests and buy-backs. Short selling in this manner is highly unlikely to generate profit for the private investor. It also comes with the risk of a loss greater than 100% while the upside is limited.

The top decile in this sample delivers an abnormal return of 11-13% over twelve months depending on measure used. While this is for the Buy-and-Hold strategy, a more active asset management approach could of course be applied where rebalancing quarterly/bi-quarter to maximize profits is done to maximize the investors return according to his/her preference.

6.4 Conclusion

The thesis confirm the results of Setterberg as PEAD-portfolios formed based on EAR and SUE show abnormal returns. The low significance to the regressions are most likely attributed to the low number of firms per decile and should not be taken as an indication that the PEAD phenomenon does not exist on the Swedish market. While it has not been the main focus of the thesis, indications of size dependency of returns to PEAD portfolios has been found. While the SUE-results show similar results to Setterberg's, EAR show significantly lower returns. This may well be due to the naïve approach used in this thesis. Normalizing this measure by the French-Fama factors as suggested by earlier reserach is a field of further study.

The ways of constructing the different measure have a significant impact on the results. The study shows that measures calculated by using raw earnings generally produce a higher drift than those using EPS, both in abnormal return and consistency in outperforming the market. This is likely due to EPS being related to firm size. Stock price also seems to be correlated to firm size and is such a less suited standardizing denominator, and using the standard deviation is preferred. Which of the different approach to use when calculating unexpected earnings for use in the SUE-measure is still left unanswered. While the auto-regression approach showed poor performance it was widely explained by the short time period the portfolios covered. The two remaining ways of calculating unexpected earnings were at par with each other depending on denominator used.

7. References

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8. Appendix

Appendix A: Extreme Decile Portfolio Composition

This section contains the tables over the distribution between Large-, Mid- and Small cap stock in the extreme decile portfolios. The measure is indicated in the left-most column, whereas the extreme decile is indicated in the top left.

High	Large Cap		Mid Cap		Small Cap	
	EPS	Earnings	EPS	Earnings	EPS	Earnings
$SUE_{1/p}$	14,0%	26,7%	60,9%	56,1%	25,1%	17,2%
$SUE_{2/p}$	15,7%	28,2%	60,3%	57,8%	24,0%	14,0%
$SUE_{3/p}$	18,0%	28,2%	58,2%	55,0%	23,9%	16,8%
$SUE_{1/s}$	27,0%	28,6%	59,1%	60,4%	13,9%	11,0%
$SUE_{2/s}$	25,5%	20,6%	61,0%	59,7%	13,5%	19,7%
$SUE_{3/s}$	23,5%	21,3%	61,7%	59,3%	14,8%	19,4%

Low	Large Cap		Mid Cap		Small Cap	
	EPS	Earnings	EPS	Earnings	EPS	Earnings
$SUE_{1/p}$	12,8%	30,7%	62,7%	54,8%	24,6%	15,0%
$SUE_{2/p}$	12,5%	31,7%	63,1%	55,4%	23,6%	13,9%
$SUE_{3/p}$	18,3%	32,1%	61,4%	55,3%	18,8%	12,5%
$SUE_{1/s}$	32,8%	27,7%	58,0%	60,5%	10,2%	13,2%
$SUE_{2/s}$	28,1%	27,5%	61,6%	61,7%	12,2%	11,9%
$SUE_{3/s}$	24,3%	25,3%	63,9%	63,3%	11,8%	10,2%

High	Large Cap	Mid Cap	Small Cap
EAR	41,4%	54,0%	4,6%
EAR_{adj}	40,9%	54,4%	4,7%

Low	Large Cap	Mid Cap	Small Cap
EAR	37,0%	55,9%	6,1%
EAR_{adj}	36,3%	56,4%	6,1%

Appendix B: Full SUE Decile Returns (EPS)

The tables in this section show the average return for the deciles in each of the SUE-measures using EPS. The measure is indicated in the top left corner of the table. Columns indicate deciles whereas rows indicate months. Month 0 indicate the return between the date of the report and portfolio formation. Month 1 indicate the return 1 month after portfolio formation and so on.

