ACCELERATE YOUR RETURNS?

An examination of Earnings Acceleration and a range of other earnings-related stock market anomalies - The Swedish Case

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Master Thesis

Stockholm School of Economics

2020

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Abstract:

In this study, we aim to explore whether an investor can use earnings acceleration (EA), defined as quarterly change in earnings growth, to construct a viable trading strategy that is able to separate future winners and future losers on the Swedish stock market. Using a sample from 2004 to 2016, we document that a trading strategy that goes long in top decile EA stocks and short in bottom decile EA stocks is unable to generate abnormal returns in both the month- and quarter-long windows. This is largely driven by an underperforming long portfolio which regardless of asset pricing model generates negative abnormal return, significant at least at the 5% level. However, we find that the EA strategy is positively associated with future market-adjusted returns in the 30-day horizon when controlling for a range of anomalies and risk factors. Also, we show that the EA strategy can be enhanced through combining it with other earnings anomalies, for example with profitability and earnings volatility (PROVOL), it generates a hedge return of 30.5% in the 360-day window. Moreover, we show that 4 out of 5 related earnings anomalies that have been documented in the U.S. namely gross profit, profit trend, earnings growth patterns and PROVOL are present on the Swedish market. Overall, we interpret these results as indications of market mispricing, which investors can exploit in a simple manner. Lastly, we test the performance of a revised EA strategy and show that it was highly successful in two sub-samples periods, indicating that EA provides value-relevant information.

Keywords:

Earnings acceleration, stock market anomalies, market efficiency, fundamental analysis, earnings

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Master Thesis
Master Program in Accounting, Valuation & Financial Management
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Acknowledgements

We would like to express our sincere appreciation to Assistant Professor and Docent, Stina Skogsvik, for providing valuable insights and thoughtful guidance throughout the process of writing this thesis. We would also like to extend our gratitude to Assistant Professor, Antonio Vazquez, for useful counseling within the field of quantitative research.

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Stockholm, 6 December 2020

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1. Introduction

It is not without reason that researchers have for almost half a decade tried to identify market anomalies that can generate positive risk-adjusted returns; constructing a trading strategy able to outperform the market over time has both economic and reputational benefits. A recurring theme among these anomalies is the topic of earnings and the inherent ability of this variable to explain future stock returns (e.g. Ball and Brown, 1968). Bernard and Thomas (1989) present evidence relating to the inability of stock prices to fully reflect the implications of current earnings surprises, giving rise to a post-earnings announcement drift (PEAD) and an estimated annualized abnormal return of 18 percent. Likewise, academic research on similar topics have helped to identify several other earnings anomalies e.g. the profit trend anomaly (Akbas et al., 2017) and past earnings volatility (Cao and Narayanamoorthy, 2012). However, we find that within these studies the topic of earnings acceleration (EA), defined as change in earnings growth i.e. the second derivative of earnings, is a topic that has been relatively under researched. Although references to the role of change in earnings growth in explaining stock returns has been mentioned in many studies (e.g. Gordon, 1959; Malkiel and Cragg, 1970; Ohlson and Juettner-Nauroth, 2005), its primary function in these studies has been to act as one of several factors in earnings-based equity valuation models. It is only more recently that the topic of EA has been recognized as a topic worth delving into on its own. Despite EA having been discussed by equity research analysts as a viable trading strategy, for example Zacks Investment Research actively provides recommendations of firms with "superb earnings acceleration"[1], focus from academic research does not match.

To our knowledge, there have only been two papers published on this topic, namely the studies conducted by Cao et al (2011), and He and Narayanamoorthy (2020). Both studies are based on U.S. data, with the former focusing on contemporaneous returns using annual data and the latter on future returns using quarterly data. Cao et al. show that there is a strong association between contemporaneous returns and EA and that EA is a useful tool in predicting future earnings. Furthermore, it is shown that EA conveys information incremental to that provided by changes in analysts' forecasts of long-term earnings growth. He and Narayanamoorthy (2020) further these claims by constructing a trading strategy that goes long (short) in the top (bottom) EA decile and show that it is able to generate annualized abnormal returns of 23.0% in the 30-day window, and through an extensive series of robustness checks they conclude that their results are significantly distinct from returns

[1] E.g. Chakraborty, T. (2019). 3 of the Best Stocks With Superb Earnings Acceleration. Zacks Investment Research. Newstex.

arising from previously documented anomalies and risk factors. They find that their results are consistent with investors assuming a seasonal random walk model for quarterly earnings and thus miss the implications of EA for future earnings growth. As such, their results indicate market mispricing. Both studies conclude that more useful information can be extracted from reported earnings numbers than previously documented.

With only two papers published on this topic, both using U.S. data, there is a need for out-of-sample studies. Hence we intend to build upon these papers, with primary focus on He and Narayanamoorthy's (2020) study, by exploring this concept in a previously untested market. For this we have chosen the Swedish market and that is for several reasons. Firstly, with a few exceptions, research on Swedish earnings anomalies other than PEAD is scarce. Thus, there exists a gap in previous literature regarding evidence of these anomalies in Sweden and a thorough explanation regarding how they relate to each other, something we shed light on in this paper. Secondly, PEAD, which is closely related to EA, has been shown to act differently in Sweden than in many other countries, with the positive earnings surprise drift providing significantly higher abnormal return compared to its negative equivalent and the drift being more prolonged with longer optimal holding period (e.g. Chordia and Shivakumar, 2006; and Setterberg, 2011). Thirdly, a majority of papers, including Rouwenhorst (1998), Griffin et al. (2003), and Doukas and McKnight (2005), have been unable to find significant support for the existence of a momentum anomaly on the Swedish market. In sum, although the Swedish stock market is well-established and the sixth largest in Europe (Riksbank, 2016), previous research on the market has shown contradicting evidence regarding many well-documented phenomena within the field of stock market anomalies, making it an interesting market for research. Also, Skogsvik and Skogsvik (2010) evidence that the Swedish market has become more efficient over time.

More specifically, using a sample of quarterly data from all non-financial and non-utility stocks listed on the Stockholm Stock Exchange 2004-2016, we aim to answer the following research questions:

A: Does earnings acceleration (quarterly change in earnings growth) convey information regarding future abnormal returns to investors on the Swedish market?

B: Are there other observable earnings anomalies on the Swedish market, and if so, are they able to explain the returns generated by the earnings acceleration strategy?

This study makes three main contributions to the existing literature. First, it provides an out-of-sample study with regard to EA's association with future returns. We do not only add increased knowledge about the Swedish stock market, but also EA given that it is the first study outside the U.S. market on this topic as He and Narayanamoorthy (2020) remains the only published paper to examine this relationship. Second, we examine the performance of other earnings anomalies: PEAD (Bernard and Thomas, 1989), gross profit (Novy-Marx, 2013), combination of profitability and earnings volatility (PROVOL, He and Narayanamoorthy, 2020; Cao and Narayanamoorthy, 2012), profit trend (Akbas et al., 2017), and earnings growth patterns (Cao et al, 2011), all except PEAD which to our knowledge have not been tested on the Swedish market. Examining several anomalies enables more robust conclusions regarding market efficiency. Third, we test the performance of these anomalies including EA together with well-documented risk factors simultaneously which allow for conclusions regarding a) how they interact with each other, and b) if each anomaly is incremental to the others. Though a trading strategy may be able to yield abnormal returns, it could be a manifestation of an already known anomaly, making it a highly relevant aspect to consider. Many studies tend to focus on one stock market anomaly in either isolation or at maximum in relation to an asset pricing model. To our knowledge, this paper is the first to examine a plethora of earnings anomalies on this market.

In sum, we document that a trading strategy that goes long in high (top decile) past EA stocks and short (bottom decile) in low past EA stocks was highly unsuccessful on the Swedish market 2004-2016. We are not able to observe any clear progressive increase in returns as we move from the lowest to the highest decile. This is largely driven by underperformance in the long portfolio which regardless of asset pricing model generates negative abnormal return in both the 30- and 90-day windows, significant at least at the 5% level. Conversely, the short portfolio generates an annualized abnormal return of -28.3% in the 30-day window, significant at the 5%-level using the Fama-French three factor model. However, the short position is unable to generate significant abnormal return using the Carhart four factor model.

In relation to a range of other documented anomalies and risk factors, we only find a significant association between EA and future market-adjusted returns for the 30-day and 60-day window of 1.3% and 1.9%, respectively, while it loses significance and magnitude as the holding period increase. Also, several other anomalies, including gross profit, past earnings volatility and momentum have larger and more significant positive association with future market-adjusted returns. However, we find that the EA strategy can be significantly improved through combining it with other earnings anomalies, especially PROVOL and gross profit. For example, with PROVOL, taking a long (short) position in firms where both strategies give a buy (sell) -signal, it generates a hedge return of 30.5% in the 360-day window.

Regarding other earnings anomalies, our tests indicate that several are present on the Swedish market, particularly gross profit and PROVOL. We interpret these results as indications of mispricing on the Swedish market, giving rise for investors to use strategies that are easy to implement and receive compensation beyond what is theoretically expected. Interestingly, in line with previous research on the Swedish market, we find a more prolonged return period with PEAD, profit trend, gross profit and PROVOL having a longer optimal holding period compared to previous findings on the U.S. market. In contrast to previous research in Sweden, we do not find support for PEAD. Moreover, we show that some anomalies when tested in isolation give rise to positive and highly significant hedge returns, while when examined in relation to other anomalies lose significance and magnitude. However, we acknowledge that our tests of anomalies other than EA are limited and exhort future research to extend them for further robustness.

Finally, we test the performance of a revised EA strategy, taking a long position in decile ranks 6-9 and short position in the extreme decile ranks 1 and 10. We argue that the reasoning behind such a strategy is that investors in Sweden overreact to extreme EA announcements, regardless of being positive or negative. The positive association with future returns indicates that the measure does provide value-relevant information that investors can exploit in decile 6-9. To rule out data-mining concerns, we show that this strategy was successful in two different sub-sample periods, generating a positive hedge return significant at the 1%-level for all six different holding periods (from 30 to 360 days) in both samples. Furthermore, the revised strategy is able to produce an annualized abnormal return of 39.3% in the 30-day window, risk-adjusted using the Fama-French three factor model. When using the Fama-French model in this window, the abnormal return is also significant above the Harvey et al. (2016) suggested t-statistic hurdle of 3.0. Given that we constructed this strategy and that it too some degree lacks theoretical bearing, we do not interpret the results as indication of market mispricing but rather that EA provides value-relevant information.

The remainder of this paper is structured as follows. Section 2 provides a theoretical background discussing the concepts of market efficiency and earnings as well as presenting results from previous research on EA and related anomalies. Next we disscus the development of our hypotheses in Section 3. Section 4 outlines our data collection, research design and method specifications. The empirical results are subsequently presented in Section 5 including descriptive statistics, regression analyses and robustness checks. Lastly, the concluding remarks, limitations of our study and suggestions for future research are discussed in Section 6.

2. Literature Review

This section begins by describing one of the most fundamental concepts in financial theory, The Efficient Market Hypothesis, which argues that asset prices fully reflect all available information and therefore investors should not be able to increase returns without increasing risk. Next, we discuss different explanations behind stock market anomalies in a general sense. We then describe earnings and show how it relates to the value of stocks, before outlining other earnings anomalies that are related to our research topic. Thereafter, we introduce earnings acceleration and explore the concept in depth. This section ends with a discussion of previous findings on the Swedish market, as well as a summarizing table of relevant literature.