$SUE_{1/p}$	Decile 1 -0,2962	Decile 2 -0,0415	Decile 3 -0,0222	Decile 4 -0,0080	Decile 5 -0,0019	Decile 6 0,0026	Decile 7 0,0078	Decile 8 0,0186	Decile 9 0,0407	Decile 10 0,2712	PEAD -
Month 0	0,6%	1,8%	2,6%	3,0%	2,1%	2,1%	1,3%	3,3%	2,4%	0,6%	-0,1%
Month 1	-0,6%	0,6%	1,4%	1,7%	0,9%	0,9%	0,0%	2,1%	1,2%	-0,7%	-0,1%
Month 2	-2,1%	-1,9%	1,6%	1,4%	-0,4%	-1,7%	-1,4%	3,2%	0,2%	2,4%	4,4%
Month 3	-2,3%	-1,1%	1,8%	0,2%	-0,8%	-2,7%	-2,2%	4,6%	1,7%	1,2%	3,5%
Month 4	-0,2%	-1,2%	3,4%	1,6%	-0,1%	0,4%	-0,2%	4,4%	2,0%	1,6%	1,8%
Month 5	0,0%	-2,6%	1,7%	-0,7%	-2,3%	-1,3%	-0,9%	3,2%	0,1%	2,5%	2,5%
Month 6	1,7%	-2,0%	4,3%	-0,3%	-2,3%	-1,1%	-1,2%	4,9%	2,0%	0,8%	-0,9%
Month 7	0,2%	-3,1%	6,0%	-0,8%	-3,1%	-1,0%	-2,1%	3,6%	0,6%	0,5%	0,3%
Month 8	3,5%	-2,1%	7,6%	1,3%	-3,0%	-0,3%	-1,5%	4,6%	1,0%	1,9%	-1,6%
Month 9	3,2%	-1,9%	6,7%	0,4%	-4,8%	-2,4%	-2,1%	3,4%	-0,6%	-0,7%	-3,9%
Month 10	5,5%	-0,9%	6,4%	0,7%	-5,4%	-1,8%	-2,4%	4,4%	-1,9%	-2,0%	-7,5%
Month 11	9,1%	-2,0%	8,2%	0,6%	-5,5%	-4,4%	-2,3%	5,5%	-1,1%	0,4%	-8,7%
Month 12	9,6%	-0,7%	10,0%	2,2%	-6,1%	-4,9%	-3,1%	5,1%	-2,3%	-2,0%	-11,6%

$SUE_{1/s}$	Decile 1 -2,7838	Decile 2 -0,4459	Decile 3 -0,1515	Decile 4 -0,0100	Decile 5 0,1931	Decile 6 0,4742	Decile 7 0,8064	Decile 8 1,2251	Decile 9 1,7716	Decile 10 3,2789	PEAD -
Month 0	1,2%	1,8%	5,9%	1,4%	2,7%	5,0%	3,4%	-0,6%	0,9%	2,4%	1,1%
Month 1	-0,8%	-0,3%	3,8%	-0,6%	0,6%	3,0%	1,3%	-2,6%	-1,1%	0,3%	1,1%
Month 2	0,6%	1,2%	4,0%	-1,0%	1,2%	1,3%	-1,3%	-4,8%	-2,4%	2,8%	2,2%
Month 3	0,4%	-1,9%	4,3%	-3,5%	-2,3%	-1,5%	0,3%	-2,0%	-1,1%	-1,7%	-2,1%
Month 4	0,4%	1,7%	7,9%	-3,1%	-1,4%	-1,1%	-0,8%	-2,5%	-2,1%	-2,9%	-3,2%
Month 5	0,6%	1,2%	4,6%	-3,2%	-4,9%	-5,9%	-1,4%	-5,2%	-3,9%	-3,7%	-4,3%
Month 6	2,1%	0,0%	4,4%	-1,4%	-0,8%	-4,4%	0,7%	-0,4%	-0,9%	-3,3%	-5,4%
Month 7	1,6%	-2,3%	4,9%	-3,6%	-3,7%	-5,0%	3,0%	3,2%	-0,2%	1,6%	-0,1%
Month 8	3,7%	-1,8%	5,7%	-1,9%	-1,4%	-4,7%	2,3%	3,8%	1,1%	2,3%	-1,5%
Month 9	0,5%	-6,4%	1,6%	-7,5%	-6,8%	-9,2%	3,3%	-1,1%	-5,4%	-0,8%	-1,3%
Month 10	3,2%	-4,6%	0,9%	-7,3%	-4,0%	-8,0%	3,0%	-4,4%	-5,1%	0,0%	-3,1%
Month 11	6,3%	-2,0%	2,7%	-2,9%	-0,6%	-7,1%	4,6%	-0,7%	-4,1%	-1,8%	-8,1%
Month 12	7,2%	-1,7%	3,5%	-0,9%	3,1%	-10,2%	2,6%	1,6%	-6,0%	-3,7%	-10,9%