2.1 The Efficient Market Hypothesis

While the notion of an "efficient market" dates back to the early 1900's (Bachelier, 1900), the concept was reborn in the late 1950's and early 1960's (e.g. Roberts, 1959; Fama, 1965; Samuelson, 1965). It was further popularized by Fama (1970) through formalizing The Efficient Market Hypothesis. As Fama describes in his review, a market is efficient if it always "fully reflects" available information. Fama argues that new information, either related to actual or expected changes of value-relevance, will be reflected in security prices immediately. This is expressed as:

$$E((P_{i,t+1}|\theta_t) = (1 + E(R_{i,t+1}|\theta_t)) * P_{i,t} \tag{1}$$

Where:

θ_t = available information at time t

$P_{i,t}$ = price of stock i at time t

$R_{i,t+1}$ = return of stock i from time t to t+1

With regard to "available information", Fama classifies efficient market tests according to three information subsets: weak-form tests, semi-strong form tests, and strong form tests. The weak form of market efficiency suggests that security prices reflect all the data of past prices, making a trading strategy based on technical analysis useless. The semi-strong form goes one step further and in addition to the above includes other obviously publicly available information e.g. earnings announcements. From this perspective, investors cannot utilize neither technical nor fundamental analysis to generate abnormal returns. The strong form concerns whether current security prices reflect insider information. This version is considered an extreme form of market efficiency and is widely treated as a logical extension of the information subsets rather than describing the reality. Fama finds strong support for both the weak and the semi-strong form of market efficiency, and overall, he concludes that, with a few exceptions, the efficient market model stands up well. Market efficiency remains one of the most tested concepts in economics with numerous model improvements and results of the empirical body largely consistent with Fama's (Jensen, 1978).

LeRoy (1976) argues that the definition of Fama (1970) is non-testable and tautological given that it implicitly assumes that the expected deviation of realized return from expected return is zero. Fama (1976) answered to this criticism by admitting that any test of market efficiency is also a test of the model of equilibrium used by investors. He also changes his definition of information efficiency, where it is assumed that all relevant events occur at discrete times and that the stock prices at time t-1 depend on the multivariate probability distribution of stock prices at time t. With this definition, information efficiency at time t-1 requires that all available information is used correctly to specify the probability distribution. This can be summarized as:

$$f((P_t|\theta_{t-1}) = f_m(P_1|\theta_{t-1}^m) \quad (2)$$

Where:

P_t = the vector of prices of securities at time t

θ_{t-1} = the set of information available at time t-1

θ_{t-1}^m = the set of information used by the market at time t-1

$f((P_t|\theta_{t-1})$ = the market assessed density function for P_t

$f_m(P_1|\theta_{t-1}^m)$ = the true density function for P_t implied by θ_{t-1}

Although Fama's work is by many considered a cornerstone of financial theory, it has been further criticized for excluding heterogenous expectations and asymmetric information between investors. Therefore, several alternative definitions of market efficiency have been proposed, where the differences are primarily related to the definition of the information sets used in the testing. Jensen (1978) takes a more general approach with regard to available information in his definition of market efficiency, stating that "a market is efficient with respect to information set θ_t if it is impossible to make economic profits by trading on the basis of information set θ_t" where economic profit is considered risk-adjusted returns net of all costs. Beaver (1981) criticizes the ambiguity introduced by the use of the term “information set” and therefore proposes another definition of market efficiency: “a securities market is efficient with respect to an information system if and only if security prices act as if everyone knows that information system”. Beaver thus distinguishes between signal efficiency, that it holds for a specific signal, and information system efficiency, that it holds for every signal. As such, his definition incorporates heterogenous expectations, asymmetric information and differences with regard to interpretation of information.

To sum up, according to the Efficient Market Hypothesis, investors can earn high abnormal returns in the short run but that is due to future information announcements that were impossible to forecast i.e. luck. In the long run, investors should not be able to increase returns without taking on greater risk, therefore a trading strategy based on earnings acceleration, as the one described in this paper, should be incapable of predicting future abnormal returns.

2.2 Stock Market Anomalies

Shortly after the influential review of Fama (1970), a growing body of evidence in favor of the efficient market hypothesis had emerged. On the contrary, many academic papers have since documented several stock market anomalies in which returns are inconsistent with the prediction of asset pricing theories (e.g. Basu, 1977; Stattman, 1980; Banz, 1981; Bernard and Thomas, 1990; and Jegadeesh and Titman, 1993). Interestingly, many studies show that investors can earn abnormal returns from such anomalies and that some of them persist over time. As such, in a world with a perfect asset pricing model, stock market anomalies per definition should violate the efficient market hypothesis. Abnormal return is defined as a significant difference between the expected return and the actual return.

$$AR_{it} = R_{it} - E(R_{it}) \tag{3}$$

Where:

AR_{it} = abnormal return for firm i at time t

R_{it} = actual return for firm i at time t

$E(R_{it})$ = expected return for firm i at time t.

The prevalence of market anomalies has several explanations, below follows a summary of the most relevant.

2.2.1 The Risk-Based View

A common explanation to claims of mispricing is that the anomaly arises from an unmeasured dimension of risk in the benchmark model. The risk of falsely concluding abnormal returns has, however, decreased through the development of more sophisticated asset pricing models. Using Markowitz's (1952) portfolio theory, the Capital Asset Pricing Model (CAPM) was independently developed by Sharpe (1964), Lintner (1965) and Mossin (1966). The model argues that investors are only compensated for systematic risk since firm-specific (idiosyncratic) risk can be avoided through diversification.

$$E(R_{it}) = R_{ft} + \beta_i(E(R_{Mt}) - R_{ft}) \tag{4}$$

Where:

$E(R_{it})$ = expected return for firm i at time t

R_{ft} = risk-free rate at time t

β_i = beta of firm i defined as covariance of firm i's and the overall market's returns divided by the variance of the return of the market

$E(R_{Mt})$ = expected return of the market at time t

Although CAPM is till this day, together with the Arbitrage Pricing Theory (Ross, 1976), the only theoretically founded models for estimating the expected stock return, numerous empirical tests criticize its practical foundation. Fama and French (1993) finds that the model is only able to explain around 70 percent of the diversified portfolio returns. Fama and French (2004) argue that the relation between beta and average return is flatter than predicted by the model, resulting in estimates of high beta stocks being too high and estimates of low beta stocks being too low. The authors conclude that CAPM remains an important theoretical concept, but the practical limitations are serious enough to invalidate most applications of the model. Similarly, Baker et al. (2011) show that high-beta and high-volatility stocks have long underperformed low-beta and low-volatility stocks, referred to as the low-volatility anomaly. Such an anomaly contradicts the prediction of the CAPM.

Following criticism, research has since the late 1970's focused on finding additional risk factors to improve the model. Banz (1981) argues that common stocks of small firms, on average, have higher risk-adjusted returns than larger firms. On a similar note, Stattman (1980) and Rosenberg et. al (1985) find that average stock returns are positively related to the book-to-market ratio of a firm. Inspired by the work of the aforementioned and others, Fama and French (1993) developed an extended version of the CAPM, adding two risk factors related to a firm's market capitalization (size) and book-to-market ratio (value).

$$E(R_{it}) = R_{ft} + \beta_i(E(R_{Mt}) - R_{ft}) + B_{si}SMB + B_{hi}HML \quad (5)$$

Where:

SMB = difference between returns of small and large firms

B_{si} = coefficient of firm i with regard to a linear regression of the SMB factor

HML = difference between returns of firms with high and low book-to-market ratios

B_{hi}= coefficient of firm i with regard to a linear regression of the HML factor

Although Fama and French report that their extended three factor model explains more than 90 percent of the variation of returns of diversified portfolios, several papers argue that the size and value effect should not be considered risk factors but rather persistent anomalies (e.g. Haugen, 1999). A similar argument has been made with regard to another well-documented anomaly, namely the momentum effect. Contradicting the weak form of market efficiency, Jegadeesh and Titman (1993) find that stocks will, on average, continue on the price trend of previous performance, i.e. winners (losers) will perform well (poorly), in the 12-month horizon. Carhart (1997) incorporates this effect by extending the Fama and French's three factor model.

$$E(R_{it}) = R_{ft} + \beta_i(E(R_{Mt}) - R_{ft}) + B_{si}SMB + B_{hi}HML + B_{pi}PR1YR \quad (6)$$

Where:

$PR1YR$ = difference between returns of previous winners and previous losers

B_{pi} = coefficient of firm i with regard to a linear regression of the PR1YR factor

Furthermore, Fama and French (2015) make an extension to their three-factor model by adding two new factors – investment and profitability – arguing that they increase explanatory power of portfolio returns.

$$E(R_{it}) = R_{ft} + \beta_i(E(R_{Mt}) - R_{ft}) + B_{si}SMB + B_{hi}HML + B_{ri}RMW + B_{ci}CMA \quad (7)$$

Where:

RMW = difference between returns of firms with robust and weak operating profitability

B_{ri} = coefficient of firm i with regard to a linear regression of the RMW factor

CMA = difference between returns of firms investing conservatively and firms investing aggressively

B_{ci} = coefficient of firm i with regard to a linear regression of the CMA factor

2.2.2 The Mispricing View

Vast majorities of literature concerning stock market anomalies attribute their findings of significant abnormal return to market mispricing i.e. deviation relative to a perfect prediction model. These results are indications of market inefficiency. Shiller (1981) studies historical price movements on the U.S. stock market and examines which levels of future dividends and discount rates would justify the observed movements. He argues that stock price appears to be between five and thirteen times too volatile to be attributed to new information. Furthermore, he concludes that the failure of the efficient market model is so dramatic that it would seem impossible to attribute it as anything other than market mispricing. Likewise, Haugen (1999) evidences that growth stocks are overvalued and that value stocks are undervalued. He argues that such anomalies will remain in the future since stock prices are primarily influenced by institutional investors, whose performance according to Haugen is often measured relative to the S&P500. Given that the S&P500 mainly consists of growth stocks, he argues that directors will avoid value stocks in fear of performing worse than the S&P500.

The concept of market mispricing is, however, to some degree controversial given that there is limited consensus among academics with regard to a proper benchmark model. Although evolution of asset pricing theory has generated models with increased explanatory power, other than CAPM and APT these models are all empirically oriented. As the expected return is based on a prediction using an asset pricing model, a recurring problem when testing for abnormal returns is that one can never be certain if a potential deviation is due to an incomplete benchmark model or if the market is truly inefficient. Fama (1991) refers to this as the "joint hypothesis problem".

Since the late 1990's, there has been an increase in literature focusing on human psychological limitations in explaining market mispricing, so-called behavioral finance. For example, Barberies et al. (1998) argue that investors suffer from conservative and representative biases, resulting in an underreaction to information in the short-run and overreaction in the longer-term. Such explanations have also received criticism for being sample-specific and counter-intuitively being able to explain both underreaction and overreaction (e.g. Fama, 1998).

2.2.3 Limits to Arbitrage

Given that market anomalies are documented in a theoretical setting, several papers suggest that there exist limitations preventing investors from generating abnormal returns in practice. McLean and Pontiff (2016) study the impact of transaction costs on 82 anomalies (including size, value and momentum) and find a 35 percent post-publication reduction in average strategy performance. Furthermore, Novy-Marx and Velikov (2016) argue that the results of many documented anomalies should be viewed skeptically because they use equally-weighted portfolios. Such a return calculation boosts the contribution of smaller stocks, which increases concerns related to liquidity and transaction costs. Additional concerns have been raised regarding short sale impediments given that many trading strategies are based on a combination of undertaking long and short positions (e.g. Stambaugh et al., 2012).

2.2.4 Selection Bias

Schwert (2003) argues that many documented anomalies fail to persist over time and geography, indicating selection bias e.g. through data snooping where the researcher looks for statistical significance without an initial hypothesis. As such, the prevalence of an anomaly may be limited to the specific sample. Green et al. (2017) tries to identify firm characteristics that provide independent information about average monthly stock returns by simultaneously including 94 characteristics with adjustments for data-snooping bias. Interestingly, they find statistical significance for just two characteristics post-2003, raising concern about selection bias for many documented anomalies. Harvey et al. (2016) suggest that researchers should use a hurdle of the t-statistic larger than 3.0 (corresponding to a p-value of 0.27%) compared to the usual hurdle of 2.0, to conclude statistically significant abnormal returns. They study 316 different factors that has been documented to explain cross-section of expected returns from 1967 till 2016 and argue that given the plethora of factors and the inevitable data mining, many factors have been deemed significant by chance. Furthermore, they present three reasons to why the threshold should increase over time. First, the rate of discovering a true factor has decreased as the most logical factors already has been studied. Second, there is limited amount of data. Third, the cost of data mining has dramatically decreased. They conclude that most published studies on stock market anomalies likely would not pass such a hurdle.

2.3 Earnings-related stock market anomalies

With the concept of stock market anomalies and common explanation behind their presence sorted out, we narrow our scope to focus on earnings-related anomalies. We begin by describing earnings and its value implications on firms, before discussing some of the most well-documented earnings anomalies. Lastly, we provide a detailed review on previous findings with regard to earnings acceleration.

2.3.1 Value Implications of Earnings

With its foundation developed by Burr Williams (1938), the dividend discount model (DDM) shows that the intrinsic value of a firm can be expressed as a function of expected dividends, growth rate of dividends, and the required rate of return on equity. The residual income valuation (RIV) model originates from the DDM, however, in contrast to dividends it focuses on value generating activities through book values and earnings (Preinreich, 1938; Edwards and Bell, 1961; and Ohlson, 1995).

$$V_0 = BV_0 + \sum_{t=1}^{\infty} \frac{Earn_t - BV_{t-1} - r_E}{(1+r_E)^t} \tag{8}$$

Where:

V_0 = intrinsic value of owners' equity at time 0

BV_t = book value of owners' equity at time t

$Earn_t$ = earnings at time t

r_E = required rate of return on owners' equity

According to this valuation model, increased earnings should be positively related to the value of a firm and thus future returns. The positive relation between earnings and expected stock returns holds, irrespective of whether investors are rational or irrational when developing their expectations. Therefore, conclusions regarding whether future stock returns from an earnings-based strategy are due to rational pricing arising from compensation for risk or irrational mispricing cannot be drawn. Importantly, for the reasoning above to hold, the increase in earnings must come from true value creation rather than earnings management. According to the valuation conservation principle, earnings that are solely due to the choice of accounting method are value irrelevant as they do not affect cash flows. In the residual income valuation model, this is reflected through the relationship between earnings and the book value of owner's equity.

2.3.2 Post Earnings Announcement Drift

Among the many-documented stock market anomalies that have been subject to academic research the topic of post-earnings announcement drift (PEAD) is one that has been studied intently. PEAD describes the tendency for stocks cumulative abnormal returns to drift in the direction of an earnings surprise for several weeks (or even months) following an earnings announcement. This phenomenon was first documented by Ball and Brown (1968), who find that after annual earnings are announced, cumulative abnormal returns continue to drift up for good news and down for bad news. Many have since replicated these studies in different markets and time periods to more often than not find similar results, most notably Bernard and Thomas (1989, 1990). They set out to discriminate between two competing explanations of PEAD, the first being that at least a portion of the price response is delayed, and the second reasoning being that abnormal returns are nothing more than a fair compensation for bearing risk that is priced but not captured by the CAPM. Using US data from 1974-1986, the pair is able to present evidence that investors hold naive expectations when it comes to future quarterly earnings, assuming that they will be comparable to the results of that same quarter in the previous year. Therefore, it is theorized that investors underestimate the persistence in earnings surprises allowing the price drift to continue over long periods. Bernard and Thomas (1989) find that in the 60-day post-announcement period, the difference between the top and bottom quintile is able to generate an abnormal return of approximately 18% on an annualized basis, controlled for firm size.

2.3.3 Gross Profit Anomaly

Another anomaly with a focus on earnings is the gross profit anomaly discussed by Novy-Marx (2013). By conducting a study on the US market with data points from 1963 to 2010, he aims to answer the question of whether or not gross profitability can predict the cross section of expected returns. The results of the study lead Novy-Marx to urge the importance of controlling for profitability to achieve the best performance from a value strategy. By using gross profits-to-assets one can measure profitability, which is said according to Novy-Marx, to have roughly the same power as book-to-market in predicting the cross-section of average returns. The simple strategy entails using gross profit-to-assets as a means to separate between very profitable firms and less profitable firms. He finds that the average value spread across five different book-to-market quintiles is 0.68% per month, using Fama and French three factor model and Carhart’s four factor model to control for risk. Novy-Marx explains that applying this strategy effectively hedges value strategies and enhances a number of other strategies as well, especially among the largest, most liquid firms. Moreover, he claims that controlling for gross profitability explains most earnings-related anomalies along with a wide range of seemingly unrelated profitable trading strategies.

2.3.4 Profit Trend

Following in the same vain as Novy-Marx (2013), Akbas et al. (2017) seeks to study the importance of recent profitability in predicting firms' future returns. Their study, conducted on the US market in the time period 1997 to 2012, shows that the recent trajectory of a firm's profits can be used to predict future profitability and stock returns. The profit trend for each firm is found from a regression of the eight most recent quarters' gross profits in relation to total assets. Akbas et al. claim that the predictive power of the profit trend is different from the level of profitability, PEAD, or other well-known determinants of stock returns. The results from their study show that firms with a high level of profits significantly outperform low profit firms by an average of 0.27% to 0.63% per month (depending on the profit trend quintile). Also, firms with a positive trend in profits outperform negative-trend firms by 0.62% to 0.97% per month, risk controlled against Fama and French three and five factor models, along with Carhart's four factor model. The profit trend is also shown to successfully predict the earnings surprise of the next quarter, and analyst forecast errors over the following 12 months. This indicates that investors underreact to the information in the profit trend.

2.3.5 Past Earnings Volatility

Dichev and Tang (2009) empirically demonstrate that annual earnings predictability can significantly be improved when taking past earnings volatility into account. They also show errors in analyst forecasts, suggesting that analysts are missing the implications of earnings volatility on mean reversion of earnings. Cao and Narayanamoorthy (2012) build on the aforementioned study by constructing an investment strategy based on a combination of PEAD and past earnings volatility. Overall, using U.S. quarterly data 1987-2008, they find that lower ex ante earnings volatility, measured as standard deviation of EPS in the 8 most recent quarters, leads to significantly higher drift. The abnormal return magnitude of this effect (difference between top and bottom earnings volatility decile) is 0.61 percentage points in the three-day window after the announcement date, and 5.02 percentage points in the one-quarter window. The returns are risk-adjusted using Fama and French three and five factor models, as well as Carhart's four factor model. Without considering the effect of earnings volatility, their findings indicate that the PEAD strategy generates abnormal returns of 0.71% and 6.06% in the short- and long-window, respectively, which highlights the economic impact of considering earnings volatility. They conclude that the market does not only underreact to this volatility effect, but in fact midjudges its direction.

2.3.6 Earnings Acceleration

Before 2011, there were several studies conducted in which earnings acceleration is used as a factor in explaining stock prices, however it is typically included as one of many other control variables (e.g. Ohlson and Juettner-Nauroth, 2005; Chen and Zhang, 2007). Also, these papers use forecasted rather than realized earnings acceleration as metric in determining the value of a firm. This lack of focus from literature on earnings acceleration as a lone variable, and the role it plays in the value of stock is what makes Cao et al. (2011) work unique. The paper aims to study the impact of the change in earnings growth (earnings acceleration) in order to deem whether or not this variable conveys value relevant information, and to find if analysts use this information in revising their earnings forecast. Their returns model draws inspiration from the theoretical work of Ohlson and Juettner-Nauroth (2005). The reasoning behind this is that Cao et al. find that the Ohlson and Juettner-Nauroth model has a unique feature in that it distinguishes between short-term future earnings growth and long-term future earnings growth, a feature that Cao et al. intends to replicate in their own study. Tests are performed using a large sample of U.S. firms from 1963 through 2008, where results from both the short-window (3 days around the earnings announcement, one day before to one day after) and the long-window (annual, 9 months before announcement to 3 months after) reveal a strong association between contemporaneous returns and earnings acceleration after controlling for earnings levels and changes. Cao et al. define earnings acceleration according to a simple formula, which follows as:

$$EA_t = \Delta EA_t - \Delta EA_{t-1} \tag{9}$$

Where:

EA_t = Earnings acceleration at time t

ΔEA_t = Earnings growth at time t

The testing indicates a positive association between current returns and earnings acceleration, meaning that the higher (lower) the earnings acceleration, the higher (lower) current returns are. The pair divide their sample into 6 different partitions based on the level of earnings acceleration, where the group defined by the highest positive earnings acceleration generates mean returns of 41.2% whilst the group defined by the most negative earnings acceleration generates returns of 2.5%. This shows a mean raw return difference of 38.7% between the partitions, where risk controls used for testing include book-to-market, lagged equity book value, and change in current dividends. Additionally, results show that earnings acceleration is useful in predicting future earnings, and that financial analysts' appear to use this information in adjusting their forecasts. The study by Cao et al. extends the empirical returns-earnings model that includes only earnings levels and changes to shows that more useful information can be extracted from reported earnings numbers than what had been previously documented.