$SUE_{2/p}$	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	PEAD
	-0,1604	-0,0373	-0,0172	-0,0076	-0,0022	0,0017	0,0066	0,0150	0,0425	0,1614	-
Month 0	-0,1%	1,8%	4,8%	1,4%	0,6%	1,8%	1,4%	1,1%	1,0%	-0,4%	-0,4%
Month 1	-0,6%	1,3%	4,3%	0,9%	0,1%	1,3%	0,9%	0,6%	0,5%	-0,9%	-0,4%
Month 2	-1,1%	-0,5%	4,2%	-1,2%	-1,1%	0,7%	0,0%	2,1%	-0,5%	-1,3%	-0,2%
Month 3	0,0%	-0,7%	4,9%	-0,4%	-1,3%	-0,3%	0,9%	3,8%	0,4%	-1,5%	-1,4%
Month 4	1,2%	-1,1%	6,8%	0,7%	1,1%	0,0%	2,0%	3,8%	1,1%	-0,6%	-1,8%
Month 5	2,3%	-2,8%	4,5%	0,3%	0,3%	-0,4%	0,9%	2,7%	0,9%	-1,2%	-3,5%
Month 6	3,7%	-1,4%	6,4%	0,1%	-0,5%	-1,0%	1,2%	3,9%	2,4%	0,3%	-3,4%
Month 7	2,2%	-3,6%	9,3%	0,9%	-0,2%	-1,2%	0,3%	2,3%	0,8%	0,0%	-2,2%
Month 8	2,7%	-1,8%	11,0%	3,8%	0,7%	-0,2%	0,5%	5,8%	1,5%	2,1%	-0,6%
Month 9	2,4%	-1,6%	10,7%	2,2%	-0,9%	-2,3%	-0,2%	4,7%	-0,2%	0,6%	-1,8%
Month 10	3,0%	-0,5%	10,8%	4,8%	-0,8%	-1,2%	-0,1%	4,7%	-1,6%	1,1%	-1,9%
Month 11	4,9%	0,3%	10,5%	5,9%	-1,9%	0,2%	0,8%	5,6%	-0,8%	1,6%	-3,3%
Month 12	7,3%	0,1%	10,9%	4,9%	-2,4%	0,1%	0,2%	4,5%	-0,3%	-0,8%	-8,2%

$SUE_{2/s}$	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	PEAD
	-4,1521	-1,3698	-0,7659	-0,4361	-0,1410	0,1380	0,4417	0,7796	1,5666	4,8704	-
Month 0	3,0%	2,2%	1,0%	1,5%	3,3%	0,8%	3,2%	3,3%	0,8%	2,8%	-0,2%
Month 1	1,6%	0,7%	-0,5%	0,0%	1,8%	-0,7%	1,7%	1,8%	-0,7%	1,3%	-0,2%
Month 2	1,0%	-3,2%	0,2%	-1,5%	1,1%	-3,4%	3,1%	1,8%	-1,0%	0,5%	-0,5%
Month 3	-0,2%	-3,6%	0,4%	-2,6%	0,3%	-2,3%	1,9%	2,6%	-0,8%	2,4%	2,5%
Month 4	0,3%	1,0%	1,3%	-1,6%	0,7%	0,0%	1,3%	4,5%	-0,3%	3,7%	3,3%
Month 5	-0,7%	-1,9%	-0,5%	-1,6%	-2,6%	-1,6%	-0,2%	4,2%	-1,6%	4,3%	5,0%
Month 6	0,5%	0,8%	-0,8%	-2,5%	-2,7%	-1,4%	-0,4%	6,0%	0,2%	6,7%	6,3%
Month 7	-1,0%	0,7%	-2,1%	-3,3%	-1,7%	-3,3%	-1,7%	5,1%	-0,1%	7,2%	8,2%
Month 8	1,6%	1,2%	-1,1%	-4,5%	1,5%	-3,5%	0,3%	4,4%	2,2%	12,5%	10,9%
Month 9	-0,9%	1,5%	-1,8%	-6,0%	-1,8%	-4,2%	-0,8%	2,7%	1,8%	11,6%	12,5%
Month 10	0,6%	2,2%	-3,2%	-4,8%	-2,1%	-4,4%	1,2%	2,1%	0,6%	13,3%	12,7%
Month 11	1,7%	0,4%	-2,6%	-4,5%	0,6%	-4,5%	1,8%	2,7%	2,3%	13,8%	12,1%
Month 12	5,4%	1,9%	-3,9%	-0,9%	0,7%	-5,1%	1,0%	0,5%	1,0%	13,1%	7,7%