He and Narayanamoorthy (2020) build upon this by exploring the explanatory power of earnings acceleration on future abnormal returns. Their research distinguishes itself from the studies conducted by Cao et al. in two significant ways. Firstly, they focus on future returns rather than contemporaneous returns since they intend to find whether or not the market is efficient in incorporating the effects of earnings acceleration. Secondly, given their anomaly context, they focus on quarterly earnings growth rather than annual earnings growth. The reasoning for this is that much of the information to the market in annual earnings number has already been pre-empted by the three preceding quarterly earnings numbers, therefore it is likely that this information has already been incorporated in the stock price. Another key difference between the two studies is that He and Narayanamoorthy aim to research if a trading strategy that goes long (short) in the top (bottom) earnings acceleration decile can yield abnormal returns, whilst Cao et al. only set out to study whether earnings acceleration holds value relevant information (see table 1 for a detailed comparison between the two studies). He and Narayanamoorthy's study uses a large sample size of U.S stocks from 1972 to 2015, with some additional restrictions such as only including NYSE, AMEX, and NASDAQ firms, and excluding all financial and utility firms as these firms were highly regulated during much of their sample period, which could result in unusual earnings-return relationships. In some few regards, He and Narayanamoorthy employ a similar test design to that of Cao et al. since they too calculate returns over two windows. A window beginning two days after the quarter's earnings announcement and ending on day 30, and a second window beginning two days after the quarter's earnings announcement and ending one day after following quarter's earnings announcement date. Other than that, however, the test design and aim differ significantly as He and Narayanamoorthy focus on market efficiency, something Cao et al. do not. He and Narayanamoorthy define earnings acceleration in three different equations, where the primary equation used in the study is defined as follows:

$$EAP_{i,t} = EGP_{i,t} - EGP_{i,t-1} = \frac{EPS_{i,t} - EPS_{i,t-4}}{Stock\ Price_{i,t-1}} - \frac{EPS_{i,t-1} - EPS_{i,t-5}}{Stock\ Price_{i,t-2}} \quad (10)$$

Where:

$EAP_{i,t}$ = earnings acceleration for firm i at quarter t

$EGP_{i,t}$ = earnings growth (deflated by stock price), for firm i at quarter t

$EPS_{i,t}$ = earnings per share for firm i at quarter t

The results of their study indicate that earnings acceleration (when defined as quarter-over-quarter change in earnings growth) has significant explanatory power for future excess returns. For the hedge portfolio (top decile minus bottom decile), the one-month abnormal return is found to be 1.8% (23% annually), and the three-month abnormal return 3.4% (14% annually). These returns are found using the aforementioned trading strategy where stocks are bought or sold two days after the earnings announcement, however, when applying a more conservative trading strategy involving calendar month rebalancing significant excess returns are still observable. These excess returns are also shown to be robust to a wide range of previously documented anomalies, namely PEAD, profit trend, combination of known mispricing anomalies, gross profit, accruals, past earnings volatility, return momentum, total asset growth, as well as size and book-to-market. They are also robust to a large number of risk controls including Fama-French three and five factor model as well as Carhart's four factor model. Moreover, it is shown that the excess returns from the basic earnings acceleration strategy can be enhanced further by focusing on profit firms, low earnings volatility firms and on specific patterns of earnings growth. One such pattern is going long on high earnings acceleration firms represented by positive acceleration and consecutive positive earnings growth quarter (which signifies low mean reversion) and going short on low earnings acceleration firms represented by positive earnings growth followed by negative earnings growth. By following this strategy, it is shown that one can improve the abnormal return by 45% (from 1.8% to 2.6% over a month). Our own study draws many parallels to the one conducted by He and Narayanamoorthy, as such it is the most relevant study for the one we are performing.

	Cao et al. (2011)	He and Narayanamoorthy (2020)
Period	1963-2008	1972-2015
Market	U.S.	U.S.
Data points	74,612	377,907
Reporting period	Annual	Quarterly
Return type	Contemporaneous	Future
Test of	Value-relevant information	Market efficiency
Annual return	Mean raw return difference of 38.7% (year-long window)	Abnormal return of 23.0% for short window and 14.0% for long window
Earnings acceleration definition	Change in annual earnings growth	Change in annual growth of EPS on a quarterly basis (seasonally differenced EPS)
Holding period	-270 to +90 for long window and -1 to 1 for short window	From +2 to 30 days for short window and 90 days for long window
Portfolio formation	6 Partitions	10 Deciles
Control variables	BM, Lagged BV, Change in dividends	FF3, FFM, FF5, range of related anomalies
Conclusion	There is a positive association between current returns and earnings acceleration	Earnings acceleration has significant explanatory power for future risk-adjusted returns

Table 1: Comparison between Cao et al. (2011) and He and Narayanamoorthy (2020).

2.4 A Swedish Perspective

Given that we in this paper evaluate the performance of a strategy based on earnings acceleration on the Swedish market, we narrow our scope further to focus solely on Sweden in this section. We begin by describing the Swedish stock market to increase the contextual understanding of our findings. Thereafter, we present previous findings with regard to stock market anomalies on this market.

2.4.1 The Swedish Stock Market

By the end of the second-to-last year of our sample, 2015, there were two regulated marketplaces in Sweden, namely Nasdaq Stockholm and Nordic Growth Market. In addition, there were also three self-regulated markets (MTFs): First North Stockholm, Nordic MTF and Aktietorget. At the end of 2015, the total market capitalization of the stock market at Nasdaq Stockholm was SEK 5.77 trillion, making it the sixth largest stock exchange in Europe. At that point in time, a total of 298 firms were listed on the two regulated markets, among which a vast majority were Swedish. Moreover, stemming from 62 million transactions, turnover amounted to SEK 4.2 trillion in 2015. Since early 1990’s, foreign ownership has steadily grown and from 1996 and onwards foreign investors form the greatest category of shareholders on the Swedish stock market (Sveriges Riksbank, 2016).

To our knowledge, there are no studies regarding the impact of market frictions on anomalies on the Swedish stock market including the impact of transactions costs, short-sale impediment and other limits to arbitrage. Short selling has been formally allowed since 1991 (Sveriges Riksdag, 1991) with generally fewer restrictions compared to other markets. Unlike many other countries during the 2007-2008 financial crisis, Sweden did not introduce any restriction on short selling. Compared to e.g. the U.S., however, supply of shares possible to borrow is proportionally lower.

2.4.2 Swedish Stock Market Anomalies

Early studies about market efficiency on the Swedish market focus on testing the weak form of market efficiency (e.g. Jennergren and Krosvold, 1974; Jennergren, 1975; and Claesson, 1987). Through six sub-studies during the sample period 1978-1984, Claesson (1987) finds deviations from the weak form market efficiency, mainly related to January anomaly but also the day-of-the-week effect and the ex-dividend day anomaly. Liljeblom (1989) studies whether earnings forecasts published in the business journal “Veckans Affärer” are able to generate abnormal returns. Her results suggest that the hypothesis of a semi-strong form of market efficiency cannot be rejected. Following in the same vain, Skogsvik (2002) tests the semi-strong form of market efficiency through a series of forecasting models based on accounting metrics in three sub-periods 1971-1985. In all sub-periods, she finds that investors can earn abnormal returns from trading based on accounting metrics, which represent indications of market mispricing. With the background of several papers, including Rouwenhorst (1998), Griffin et al. (2003), and Doukas and McKnight (2005), being unable to find significant support for the existence of a momentum anomaly on the Swedish market, Setterberg (2011a) aims to investigate the successfulness of such a strategy 1990-2005. Contrary to previous literature and the weak form of market efficiency, Setterberg finds that the momentum strategy generates a significant monthly abnormal return equivalent to over 1%, risk-adjusted using the Fama-French three factor model.

Below, we discuss some of the more recent findings on earnings-related stock market anomalies on the Swedish market.

2.4.2.1 Post Earnings Announcement Drift

Chordia and Shivakumar (2006) show that the momentum and the PEAD anomalies on the Swedish stock market are highly correlated. With this background, Setterberg in the first paper of her Ph.D. dissertation from 2011, studies the post-earnings announcement drift using a sample of large cap firms listed on the Stockholm stock exchange 1990-2005. Using a similar methodology to Bernard and Thomas (1989), she finds that a PEAD trading strategy based on quarterly earnings surprises with a twelve-month holding period generates a monthly abnormal return of 0.9% (11.4% annualized), risk-adjusted using the Fama-French three factor model. Compared to research on other markets, the magnitude of the drift is similar, for example, Bernard et al. (1997), and Liu et al. (2003) find abnormal returns of 6.3% and 10.8% over twelve months on the U.S. and UK stock markets, respectively. However, in Sweden, Setterberg finds that the drift effect is more prolonged as it only creates significant abnormal returns for a twelve-month holding period, and that it is significantly larger after positive earnings surprises. Also, given that the evidence indicates limited risk-adjusted returns for the negative earnings surprises, Setterberg argues that thinking of PEAD as a potential omitted risk factor is counter-intuitive, as it would in such a scenario imply positive abnormal returns and an upward drift for the announcement of bad news. Her results are thus an indication of market mispricing. Overall, her findings indicate that this anomaly acts differently in Sweden than what previous research on the U.S. stock market suggests (e.g. Bernard and Thomas, 1989).

2.4.2.2 Uncertainty in Unexpected Earnings

In the second paper of her dissertation, Setterberg (2011b) studies whether GAAP earnings and core earnings introduce different levels of information uncertainty to investors on the Swedish stock market. She defines information uncertainty as to what extent the earnings signal is informative about the firm's "true" value creation, so-called economic earnings. By using the same selection criteria but a new time period, 2004-2008, she examines the performance of a quarterly PEAD strategy when considering the two earnings measures. She finds that the post-announcement drift is only significant for GAAP earnings, generating an excess return of about 1% per month. Setterberg argues that although information uncertainty could be considered a risk factor, compensation for bearing such risk is not high enough to fully explain the high risk-adjusted returns, again indicating market mispricing. Finally, her results reveal that differences in earnings levels rather than differences in forecasting models is what drives the return differences between the two measures.

2.4.2.3 Return on Equity

Inspired by Skogsvik's (2008) findings on the Swedish market that a strategy based financial statement information is able to generate a hedge return of 29% over a three-year holding period, Skogsvik and Skogsvik (2010) evaluate the profitability of a two-step accounting-based trading strategy. They use a sample of manufacturing companies quoted on Swedish stock market over the period 1983-2003 in six different sub-samples. Firstly they make a probabilistic prediction of changes in the medium-term book return on owners' equity (ROE), for each firm yielding a probability of an increase of medium-term ROE from 0.0 to 1.0. In step two, the authors assess market expectations of changes in medium-term ROE based on stock prices and the residual income valuation model. This step results in an indicator variable where a positive (negative) value implies that the current stock price is higher (lower) than what would be motivated by historical medium-term ROE. Combining the two steps, the strategy involves taking a long (short) position in companies with a probability of increased ROE higher (lower) than 0.5 and a positive (negative) value of the indicator variable. The positions are held for 36 months. Overall, the strategy is proven to be successful as it generates an average monthly CAPM-adjusted return of up to 0.8% for the hedged (zero-net investment) position, indicating market mispricing. However, they evidence that the profitability of the strategy decreased significantly after 1995, consistent with the idea that market efficiency has increased over time. Moreover, they argue that a reasonable interpretation of their results is that the indication of mispricing is more hypothetical than evidence of market inefficiency. Interestingly, the authors find that the positive hedge returns are almost solely due to the returns in the long portfolio.

An advantage of their research approach is that enables them to distinguish between two different kinds of market mispricing; forecasting mispricing where stock prices do not fully reflect the forecasting ability of the accounting numbers, and modelling mispricing where the stock prices do not fully reflect the valuation implications of the forecasted value drivers. Skogsvik and Skogsvik find that both kinds of market mispricing have explanatory power of the abnormal returns generated by the trading strategy. The authors also emphasize the importance of the strategy being implementable for investors. As such, they differentiate between statistical and realistic return metrics, with the latter being solely based on information that was available to the investors at the time of portfolio formation. With the realistic return metric, returns of the strategy were slightly reduced but the overall conclusions still hold.

2.5 Summary

A theory that is still today taught in every finance introductory course is The Efficient Market Hypothesis, which argues that investors cannot increase return without increasing risk. Although it remains one of the most fundamental concepts within the field. over 300 different stock market anomalies, where returns are significantly different than predicted by an asset pricing model, have been documented since the 1970's. The concept of stock market anomalies is however, far from straightforward not least given that one can never be certain whether such findings are due to market mispricing or a disregarded risk factor (joint hypothesis problem). Also, there are increasing concerns with regard to potential data mining and lack of true statistical significance.

Among all documented anomalies, many focus on earnings as it has clear link to the value of a company. Although some of these, for example the Post Earnings Announcement Drift, have received huge attention from researchers, others clearly need additional robustness checks through out-of-sample studies.