$SUE_{3/p}$	Decile 1 -0,1244	Decile 2 -0,0280	Decile 3 -0,0116	Decile 4 -0,0043	Decile 5 -0,0003	Decile 6 0,0027	Decile 7 0,0068	Decile 8 0,0162	Decile 9 0,0413	Decile 10 0,1490	PEAD -
Month 0	0,2%	5,8%	1,1%	2,2%	0,2%	1,0%	1,7%	1,3%	0,8%	-0,3%	-0,6%
Month 1	-0,3%	5,3%	0,6%	1,7%	-0,3%	0,5%	1,2%	0,8%	0,3%	-0,9%	-0,6%
Month 2	-1,6%	3,8%	0,1%	-0,4%	-2,0%	-0,7%	1,2%	0,7%	1,6%	-1,2%	0,4%
Month 3	-1,1%	3,6%	1,3%	0,2%	-2,9%	-0,3%	2,1%	2,7%	2,3%	-1,6%	-0,6%
Month 4	-0,8%	4,1%	3,6%	0,6%	-1,7%	0,8%	2,3%	3,1%	2,9%	0,5%	1,3%
Month 5	-0,9%	2,8%	2,5%	-0,3%	-1,6%	-1,9%	1,5%	1,2%	2,4%	0,8%	1,6%
Month 6	0,5%	6,0%	3,0%	0,1%	-2,0%	-2,1%	2,6%	2,6%	3,3%	2,1%	1,5%
Month 7	-1,5%	6,9%	4,5%	0,6%	-1,7%	-2,7%	1,8%	1,3%	2,3%	1,1%	2,6%
Month 8	-1,6%	7,5%	6,6%	1,1%	-1,8%	-0,9%	2,6%	4,2%	3,6%	4,0%	5,7%
Month 9	-2,4%	10,4%	6,6%	-0,7%	-4,3%	-2,3%	2,2%	3,3%	2,0%	2,3%	4,7%
Month 10	-1,8%	11,7%	9,0%	-1,9%	-3,6%	-1,3%	1,4%	1,9%	1,1%	4,3%	6,1%
Month 11	-0,7%	12,6%	11,1%	-1,8%	-4,3%	-0,7%	2,5%	2,4%	2,0%	5,1%	5,9%
Month 12	0,4%	13,1%	11,9%	-1,9%	-5,1%	-0,4%	2,3%	0,8%	1,9%	4,1%	3,7%

$SUE_{3/s}$	Decile 1 -3,7259	Decile 2 -1,1501	Decile 3 -0,5298	Decile 4 -0,2418	Decile 5 -0,0325	Decile 6 0,1831	Decile 7 0,4039	Decile 8 0,6947	Decile 9 1,3902	Decile 10 4,5021	PEAD -
Month 0	2,8%	2,8%	1,9%	1,8%	2,3%	2,3%	1,7%	2,4%	3,8%	2,6%	-0,1%
Month 1	1,3%	1,3%	0,4%	0,3%	0,8%	0,8%	0,2%	0,9%	2,3%	1,1%	-0,1%
Month 2	-0,3%	2,1%	0,2%	-2,0%	-0,2%	-1,1%	-1,7%	1,3%	4,5%	-0,2%	0,1%
Month 3	-0,5%	-1,7%	0,6%	-2,8%	-1,0%	-0,2%	0,0%	0,2%	5,2%	1,4%	1,9%
Month 4	0,0%	2,1%	2,6%	-1,0%	-0,3%	0,5%	0,7%	1,9%	5,1%	2,9%	2,9%
Month 5	-1,1%	-1,0%	1,6%	-3,3%	-1,7%	-0,1%	-1,5%	0,3%	4,3%	3,7%	4,8%
Month 6	0,4%	0,1%	3,3%	-4,5%	-1,5%	0,3%	-1,0%	0,4%	7,2%	5,6%	5,3%
Month 7	-0,2%	-1,4%	1,7%	-6,1%	-0,1%	0,9%	-2,7%	-1,4%	7,5%	5,8%	6,0%
Month 8	2,3%	-1,0%	1,0%	-4,3%	0,7%	3,4%	-2,7%	-0,2%	10,0%	10,6%	8,3%
Month 9	0,1%	-2,9%	0,0%	-5,4%	-1,7%	3,0%	-3,0%	-1,7%	8,3%	9,4%	9,3%
Month 10	1,0%	-4,4%	1,2%	-5,7%	-2,3%	5,0%	-3,3%	-2,6%	9,9%	10,7%	9,8%
Month 11	1,1%	-6,2%	1,1%	-3,8%	-2,6%	6,7%	-2,8%	-1,9%	11,9%	11,4%	10,3%
Month 12	4,7%	-5,9%	2,0%	-1,6%	-2,1%	5,1%	-3,6%	-4,3%	11,9%	10,2%	5,5%

Appendix C: Full SUE Decile Returns (Earnings)

The tables in this section show the average return for the deciles in each of the SUE-measures using earnings. The measure is indicated in the top left corner of the table. Columns indicate deciles whereas rows indicate months. Month 0 indicate the return between the date of the report and portfolio formation. Month 1 indicate the return 1 month after portfolio formation and so on.