Earnings Acceleration, defined as either annual or quarterly change in earnings growth, has been mentioned among practitioners and in several other studies as a control variable, but He and Narayanamoorthy (2020) are the very first to study the relationship between this metric and future returns. Through a variety of robustness checks, including well-documented asset pricing models and a range of related stock market anomalies, they are able to find statistically significant support above Harvey et al.'s (2016) threshold of t-statistic larger than 3.0.

Sweden has a well-established stock market, however, previous research on the topic of stock market anomalies is quite limited. In addition, what clearly makes Sweden interesting is that previous research on this market suggests that many stock market anomalies act differently on the Swedish market than when compared to many other countries. There is limited consensus about a momentum factor, returns are driven by the performance of the long portfolio, and the underreaction to information seems to be more prolonged.

Overall, our literature review confirms that there exists a research gap on the Swedish market with regard to the causality between earnings acceleration and future returns, documentation of many other earnings-related anomalies as well as an examination of how they interact with each other and provide incremental information.

Author(s)	Anomaly	Metric	Decision rule	Market	Time period	Data points	Holding period	Risk controls	Annualized abnormal return
He and Narayanamoorthy (2020)	Earnings acceleration	Quarterly change in earnings growth	Long (short) stocks in the highest (lowest) earnings acceleration decile	U.S.	1972-2015	377,907	30 days (90 days)	FF3, FFM, FF5	23.0% (14.0%)
Bernard and Thomas (1989)	PEAD (Earnings surprise)	Earnings relative to a prediction model based on historical data	Long (short) stocks in the highest (lowest) earnings surprise decile	U.S.	1974-1986	84,792	60 days (up to 240 days)	Size-adjusted	18.0%
Novy-Marx (2013)	Gross profit	Gross profit-to-assets	Long (short) stocks in the highest (lowest) gross profit decile	U.S.	1963-2010	N/A	6-12 months	FF3, FFM	8.5%
Akbas et al. (2017)	Profit trend	Regression of eight most recent quarters' gross profit-to-assets	Long (short) stocks with the highest (lowest) trend in profit for the most recent quarter	U.S.	1977-2012	928,152	30 days	FF3, FFM, FF5	3.3% to 7.8%
Cao and Narayanamoorthy (2012)	Earnings volatility	Standard deviation of EPS in the 8 most recent quarters	PEAD adding long (short) in the highest (lowest) earnings volatility quintile	U.S.	1987-2008	305,908	3 days (3 months)	Market-adjusted	Non-annualized difference of 0.6% (5.0%)
Setterberg (2011a)	PEAD (Earnings surprise)	Same as Bernard and Thomas (1989)	Long (short) stocks in the highest (lowest) earnings surprise decile	Sweden	1990-2005	4,241	12 months	FF3	11.4%
Setterberg (2011b)	Expected earnings uncertainty	Quarterly GAAP and core earnings	Above while considering two different earnings measures	Sweden	2004-2008	790	12 months	FF3	12.6%
Skogsvik and Skogsvik (2010)	Medium-term return on equity	Average annual earnings-based ROE three years ahead	Long (short) position in firms with a prob. of increased ROE higher (lower) than 0.5 and a positive (negative) value of the indicator variable	Sweden	1983-2003	968	36 months	CAPM, E/P, BM, Size, DY	Up to 10.0%

Table 2: Summary of relevant literature.

3. Hypotheses Development

In this paper, we evaluate an earnings acceleration-based strategy along with other previously documented earnings anomalies on the Swedish stock market. Ultimately, we aim to answer whether earnings acceleration conveys information about future returns to investors beyond previously documented risk factors and anomalies. We divide our research question into a total of nine hypotheses in three different sub-categories: earnings acceleration's association with future returns, other earnings anomalies and Swedish market characteristics.

3.1 Earnings Acceleration's Association with Future Returns

Following in the footsteps of He and Narayanamoorthy (2020), we intend to find out whether a trading strategy based around earnings acceleration can generate abnormal returns on the Swedish stock market. Before any assumptions over the results obtained can be made, testing against commonly accepted risk factors are conducted. The rationale behind this is to help explain the returns so that one can rule out a risk-based explanation. This reasoning has also led to the decision to test the returns against other well-known anomalies mentioned in our literature review, as we intend to test if one can distinguish the generated returns from other anomalies that could have a contributing influence. As such our first two hypothesis are formulated as follows:

H1: Investors can earn a significant abnormal return using a strategy based on taking a long (short) position in the highest (lowest) earnings acceleration decile.

H2: The abnormal returns generated by the earnings acceleration strategy cannot be fully explained by other known anomalies including PEAD, book-to-market, size, gross profit, earnings volatility, profit trend, momentum and asset growth.

He and Narayanamoorthy (2020) also find that the earnings acceleration effect is stronger among firms with low earnings volatility and high profitability. This claim receives credibility from the research conducted by Dichev and Tang (2009) and Cao and Narayanamoorthy (2012), who find that higher volatility firms mean-revert faster. Thus, firms with more volatile earnings or lower profitability should demonstrate lower future abnormal returns from the earnings acceleration strategy. Following this we hypothesize as follows:

H3: Returns from the earnings acceleration strategy can be enhanced by going long (short) in firms with positive (negative) profitability and below-median (above-median) earnings volatility.

We also intend to investigate another finding by He and Narayanamoorthy with regards to patterns in the earnings acceleration variable. The pair found that when dividing their sample in to 6 groups of different patterns based on both the current and previous quarter's earnings growth helped enhance their strategy by generating higher abnormal returns (details regarding the formation of the groups are found in section 4.5.1). We intend to replicate this testing in our sample to explore if similar results can be achieved when applied on the Swedish market. This is formalized into the following hypothesis:

H4: Returns from the earnings acceleration strategy can be enhanced by going long in pattern 1 firms and short in pattern 5 firms.

The final hypothesis regarding future returns concerns the implementability of the earnings acceleration strategy. Essentially this entails studying whether this is a strategy that can be used by investors in a practical setting, and not just theoretically. This is important as it provides information on the viability earnings acceleration, beyond an academic point of view, including short-sale impediments and transaction costs. To investigate this, we intend to test the following hypothesis:

H5: The earnings acceleration strategy is able to generate abnormal returns after making implementability adjustments, including calendar month rebalancing and exclusion of low market capitalization stocks.

3.2 Other Earnings Anomalies

Given that studies surrounding anomalies on the Swedish market has been quite scarce in comparison to other markets such as the U.S. one, we find that there is gap in the current research that we will attempt to fill. More specifically we will aim to investigate the effects of 5 related anomalies, namely; PEAD, profit trend, gross profit, earnings growth patterns, and a combination of volatility and profitability. Given prior research on the U.S. market, the expectation is that employing strategies focused on these anomalies will generate abnormal returns on the Swedish market. As such we will test the following hypothesis:

H6: The anomalies PEAD, profit trend, gross profit, earnings growth patterns, and combination of earnings volatility and profitability are able to separate future winners and future losers.

3.3 Swedish Market Characteristics

Setterberg (2011a) finds that when studying the PEAD effect on Swedish market that some deviations to previously documented literature occurs. Most notably she finds that significant abnormal returns are only found for a twelve-month holding period, and that returns were significantly larger after a positive earnings announcement. Given that we test the performance of earnings anomalies including earnings acceleration, one can thus expect that annualized returns in the longer windows will be larger than the returns in the shorter windows. Another prediction that could be made is that the long position would generate larger returns in comparison to the short position. To test these expectations, we formulate the following hypotheses:

H7: In comparison to what previous findings on the U.S. market suggests, the optimal holding period for earnings anomalies including earnings acceleration is longer

H8: The long position contributes significantly more to portfolio returns for earnings anomalies including earnings acceleration

The final hypothesis we intend to test relates to the magnitude of the abnormal returns. From the research conducted by Skogsvik and Skogsvik (2010) one can come to the assumption that the Swedish market has become more efficient as time passes, this is reflected in diminishing abnormal returns in more recent years. Therefore, we expect that the returns generated from the earnings acceleration strategy on the Swedish market will be smaller than comparable returns on the US market, which we hypothesize as:

H9: The magnitude of the abnormal returns from the earnings acceleration strategy is smaller than in He and Narayanamoorthy (2020)

4. Sample and Methodology

In this section, the applied research methodology is described. We begin with presenting a table that summarizes all variable definitions, before discussing our sample, data sources and data collection process. Thereafter, we describe our research design in depth, including strategy description, return calculation and main test design. Finally, we discuss our additional tests and present a table related to how our research design ties back to the hypotheses described in section 3. Throughout this section we also highlight considerations related to reliability, validity and comparability of our study.

Variable	Description
EMAR	Equal-weighted market adjusted buy-and-hold return
EGA	Earnings growth (q-q), deflated by absolute value of earnings
EGP	Earnings growth (q-q), deflated by price. Our measure of PEAD.
EGV	Earnings growth (q-q), deflated by standard deviation of earnings in the last eight quarters
EAP	Earnings acceleration (q-q), price deflated
EAA	Earnings acceleration (q-q), absolute value of earnings deflated
EAV	Earnings acceleration (q-q), deflated by standard deviation of earnings in the last eight quarters
TREND	Trend in quarterly gross profitability
SIZE	Market capitalization
BTM	Book-to-market ratio
PASTRET	Past market-adjusted return, from 180 days before to 2 days before earnings announcement
GPQ	Gross profitability in relation to total assets
VOL	Earnings volatility, standard deviation of EPS in the eight most recent quarters
AG	Total assets growth on a yearly basis
EMAR_RR	Equal-weighted market adjusted buy-and-hold return based on calendar month rebalancing
VMAR	Value-weighted market adjusted buy-and-hold return
PATTERN	Earnings growth pattern
PROVOL	Aggregated profitability and earnings volatility measure

Table 3: List of variable definitions.

4.1 Sample and Data

The sample used in this study comprises of 15,244 firm-quarter observations from firms listed on the Stockholm Stock Exchange with financials covering the time period 2004 to 2016. Accounting and price data are collected from the Thomson Reuters Datastream (see appendix A for a full list of all used variables). The reason for using 2004 as our starting point is that Thomson Reuters Datastream does not provide complete data of announcement dates for quarterly reports before this point in time. When our research was initiated, Swedish House of Finance provided data on risk factors on the Swedish Market from 1983 to 2016, which is why we use 2016 as our last sample year. Moreover, given that for some variables to be calculated past data is required (e.g. VOL and TREND), we also incorporate accounting data from 2002 and 2003. By using Stockholm Stock Exchange, we automatically exclude firms listed on the Swedish self-regulated market Aktietorget.

For each variable, random tests have been conducted to ensure accuracy and avoid potential selection bias. As such, comparisons with the financial statements in the quarterly reports have been made, and special attention has been devoted to delisted firms. We found high data accuracy in 29 out of 30 (15 delisted) randomly selected firms, while for the one with lower accuracy it was only related to a few variables. Overall, these tests indicate that we have an unbiased sample.

For comparability, we mirror He and Narayanamoorthy's (2020) exclusion of utility and financial firms. This was done in the data collection stage by excluding firms from the Thomson Reuter Datasteam's sector classifications outlined in appendix A. We drop firms with missing earnings announcement dates and/or missing stock price at earnings announcement. We also require firms to have non-missing data to calculate at least one earnings acceleration and return measure, market capitalization, and book-to-market ratio. In addition, we noticed some extreme values of earnings acceleration (up to 50,000%) as a result of inconsistencies in the EPS variable provided by Datastream. We drop these by excluding the top and bottom permille (1000-quantile) of EAP, the top permille of VOL and the top and bottom two permille of EAA. Furthermore, firms with a broken fiscal year have been excluded as a matter of convenience in the test design. Finally, firms with more than one share (e.g. A and B share) are counted as multiple observations each quarter, while we in our final sample require that each firm has a maximum of one observation each quarter through only including the most liquid share (highest number of shares outstanding). In table 4 below, follows a summary of the sample selection procedures.

Description	**Observations**	**Percent**
All Thomson Reuters non-utility and non-financial firm-quarters between 2002 and 2017	152,064	100%
Drop observations with missing earnings announcement date	-39,320	-25.9%
Drop observations without a firm name	-37,658	-27.8%
Drop observations with missing price at announcement date	-50,146	-33.0%
Drop observations whose price data is insufficient to calculate any return measure	-2,825	-1.9%
Drop outliers with regard to EAA, EAP and VOL	-133	-0.1%
Drop observations from a different year than in the sample period 2004-2016	-2,318	-1.5%
Drop observations with all earnings acceleration measures missing, that is EAA, EAP and EAV	-1,941	-1.3%
Drop observations with missing SIZE or BTM	-377	-0.2%
Drop firms with broken fiscal year	-1,067	-0.7%
Drop firm duplicates (e.g. one of A and B share)	-1,035	-0.7%
Total	15,244	10.2%

Table 4: The sample selection procedures. This table details how we reached our final sample.

The final sample of 15,244 firm-quarter observations is a significantly smaller compared to He and Narayanamoorthy's (2020) 377,907 observations as a consequence of being on a smaller market and including fewer years in our sample period. Nonetheless, the sample is much larger than previously mentioned studies on the Swedish market (see section 2.4.2 and table 2) and is by no means problematic from a statistical point of view. The fact that our final sample only represents 10.2% of the initial sample is due to Thomson Reuters Datastream including all stocks that have ever been listed on the Stockholm Stock Exchange. Therefore, firms that have been delisted prior to 2004 or listed after 2016 are included in the initial sample. Also, we included more years than our time period of focus and initially collected all instruments classified as "equities" which e.g. covers preference shares. These have, however, been excluded in the final sample. 15,244 firm-quarter observations during the period 2004-2016, implies that we on average have around 290 observations each fiscal quarter.

Variable	N	Mean	Std. Dev.	p25	Median	p75
EMAR	15,243	-0.004	0.164	-0.064	-0.013	0.042
EMARQ	15,044	-0.002	0.294	-0.124	-0.017	0.091
EAA	14,914	0.064	13.225	-0.771	-0.011	0.721
EAP	14,778	-0.003	1.356	-0.016	0.000	0.015
EAV	15,244	0.005	1.610	-0.963	0.000	0.945
EGP	15,037	0.014	1.352	-0.009	0.002	0.015
TREND	13,746	0.000	0.023	-0.003	0.000	0.003
SIZE	15,244	10,922,897	39,346,458	159,812	606,404	3,338,949
ASSETS	15,235	11,729,082	47,600,086	127,691	569,600	3,176,800
BTM	15,244	0.616	0.871	0.251	0.441	0.763
PASTRET	14,867	0.009	0.490	-0.188	-0.030	0.138
GPQ	13,596	0.077	0.150	0.026	0.067	0.113
VOL	15,244	9.031	71.243	0.167	0.463	1.265
AG	14,695	0.575	45.228	-0.102	0.026	0.158

Table 5: Descriptive statistics. Descriptive statistics of variables for our sample period 2004-2016. Our sample includes all non-utility and non-financial stocks on the Stockholm Stock Exchange. For variable definition see table 3 and section 4.2-4.4.

As can be seen in table 5, data availability differs slightly in our final sample as we do not require non-missing observations for all variables. The number of observations for the variables “TREND” and “GP” are smaller than the rest as a consequence of lower availability with regard to quarterly cost of goods sold. The average company in the sample has total assets of approximately 11.7 billion SEK and a market capitalization of 10.9 billion SEK. The median is considerably lower than the mean due to large size differences among firms in the sample. The median earnings acceleration is either zero or negative for our three measures (EAA, EAP and EAV), indicating that a majority of firms experienced decreasing earnings growth rate during the sample period. This should not be confused with earnings growth (EGP), which tells us that the average firm had positive earnings growth. Furthermore, the median equal-weighted market-adjusted return is negative for the two primary return measures, suggesting that the average firm did not outperform the market. The fact that the mean market-adjusted return is negative is due to a) exclusion of some firms and b) using equal-weighted returns while the market is represented by a value-weighted index. Overall, the negative mean market-adjusted return is positive from a reliability standpoint, as a positive mean could indicate some kind of selection bias through exclusion of firms with negative returns.

4.2 Portfolio Formation

A trading strategy based on earnings acceleration involves taking a long (short) position in firms in the top (bottom) earnings acceleration decile. In line with He and Narayanamoorthy (2020), we define earnings acceleration in three different equations, and use EAP as our primary measure for earnings acceleration given that price as deflator is most consistent with the finance literature. All measures use seasonally differenced EPS i.e. earnings growth is calculated by comparing the current EPS to the EPS at the same quarter in the previous year.

Our first definition of earnings acceleration is calculated as:

$$EAP_{i,t} = EGP_{i,t} - EGP_{i,t-1} = \frac{EPS_{i,t} - EPS_{i,t-4}}{Stock\ Price_{i,t-1}} - \frac{EPS_{i,t-1} - EPS_{i,t-5}}{Stock\ Price_{i,t-2}} \tag{11}$$

Where:

$EAP_{i,t}$ = earnings acceleration for firm i at quarter t

$EGP_{i,t}$ = earnings growth (deflated by share price), for firm i at quarter t

$EPS_{i,t}$ = earnings per share for firm i at quarter t

$Stock\ Price_{i,t}$ = stock price for firm i at quarter t

Our second definition of earnings acceleration is calculated as:

$$EAA_{i,t} = EGA_{i,t} - EGA_{i,t-1} = \frac{EPS_{i,t} - EPS_{i,t-4}}{|EPS_{i,t-4}|} - \frac{EPS_{i,t-1} - EPS_{i,t-5}}{|EPS_{i,t-5}|} \tag{12}$$

Where:

$EAA_{i,t}$ = earnings acceleration for firm i at quarter t

$EGA_{i,t}$ = earnings growth (absolute value of earnings deflated) for firm i at quarter t

Our third definition of earnings acceleration is calculated as:

$$EAV_{i,t} = EGV_{i,t} - EGV_{i,t-1} = \frac{EPS_{i,t} - EPS_{i,t-4}}{SDEPS_{i,t-1}} - \frac{EPS_{i,t-1} - EPS_{i,t-5}}{SDEPS_{i,t-2}} \tag{13}$$

Where:

$EAV_{i,t}$ = earnings acceleration for firm i at quarter t

$EGV_{i,t}$ = earnings growth (deflated by standard deviation of EPS), for firm i at quarter t

$SDEPS_{i,t}$ = standard deviation of EPS calculated from the most recent eight quarters, for firm i at quarter t

Each fiscal quarter, we divide firms into earnings acceleration deciles (ten groups). We follow He and Narayanamoorthy's (2020) methodology as we initially number the decile ranks from 0 to 9 and convert the numbers through dividing by 9 and subtracting with 0.5. This way, we obtain decile ranks in the range -0.5 (bottom decile) to +0.5 (top decile) with a mean of zero. The main benefit of using such methodology is that the range of one implies that the coefficient in a return regression represents the abnormal return from a zero-investment strategy. This is described in further detail in section 4.4.2.

In the main trading strategy, positions are taken two days after quarter t's earnings announcement date and held until a) 30 days after the announcement (short window) and b) one day after quarter t+1's earnings announcement date (long window). Given that previous findings on the Swedish market suggests that the correction of potential underreaction to information is more prolonged compared to the U.S. market, we also test returns over longer windows. More specifically, this involves taking a position two days after quarter's earnings announcement date and held for 180, 270 and 360 days, respectively. Furthermore, for robustness purposes, we test a strategy based on calendar month rebalancing, in which positions are taken at the last day of the month when the earnings were announced and then held for 30, 60, 90, 180, 270 and 360 days, respectively. We acknowledge that including so many different measures of returns raises concern of data-snooping, however, we stick with the same primary measures as He and Narayanamoorthy (2020) while using the other for robustness purposes and to test for more prolonged return period.

4.3 Measure of Returns

4.3.1 Raw and Market-Adjusted Returns

To calculate raw returns, we use Thomson Reuter Datastream's variable "Total Return Index" which is based on the closing stock price adjusted for dividends and splits. We use the simplified assumption that if a firm delists within a month from the earnings announcement date, we are unable to calculate the return and thus it is counted as missing observation, implying a net return of zero. Although this could be considered potential selection bias, the assumption is two-folded. On the one hand, an involuntary delisting for example due to bankruptcy is often correlated with negative returns. On the other hand, firms may also delist due to buyouts which is typically associated with premiums and positive returns. The fact that our mean market-adjusted return is negative mitigates potential reliability concerns. Moreover, we make the assumption that if there are missing observations of either "Total

Return Index” or the OMXSGI index, for example due to holidays, we use the closing price of the next day, up to two days ahead. The net return is calculated for different holding periods, but can be generally expressed as:

$$R_{i,t} = \frac{P_{i,t}+D_{i,t}}{P_{i,t-1}} - 1 = \frac{TRI_{i,t}}{TRI_{i,t-1}} - 1 \tag{14}$$

Where:

$R_{i,t}$= net return for firm i at time t

$P_{i,t}$ = stock price for firm i at time t

$D_{i,t}$ = net dividend for firm i at time t

$TRI_{i,t}$ = total return index for firm i at time t

Market price data was collected from Nasdaq (2020). Closing value of OMXSGI is used as the proxy for the market portfolio since it is a value-weighted index that includes all stocks on the Stockholm Stock Exchange. Also, the index accounts for reinvested dividends, which is consistent with the how we calculate net return for individual firms. The market return can be expressed as:

$$MR_t = \frac{OMXSGI_t}{OMXSGI_{t-1}} - 1 \tag{15}$$

Where:

MR_t = market return at time t

$OMXSGI_t$ = value of OMXSGI at time t

As such, the market-adjusted return is calculated as follows:

$$MAR_{i,t} = R_{i,t} - MR_t = \frac{TRI_{i,t}}{TRI_{i,t-1}} - \frac{OMXSGI_t}{OMXSGI_{t-1}} \tag{16}$$

Where:

$MAR_{i,t}$ = market-adjusted return for firm i at time t

4.3.2 Portfolio Returns

Each quarter, we form three different portfolios: a) a long portfolio (top decile), b) a short portfolio (bottom decile), and c) a combined portfolio with zero-net investment where the long portfolio is financed by the short portfolio. In the main strategy, positions are taken two days after each firm's earnings announcement. The hedge portfolio mirrors that the strategy implies taking a long position in the highest earnings acceleration decile and a short position in the lowest decile.