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	PEAD
$SUE_{1/p}$	-48902,8	-9280,5	-3343,7	-1020,3	-322,1	118,5	532,7	1890,3	5235,1	38285,0	-
Month 0	1,0%	2,3%	1,8%	3,6%	1,2%	2,0%	2,6%	1,6%	1,9%	-0,3%	-1,2%
Month 1	0,1%	1,4%	0,9%	2,7%	0,3%	1,1%	1,7%	0,7%	1,0%	-1,2%	-1,2%
Month 2	0,3%	-0,4%	-0,3%	-0,3%	-0,1%	-0,1%	-1,3%	-0,9%	0,3%	0,2%	-0,1%
Month 3	-0,6%	-0,5%	1,1%	0,8%	-0,9%	-0,3%	-1,2%	1,9%	0,9%	-0,5%	0,2%
Month 4	0,0%	-0,5%	3,0%	2,5%	-0,1%	-0,4%	0,1%	3,2%	0,3%	3,3%	3,3%
Month 5	2,5%	-1,6%	1,6%	1,3%	-1,3%	-2,2%	-1,8%	1,1%	-1,0%	7,2%	4,6%
Month 6	2,0%	0,2%	4,2%	3,0%	-1,3%	-0,8%	-1,6%	2,4%	-1,2%	8,8%	6,8%
Month 7	-1,1%	-0,8%	4,0%	4,3%	-2,0%	-0,2%	-3,3%	1,5%	-1,7%	8,5%	9,7%
Month 8	2,7%	0,1%	3,3%	5,5%	-1,1%	1,0%	-1,7%	1,9%	-2,4%	9,8%	7,1%
Month 9	2,8%	1,5%	3,2%	4,5%	-1,4%	-0,6%	-3,4%	0,4%	-3,6%	9,1%	6,2%
Month 10	5,7%	1,0%	2,9%	6,0%	-2,4%	0,2%	-2,7%	0,7%	-3,2%	8,2%	2,5%
Month 11	11,1%	1,5%	4,2%	6,4%	-1,3%	-0,1%	-5,3%	2,6%	-3,7%	10,2%	-0,9%
Month 12	8,6%	2,3%	5,0%	6,2%	0,2%	0,1%	-6,6%	2,8%	-3,6%	8,5%	-0,1%

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	PEAD
$SUE_{1/s}$	-37381,9	-6076,5	-2060,5	-760,5	-223,6	36,4	449,2	1409,8	4875,6	21567,5	-
Month 0	1,2%	2,1%	2,5%	1,6%	1,7%	1,4%	2,6%	0,6%	0,4%	0,3%	-0,9%
Month 1	0,7%	1,5%	2,0%	1,1%	1,2%	0,9%	2,1%	0,0%	-0,2%	-0,3%	-0,9%
Month 2	1,1%	0,4%	-0,4%	0,5%	1,0%	-0,3%	1,5%	-1,5%	-0,2%	-0,8%	-1,9%
Month 3	-0,2%	-0,4%	-0,3%	3,1%	0,6%	-0,9%	1,5%	0,2%	0,1%	-1,6%	-1,4%
Month 4	-0,4%	-1,2%	1,9%	6,1%	1,0%	0,3%	2,5%	0,3%	-0,4%	0,1%	0,5%
Month 5	2,2%	-2,4%	0,9%	6,8%	-0,9%	-1,2%	1,0%	-0,4%	-1,3%	2,3%	0,1%
Month 6	2,2%	-2,8%	3,5%	7,4%	-0,4%	-2,5%	2,3%	1,9%	-2,1%	4,8%	2,6%
Month 7	-0,8%	-3,2%	2,9%	7,7%	-0,4%	-1,6%	1,0%	0,4%	-3,1%	3,6%	4,3%
Month 8	1,9%	-2,3%	1,2%	8,0%	1,3%	-0,4%	3,9%	2,1%	-3,0%	5,1%	3,2%
Month 9	1,0%	-1,8%	-0,8%	6,9%	1,0%	-2,5%	4,1%	0,1%	-4,8%	7,4%	6,4%
Month 10	2,6%	-1,6%	-1,8%	7,7%	0,3%	-0,6%	5,5%	0,4%	-5,5%	7,4%	4,8%
Month 11	2,6%	-0,1%	-0,8%	8,3%	2,1%	-2,0%	4,4%	6,1%	-4,4%	7,8%	5,2%
Month 12	1,7%	0,1%	0,3%	9,6%	2,5%	-3,1%	4,3%	5,7%	-4,2%	5,7%	4,0%