We use equally-weighted returns as our primary portfolio return measure as it is easier for an investor to implement. This, however, implies that the portfolio has higher representation of smaller stocks. To account for such concerns, we make robustness tests that excludes low market capitalization stocks. The calculation of equally-weighted portfolio returns can be expressed as:

$$ER_{p,t} = \frac{1}{N}\sum_{t=1}^{N} R_{i,t} \tag{17}$$

Where:

$ER_{p,t}$ = equally-weighted portfolio return for portfolio p at time t

N = number of firms in portfolio p

Given that equally-weighted portfolios have been criticized due to concerns related to liquidity and transactions costs (e.g. Novy-Marx and Velikov, 2016), we also perform robustness test of the strategy using value-weighted returns. A drawback of value-weighted returns is that investors cannot know beforehand how the final portfolio formation looks like and thus are unable to calculate the weight of each investment until all firms have reported. If investors wait until this point, they risk missing out on much of the return. An alternative to this is to allow continuous rebalancing, however, that raises concerns related to transaction costs and implementability. To avoid the above, we assume that investors adjust the size of their investment in accordance with the desired weight. For example, if a position is taken in firm 1 with a market capitalization of 100 MSEK and the investor is about to take a position in firm 2 with a market capitalization of 200 MSEK a few days later, the size of this investment should be double the size of the first one. This assumption is not straight-forward either as investors have limited amount of money, however, we believe that it suits strategies like the ones described in the paper the best, given that they are sensitive to when positions are taken. In a general sense, value-weighted return of a portfolio is calculated as:

$$VR_{p,t} = \sum_{t=1}^{N} w_{i,t} * R_{i,t} \tag{18}$$

Where:

$VR_{p,t}$ = value-weighted portfolio return for portfolio p at time t

$w_{i,t}$ = market capitalization of firm i in relation to the total market capitalization of all firms in portfolio p at time t

4.3.3 Abnormal Returns

As described in section 2.2.1 and 2.2.2, a sophisticated asset pricing model is crucial when testing for abnormal returns, since one can never be certain whether a deviation from the expected return is due to market mispricing or an unmeasured dimension of risk. Using data provided by the Swedish House of Finance (SHoF), we perform regressions of the three portfolios' (long, short and hedge) calendar month excess returns in relation to monthly risk factors in the Fama-French three factor model and Carhart's four factor model. Although these models still have difficulties in explaining all returns, for example the size effect in the lowest book-to-market portfolios, they come a long way and are the most established asset-pricing models.

SHoF uses the one-month Swedish Treasury bill rate as proxy for the risk-free interest rate. To compute return on the market, SHoF uses SIX Return Index, which just like OMXSGI is a value-weighted index of all stocks on the Stockholm Stock Exchange and includes reinvested dividends. The breakpoints for calculating the additional risk factors are set in line with previous literature to the 80th percentile of the market capitalization, the 30th and 70th percentiles of the book-to-market-ratio, and the 10th and 90th percentiles of the one-year return for size, value and momentum factors, respectively. The portfolios are all value-weighted. This results in the following portfolios:

		Book-to-market		
		Low/Growth (30%)	Neutral (40%)	High/Value (30%)
Size	Small (80%)	Small-Growth (SG)	Small-Neutral (SN)	Small-Value (SV)
	Big (20%)	Big-Growth (BG)	Big-Neutral (BN)	Big-Value (BV)

Figure 1: Portfolio formation to calculate the factors SMB and HML

And:

		Momentum	
		Winners (10%)	Losers (10%)
Size	Small (80%)	Small-Winners (SW)	Small-Losers (SN)
	Big (20%)	Big-Winners (BG)	Big-Losers (BN)

Figure 2: Portfolio formation to calculate the factor MOM

Thereafter, the factors are calculated as:

$$SMB = \frac{SG+SN+SV}{3} - \frac{BG+BN+BV}{3} \tag{19}$$

$$HML = \frac{SV+BV}{2} - \frac{SG+BG}{2} \tag{20}$$

$$MOM = \frac{SW+BW}{2} - \frac{SL+BL}{2} \tag{21}$$

The regressions we perform in this paper related to risk-adjusted returns can be specified as follows:

$$R_{p,t} - R_{f,t} = \alpha_i + \beta_{1,i}\left(R_{m,t} - R_{f,t}\right) + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \varepsilon_{i,t} \tag{22}$$

Where:

$R_{p,t}$ = portfolio return for portfolio p at time t

$R_{f,t}$ = risk-free rate at time t

α_i = the vertical intercept (alpha)

$\beta_{1,i}$ = the coefficient with respect to excess market return

$R_{m,t}$ = market return at time t

$\beta_{2,i}$ = the coefficient with respect to the SMB factor

SMB_t = the size factor (small-minus-big) at time t

$\beta_{3,i}$ = the coefficient with respect to the HML factor

HML_t = the value factor (high-minus-low) at time t

$\varepsilon_{i,t}$ = the error-term

$$R_{p,t} - R_{f,t} = a_i + \beta_{1,i}(R_{m,t} - R_{f,t}) + \beta_{2,i}SMB_t + \beta_{3,i}HML_t + \beta_{4,i}MOM_t + \varepsilon_{i,t} \quad (23)$$

Where:

$\beta_{4,i}$ = the coefficient with respect to the MOM factor

MOM_t = the momentum factor (winners-minus-losers) at time t

With these calendar-month regressions, a statistically significant alpha is the measure of monthly abnormal returns. We also incorporate that the t-statistic must meet Harvey et al.'s (2016) suggested hurdle increase (>3.0) in order to conclude significant abnormal returns. To further strengthen the robustness of our results we use an OLS regression with Newey-West standard errors for coefficients in all regressions in this paper. The benefit of using the Newey-West estimator is that it corrects autocorrelation and heteroskedasticity in the error term. Similar to He and Narayanamoorthy (2020), we correct for up to six lags, implying that a maximum of six lags are considered in the autocorrelation structure.

4.4 Tests Related to Other Anomalies

One important aspect of this paper is that it aims to not only conclude whether an earnings acceleration-based strategy is able to generate abnormal returns, but also test how this documented anomaly interact with other related anomalies and risk factors on the Swedish market. Some of these other anomalies, we also test separately. Below, we define these other anomalies and risk factors, before describing our regression model.

4.4.1 Definition of Related Anomalies and Risk Factors

Post Earnings Announcement Drift

The key variable used in PEAD literature to measure earnings surprises is standardized unexpected earnings (SUE). The unexpected part of the earnings in the SUE model is the difference between actual earnings and the predicted earnings from a seasonal random walk model, in which EPS is expected to be unchanged compared to the same quarter previous year. Thus, we follow He and Narayanamoorthy (2020) by letting the price-deflated earnings growth measure from our main definition of earnings acceleration (EAP) represent the SUE variable that has been used in PEAD studies.

$$EGP_{i,t} = \frac{EPS_{i,t} - EPS_{i,t-4}}{Stock\ Price_{i,t-1}} \quad (24)$$

Size

Previous literature evidence that small firms, on average, outperform large firms. To measure firm size, we use the market capitalization at the time of the earnings announcement. Market capitalization is defined as the stock price at the announcement date multiplied by the total number of shares outstanding.

$$SIZE_{i,t} = P_{i,t} * TNSO_{i,t} \tag{25}$$

Where:

$SIZE_{i,t}$ = market capitalization for firm i at time t

$TNSO_{i,t}$ = total number of shares outstanding for firm i at time t

Profit trend

Akbas et al. (2017) show that the recent trajectory of a firm's profits can be used to predict future profitability and stock returns. The profit trend, from here on referred to as TREND, is represented by the $\beta_{1,i}$-coefficient in the following trend regression made each quarter:

$$GPQ_{t,i} = \alpha_{0,i} + \beta_{1,i}t + \varepsilon_{i,t} \tag{26}$$

Where:

$GPA_{t,i}$ = gross profit in relation to total assets for firm i at time t

$\alpha_{0,i}$= regression intercept

$\beta_{1,i}$ = $TREND_{1,i}$ = coefficient with respect to time, measure of profit trend

t = deterministic time trend covering quarters q-7 through q (values 1,2,3…8)

Our regression model differs slightly compared to Akbas et al. as they also include three dummy variables to account for potential seasonality in gross profits. However, the exclusion should not have any major impact on the overall results in our main regression model that is specified in section 4.4.2.

Book-to-market

The book-to-market ratio captures the fact the value stocks (high ratio) historically have outperformed growth stocks (low ratio).

$$BTM_{i,t} = \frac{BV_{i,t}}{SIZE_{i,t}} \tag{27}$$

Where:

$BTM_{i,t}$ = book-to-market ratio for firm i at time t

$BV_{i,t}$= book value of equity for firm i at time t

Momentum

Contradicting the weak form of market efficiency, previous research has documented that past winners, on average, outperform past losers, an effect incorporated in Carhart's four factor model. We define past return as the equal-weighted market-adjusted stock return from 180 days before the earnings announcement to 2 days before the announcement.

$$PASTRET_{i,t} = \frac{TRI_{i,t-2}}{TRI_{i,t-180}} - \frac{OMXSGI_{i,t-2}}{OMXSGI_{i,t-180}} \tag{28}$$

Where:

$PASTRET_{i,t}$ = past market-adjusted return for firm i at time t

Gross profitability

Novy-Marx (2013) argues that gross profits-to-assets have roughly the same power as book-to-market in predicting the cross-section of average returns. We follow Novy-Marx's definition of the gross profit anomaly.

$$GPQ_{i,t} \frac{Sales_{i,t} - COGS_{i,t}}{Total\ Assets_{i,t}} \tag{29}$$

Where:

$GPQ_{i,t}$ = gross profitability for firm i at time t

$Sales_{i,t}$ = sales for firm i at time t

$COGS_{i,t}$ = cost of goods sold for firm i at time t

$Total\ Assets_{i,t}$ = total assets for firm i at time t

Earnings volatility

Cao and Narayanamoorthy (2012) find that lower ex ante earnings volatility leads to significantly higher post earnings announcement drift. We follow their methodology and define earnings volatility as the standard deviation of EPS from the most recent eight quarters:

$$VOL_{i,t} = \sqrt{\frac{\sum_{t-7}^{t}(EPS_{i,t} - \overline{EPS_{i,t}})}{7}} \tag{30}$$

Where:

$VOL_{i,t}$ = earnings volatility for firm i at time t

$\overline{EPS_{i,t}}$ = average EPS from the most recent eight quarters for firm i at time t

Asset growth

In addition to the above, we also include the asset growth anomaly. Although we have not covered this anomaly in the literature review since it is neither one of the most researched nor earnings-related, we include it to increase comparability with the results of He and Narayanamoorthy (2020). The originators of this anomaly, however, was Cooper et al. (2008) and as such, we use their definition.

$$AG_{i,t} = \frac{TAPS_{i,t} - TAPS_{i,t-4}}{TAPS_{i,t-4}} \tag{31}$$

Where:

$AG_{i,t}$ = asset growth for firm i at time t

$TAPS_{i,t}$ = total assets per share for firm i at time t

4.4.2 Regression Specification

In this paper we aim to investigate if earnings acceleration conveys information regarding future returns to investors on the Swedish market beyond previously documented anomalies and risk factors. One important way of testing this is through the following regression model.

$$EMAR_{i,t} = \alpha_0 + \alpha_1 EGP\_DS_{i,t} + \alpha_2 EAP\_DS_{i,t} + \alpha_3 SIZE\_DS_{i,t} + \alpha_4 TREND\_DS_{i,t} + \alpha_5 BM\_DS_{i,t} + \alpha_6 PASTRET\_DS_{i,t} + \alpha_7 GPQ\_DS_{i,t} + \alpha_8 VOL\_DS_{i,t} + \alpha_9 AG\_DS_{i,t} + \varepsilon_{i,t} \tag{32}$$

Where:

α_0 = regression intercept

$\_DS_{i,t}$ = scaled decile rank with respect to the specified variable for firm i at time t

$\alpha_{1\dots9}$ = regression coefficients with regard to each anomaly/risk factor

The above regression is done across all earnings acceleration deciles and enables us to test earnings acceleration in relation to other anomalies simultaneously. For all factors in the regression, we use scaled decile ranks as described in section 4.2. Ultimately, we examine if earnings acceleration (represented by $EAP_{i,t}$) has a statically significant coefficient in explaining future equally-weighted market-adjusted returns. Moreover, we test the performance of other anomalies and risk factors.