SUE2/p	Decile 1 -28807,9	Decile 2 -3451,6	Decile 3 -1165,2	Decile 4 -343,3	Decile 5 -22,6	Decile 6 192,6	Decile 7 574,3	Decile 8 1575,7	Decile 9 4704,3	Decile 10 19540,1	PEAD -
Month 0	1,1%	3,0%	2,7%	1,1%	0,8%	1,9%	2,0%	0,5%	0,5%	0,8%	-0,3%
Month 1	0,5%	2,5%	2,2%	0,5%	0,2%	1,3%	1,4%	0,0%	0,0%	0,3%	-0,3%
Month 2	-0,3%	0,4%	-0,1%	1,0%	-0,2%	1,0%	-1,0%	-0,5%	-0,1%	1,3%	1,6%
Month 3	-1,3%	-1,8%	0,3%	1,3%	-0,5%	0,1%	1,0%	0,5%	0,2%	0,8%	2,1%
Month 4	-1,2%	-2,8%	1,8%	1,2%	2,0%	1,5%	1,2%	-0,4%	0,2%	4,2%	5,3%
Month 5	0,7%	-3,6%	-0,8%	-0,4%	1,4%	1,3%	0,9%	-0,9%	-0,8%	7,1%	6,3%
Month 6	0,1%	-4,0%	0,1%	-2,4%	2,6%	1,6%	2,3%	1,1%	-0,6%	9,4%	9,3%
Month 7	-2,4%	-4,5%	-0,3%	-1,7%	2,7%	1,6%	1,8%	0,3%	-2,3%	8,4%	10,8%
Month 8	0,3%	-6,0%	-0,4%	2,5%	4,0%	2,6%	2,8%	2,4%	-1,6%	9,8%	9,5%
Month 9	-0,2%	-7,0%	-1,4%	0,5%	3,1%	1,2%	1,7%	3,4%	-2,5%	9,6%	9,8%
Month 10	-0,5%	-7,9%	-1,1%	3,0%	3,7%	1,7%	0,4%	2,4%	-2,5%	12,5%	13,1%
Month 11	0,2%	-4,4%	-0,2%	3,3%	2,1%	2,8%	1,1%	3,0%	-1,0%	12,0%	11,8%
Month 12	-1,0%	-3,0%	0,3%	3,4%	3,1%	1,6%	1,2%	4,3%	-2,6%	11,0%	11,9%

SUE2/s	Decile 1 -2,28	Decile 2 -0,66	Decile 3 -0,24	Decile 4 0,01	Decile 5 0,23	Decile 6 0,51	Decile 7 0,74	Decile 8 1,29	Decile 9 2,27	Decile 10 5,76	PEAD -
Month 0	2,4%	0,4%	3,7%	0,5%	2,6%	1,3%	3,2%	2,9%	3,8%	2,1%	-0,2%
Month 1	1,3%	-0,7%	2,6%	-0,6%	1,5%	0,2%	2,1%	1,9%	2,7%	1,1%	-0,2%
Month 2	1,2%	-3,1%	3,8%	-1,5%	-0,3%	1,0%	0,8%	0,0%	1,6%	0,1%	-1,1%
Month 3	3,2%	-6,9%	3,8%	0,7%	0,6%	0,4%	2,8%	0,1%	1,8%	1,0%	-2,2%
Month 4	3,0%	-0,8%	8,0%	3,2%	-0,9%	0,2%	3,2%	-2,1%	8,1%	-0,1%	-3,1%
Month 5	3,8%	-3,1%	9,6%	1,8%	-5,0%	-0,3%	1,0%	0,6%	15,3%	-0,7%	-4,6%
Month 6	3,7%	-1,3%	9,9%	3,2%	-2,6%	-0,4%	3,0%	1,2%	19,7%	-1,5%	-5,2%
Month 7	3,9%	-4,5%	8,8%	3,1%	-4,5%	-2,5%	3,4%	1,2%	21,6%	0,7%	-3,2%
Month 8	5,4%	-0,9%	11,7%	1,6%	-3,1%	-2,3%	1,6%	2,9%	22,1%	2,5%	-2,9%
Month 9	4,2%	-0,6%	9,4%	-0,4%	-6,1%	-5,8%	-2,3%	-2,9%	19,9%	1,6%	-2,5%
Month 10	7,4%	3,8%	9,2%	1,2%	-5,3%	-4,5%	0,7%	-3,7%	20,2%	2,4%	-5,1%
Month 11	8,2%	10,4%	12,2%	1,7%	-5,4%	-2,7%	6,5%	-3,8%	20,1%	1,5%	-6,7%
Month 12	8,6%	9,1%	14,6%	0,8%	-5,0%	-3,9%	4,8%	-5,1%	16,5%	0,3%	-8,3%

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	PEAD
$SUE_{3/p}$	-4,77	-1,27	-0,74	-0,42	-0,14	0,14	0,45	0,90	1,78	4,94	-
Month 0	5,5%	3,1%	1,8%	1,8%	2,8%	2,1%	2,2%	3,5%	2,0%	2,0%	-3,6%
Month 1	4,1%	1,7%	0,3%	0,3%	1,4%	0,7%	0,8%	2,1%	0,6%	0,5%	-3,6%
Month 2	-0,5%	-1,3%	2,6%	-1,7%	1,3%	-0,3%	0,5%	1,2%	-1,2%	0,7%	1,2%
Month 3	-2,9%	-2,5%	1,7%	-2,4%	0,3%	2,5%	0,8%	0,6%	-1,4%	3,6%	6,5%
Month 4	-0,8%	0,1%	3,2%	-0,2%	0,9%	3,0%	2,4%	0,2%	3,5%	4,5%	5,3%
Month 5	-0,2%	-1,8%	-0,5%	0,9%	-0,6%	0,4%	-0,1%	-0,6%	9,2%	5,3%	5,5%
Month 6	-0,2%	-0,5%	-0,8%	1,8%	0,6%	1,1%	2,6%	0,0%	12,4%	7,1%	7,3%
Month 7	-2,3%	0,5%	-2,1%	1,4%	0,4%	-1,1%	1,6%	-1,1%	13,5%	5,9%	8,3%
Month 8	-2,6%	3,1%	-1,3%	1,4%	0,8%	1,0%	3,1%	-0,6%	17,1%	10,4%	13,0%
Month 9	-5,1%	3,6%	-2,3%	0,2%	-1,2%	0,5%	2,3%	-2,4%	18,6%	11,0%	16,1%
Month 10	-3,3%	2,0%	-1,7%	0,7%	-0,4%	0,9%	2,2%	-1,6%	15,7%	11,4%	14,7%
Month 11	-1,1%	-0,2%	-1,8%	0,6%	1,3%	7,4%	4,1%	-1,2%	15,7%	13,1%	14,1%
Month 12	0,8%	5,4%	-1,2%	-0,6%	0,8%	6,6%	3,1%	-3,1%	15,5%	13,0%	12,1%

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	PEAD
$SUE_{3/s}$	-4,39	-0,99	-0,50	-0,25	-0,02	0,20	0,43	0,81	1,66	4,81	-
Month 0	5,8%	3,7%	1,1%	1,4%	2,7%	1,7%	2,6%	3,3%	2,2%	2,3%	-3,6%
Month 1	4,4%	2,3%	-0,3%	0,0%	1,3%	0,3%	1,2%	1,9%	0,8%	0,9%	-3,6%
Month 2	0,3%	2,7%	-1,6%	-0,7%	0,4%	-0,7%	-0,6%	1,7%	0,7%	0,6%	0,2%
Month 3	-1,8%	0,5%	-0,8%	-2,7%	0,8%	1,1%	-0,4%	1,4%	-0,1%	3,3%	5,1%
Month 4	0,0%	3,1%	1,5%	-2,7%	2,1%	3,3%	-0,4%	2,2%	4,2%	4,3%	4,3%
Month 5	0,4%	0,0%	-0,4%	-3,1%	-0,2%	2,1%	-2,0%	1,7%	10,0%	4,6%	4,1%
Month 6	1,1%	0,5%	0,3%	-2,6%	0,8%	2,5%	-0,7%	4,6%	12,6%	5,7%	4,7%
Month 7	-1,0%	0,8%	-1,8%	-2,4%	0,9%	1,3%	-2,6%	3,5%	14,8%	4,7%	5,7%
Month 8	-0,9%	3,0%	-2,7%	0,6%	1,3%	2,9%	-2,2%	4,8%	17,6%	8,8%	9,7%
Month 9	-3,3%	1,5%	-3,1%	-0,8%	0,1%	4,9%	-2,9%	3,0%	17,1%	9,1%	12,4%
Month 10	-2,1%	0,6%	-4,0%	-1,0%	0,8%	6,6%	-2,5%	4,9%	14,3%	10,2%	12,3%
Month 11	4,1%	-0,6%	-2,9%	-0,6%	0,3%	7,9%	-1,3%	5,5%	15,0%	12,4%	8,3%
Month 12	6,3%	0,3%	-0,9%	-1,1%	-0,5%	7,6%	-1,6%	3,1%	14,9%	11,7%	5,4%

Appendix D: Full EAR Decile Returns

The tables in this section show the average return for the deciles in each of the EAR-measures. The measure is indicated in the top left corner of the table. Columns indicate deciles whereas rows indicate months. Month 0 indicate the return between the date of the report and portfolio formation. Month 1 indicate the return 1 month after portfolio formation and so on.

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	PEAD
EAR	-0,12	-0,06	-0,04	-0,02	-0,01	0,00	0,02	0,03	0,06	0,12	-
Month 0	0,2%	0,8%	1,1%	1,1%	1,0%	1,8%	1,0%	1,7%	1,2%	1,8%	1,6%
Month 1	-0,1%	0,6%	0,8%	0,8%	0,8%	1,6%	0,8%	1,5%	0,9%	1,5%	1,6%
Month 2	-1,1%	-0,1%	0,5%	-0,5%	0,4%	1,5%	0,3%	1,0%	1,1%	2,1%	3,2%
Month 3	-1,9%	-1,2%	0,0%	-0,2%	0,6%	1,5%	0,8%	0,9%	1,3%	2,4%	4,2%
Month 4	-2,3%	-1,1%	0,7%	0,4%	1,3%	1,5%	1,6%	0,9%	2,8%	3,3%	5,6%
Month 5	0,0%	-0,3%	1,2%	0,6%	2,7%	2,4%	2,2%	0,9%	3,2%	3,9%	3,8%
Month 6	-0,3%	-1,6%	1,2%	0,3%	2,9%	2,6%	2,0%	0,9%	4,2%	5,7%	6,0%
Month 7	0,6%	-0,9%	2,1%	0,5%	3,0%	3,2%	2,5%	2,3%	4,8%	6,5%	5,8%
Month 8	1,2%	-1,6%	1,3%	0,2%	2,7%	2,7%	3,0%	2,5%	5,3%	6,6%	5,4%
Month 9	1,5%	-1,3%	1,6%	0,0%	3,8%	2,7%	3,8%	3,7%	5,7%	7,4%	5,9%
Month 10	3,2%	-1,0%	1,4%	-0,4%	4,7%	2,9%	4,4%	4,3%	6,6%	8,0%	4,8%
Month 11	4,5%	-1,6%	1,5%	-0,4%	4,7%	3,2%	4,8%	4,4%	6,5%	8,5%	4,0%
Month 12	2,9%	-2,3%	1,1%	0,3%	4,4%	3,2%	4,9%	4,7%	7,1%	8,0%	5,1%

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10	PEAD
EAR_{adj}	-0,12	-0,07	-0,04	-0,03	-0,01	0,00	0,02	0,03	0,06	0,13	-
Month 0	0,5%	0,6%	1,2%	0,7%	1,6%	1,3%	1,3%	1,3%	1,5%	1,7%	1,2%
Month 1	0,3%	0,3%	0,9%	0,4%	1,4%	1,0%	1,1%	1,0%	1,3%	1,5%	1,2%
Month 2	-0,5%	-0,5%	-0,1%	-0,2%	1,1%	0,1%	0,6%	0,6%	1,8%	1,9%	2,5%
Month 3	-1,3%	-0,9%	-1,0%	0,3%	1,0%	0,8%	0,7%	0,2%	2,3%	2,1%	3,4%
Month 4	-1,6%	-0,8%	-0,7%	1,3%	1,0%	1,3%	1,2%	-0,1%	3,6%	3,3%	4,9%
Month 5	0,3%	0,1%	-0,1%	2,3%	1,8%	2,4%	1,9%	0,1%	4,2%	3,7%	3,4%
Month 6	-0,2%	-0,6%	0,3%	1,9%	1,7%	2,5%	1,9%	0,2%	5,1%	5,6%	5,8%
Month 7	0,6%	0,0%	0,4%	2,7%	1,9%	2,8%	2,6%	1,6%	5,8%	6,3%	5,7%
Month 8	1,0%	-0,6%	0,1%	1,8%	1,8%	2,8%	2,7%	1,8%	6,7%	6,4%	5,4%
Month 9	1,4%	0,2%	-0,1%	2,7%	1,7%	3,3%	3,3%	2,3%	7,2%	7,2%	5,8%
Month 10	2,4%	0,7%	-0,2%	2,5%	2,6%	3,9%	3,6%	3,0%	8,2%	7,6%	5,3%
Month 11	3,1%	0,8%	-0,6%	2,7%	3,6%	3,2%	4,1%	3,1%	8,3%	8,3%	5,2%
Month 12	1,6%	0,1%	-0,7%	2,8%	3,8%	3,0%	4,7%	2,9%	8,2%	8,1%	6,5%