Overall, this model is largely consistent with He and Narayanamoorthy's (2020) regression model. Apart from us using equally-weighted instead of value-weighted market-adjusted returns, the only difference is that they include a factor related to different accrual items in the financial statements, however, we have excluded this due to limited data availability of the necessary accounting figures. They find that such a factor in the above regression had statically significant coefficients (at the 1% level) of -0.013 and -0.022 for the one-month and quarter-long value-weighted market-adjusted returns, respectively. Given that such anomaly is less related to earnings than the once we have included, we do not expect the exclusion to have any major effect on our findings.

In addition to the specified regression model, we also test earnings acceleration together with other anomalies and risk factors through two-way sorting. This is another way of examining whether earnings acceleration adds incremental information beyond other documented anomalies. For example, we test whether earnings acceleration is statistically significant across all quintiles of the other anomalies. This is discussed in further detail in section 5 as we present the results.

4.5 Enhancing the Earnings Acceleration Strategy

In this sub-section, we present two different extensions of the earnings acceleration strategy, which He and Narayanamoorthy (2020) document enhances the performance of the strategy. In all our tests that combines earnings acceleration with another strategy, a long (short) position is taken only in firms where both strategies give buy-(sell-)signal.

4.5.1 Employing the Use of Patterns

Given the research conducted by Cao et al. (2011) and He and Narayanamoorthy (2020) surrounding factors that can enhance the earnings acceleration strategy, we decide to employ further testing to evaluate if there is a similar effect on our data sample. For this we follow in the footsteps of Cao et al. by partitioning the data into the following 6 patterns of earnings growth:

$$\boldsymbol{Pattern\ 1}: EG_t > EG_{t-1} > 0$$

$$\boldsymbol{Pattern\ 2}: EG_t > 0 > EG_{t-1}$$

$$\boldsymbol{Pattern\ 3}: 0 > EG_t > EG_{t-1}$$

$$\boldsymbol{Pattern\ 4}: 0 < EG_t < EG_{t-1}$$

$$\boldsymbol{Pattern\ 5}: EG_t < 0 < EG_{t-1}$$

$$\boldsymbol{Pattern\ 6}: EG_t < EG_{t-1} < 0$$

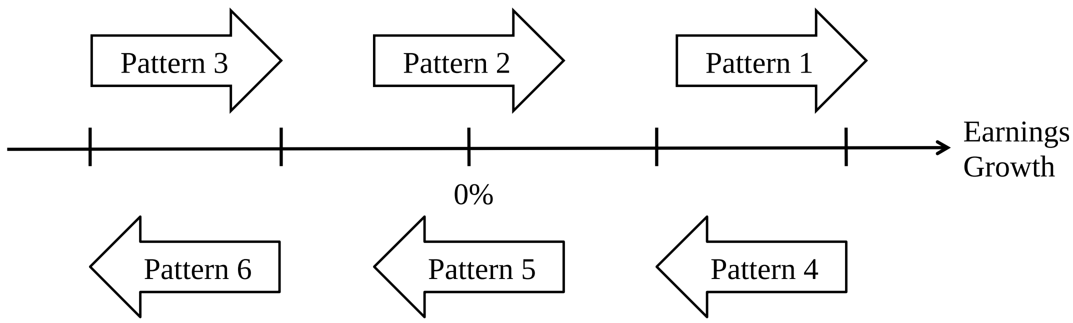

Figure 3: A visual representation of the 6 different partitions. The direction of the arrows indicates whether earnings acceleration is positive (right) or negative (left).

We name this variable PATTERN. He and Narayanamoorthy (2020) argue that the theoretical idea behind using the above patterns in relation to earnings acceleration is that pattern 1 should have the lowest mean reversion of earnings. Thus, according to their augment, it should yield the highest returns if investors miss the implications of earnings acceleration. The problem with pattern 1 is that earnings acceleration is per definition positive and therefore an investor cannot build a hedge portfolio solely based on combining this metric with earnings acceleration deciles. He and Narayanamoorthy solve this issue by using pattern 1 in combination with pattern 5 since that produces the highest hedge portfolio returns. In our tests, we use the same patterns as buy- and sell-signals.

4.5.2 Incorporating Profitability and Earnings Volatility

He and Narayanamoorthy (2020) show that their earnings acceleration strategy can be enhanced when focusing on profitable firms with low earnings volatility. We intend to examine whether this holds true for our sample as well. To do this we first distinguish between profitable and non-profitable firms, the former being firms with positive EPS and the latter being firms with negative EPS. Similarly, we divide the sample into high volatility firms and low volatility firms, where we observe the standard deviation of EPS over the 8 most recent quarters. For each quarter, firms with an above median earnings volatility are classified as high volatility firms, and firms with a below median earnings volatility are classified as low volatility firms. He and Narayanamoorthy claim that the earnings acceleration effect is stronger among profitable and low volatility firms, as these are firms with lower mean reversion in earnings. Following this we intend to divide our sample into 4 groups, grouping profitable and non-profitable firms with low and high earnings volatility firms, this combined variable is titled PROVOL. From this we create a long portfolio with firms that are profitable and have a low volatility, and a short portfolio with firms that are non-profitable and have a high volatility.

Hypothesis	**Main test**
Abnormal returns *(H1, H8 and H9)*	Regression of monthly portfolio returns for our three portfolios (long, short, hedge) with respect to Fama-French three factor and Carhart four factor models
Other anomalies and risk factors *(H2)*	Regression of market-adjusted returns in relation to scaled ranks of a series of documented anomalies including earnings acceleration and risk factors
Performance improvement *(H3 and H4)*	T-tests of difference in average market-adjusted returns for long and short portfolios that combines earnings acceleration with other anomalies.
Implementability adjustments *(H5)*	T-tests of difference in average market-adjusted returns for long and short portfolios based on a) calendar month rebalancing, b) exclusion of small market capitalization stocks and c) use of value-weighted portfolio returns
Earnings anomalies *(H6)*	T-tests of difference in average market-adjusted returns for long and short portfolios for different holding periods of the anomalies PEAD, GPQ, PROVOL, PATTERN and TREND
Length of returns *(H7)*	T-tests of difference in average market-adjusted returns for long and short portfolios with different holding periods

Table 6: Hypotheses testing. Summarizing table for how we intend to test our hypotheses

5. Results and Analysis

In the following section we present the results of the extensive testing detailed in section 4, with the ultimate aim of finding evidence that either supports or rejects our hypotheses outlined in section 3. We begin by testing the earnings acceleration strategy, before moving on to other earnings anomalies. Thereafter, we examine if the earnings acceleration can be enhanced through combining it with other earnings anomalies. Lastly, we present an alternative earnings acceleration strategy.

5.1 Earnings Acceleration on the Swedish Market

In this section we present the results of our primary testing concerning the earnings acceleration strategy on the Swedish market. As mentioned before the setup and inspiration for these tests where drawn from the research conducted by He and Narayanamoorthy (2020). In many ways, section 5.1 focuses on replicating their study.

In table 7 we present the results for both the one-month and the quarter-long equal-weighted market-adjusted returns generated using the three different earnings acceleration measures. These are divided into ten different deciles each quarter, where the lowest represents the most negative earnings acceleration, and the highest the most positive. The results reveal that the findings evidenced by He and Narayanamoorthy on the U.S. market are not nearly as recognizable on the Swedish market. One can see that decile ten is commonly among the worst performing deciles across both windows. Furthermore, the hedge return of the strategy is also drastically lower than what was observed on the U.S. market, with the best performer being the EAV measure on a month basis that shows a return of 1.0%, significant at the 10%-level. Additionally, we are not able to observe any clear progressive increase in market-adjusted returns as we move from the lowest to the highest decile, suggesting that the size of the earnings acceleration does not coincide with the magnitude of expected returns. In figure 4, we depict the development of the return for the long, short and hedge portfolios over different holding periods. Here we can clearly see indications that this would not be a worthwhile strategy to implement on the Swedish market as the long portfolio underperforms the short portfolio, with the only exception being 30- and 60-day holding periods, at which point the hedge portfolio show returns of 0.1% and 0.5%, respectively. Furthermore, we can see that if the earnings acceleration strategy was to be adopted over a year-long time span, the market-adjusted return would be -2.0%. In addition, we are also able to observe that the worst performing holding period is the six-month window, showing a non-annualized hedge portfolio return of -3.2%. These results clearly reinforce the fact that the results observed by He and Narayanamoorthy do not carry over onto the Swedish market.

EA deciles	One-month market-adjusted returns (EMAR30)			Quarter-long market-adjusted returns (EMARQ)		
	EAP	EAA	EAV	EAP	EAA	EAV
Lowest	-0.017***	-0.007*	-0.013***	-0.023*	-0.006	-0.016**
	(-2.991)	(-1.739)	(-3.102)	(-1.730)	(-0.886)	(-2.197)
2	-0.011***	-0.007*	-0.007**	-0.004	-0.011	0.005
	(-2.856)	(-1.893)	(-1.993)	(-0.465)	(-1.596)	(0.368)
3	-0.010***	-0.004	-0.009***	-0.011*	-0.005	-0.009
	(-2.807)	(-0.062)	(-2.623)	(-1.823)	(-0.605)	(-1.490)
4	-0.001	-0.012***	-0.005	0.014***	-0.012*	-0.003
	(-0.257)	(-3.425)	(-1.155)	(2.337)	(-1.756)	(-0.503)
5	-0.003	0.004	-0.011***	0.008	0.003	0.002
	(-1.225)	(0.879)	(-2.824)	(1.278)	(0.347)	(0.286)
6	0.001	0.002	0.006	0.008	0.005	0.008
	(0.2405)	(0.322)	(1.127)	(1.337)	(0.703)	(0.972)
7	0.006	0.001	0.005	0.009	0.001	0.004
	(2.052)	(0.114)	(1.005)	(1.533)	(0.089)	(0.652)
8	0.005	-0.005	-0.004	0.006	0.008	-0.008
	(1.232)	(-1.466)	(-1.072)	(0.937)	(0.671)	(-1.278)
9	0.005	-0.003	0.001	0.008	-0.002	0.004
	(1.232)	(-0.891)	(0.202)	(0.910)	(-0.312)	(0.476)
Highest	-0.016**	-0.008**	-0.003	-0.030***	0.000	-0.008
	(-2.256)	(-2.033)	(-0.674)	(-3.210)	(-0.023)	(-1.178)
Highest-	0.001	-0.001	0.010*	-0.008	0.006	0.008
Lowest	(0.061)	(-0.233)	(1.742)	(-0.478)	(0.587)	(0.826)

Table 7: Equal-weighted market-adjusted returns for the three EA measures. This table reports the average market-adjusted returns for equally-weighted portfolios based on each quarter dividing firms into earnings acceleration deciles, with accounting figures from the time period 2004-2016 on the Stockholm Stock Exchange. Positions are taken two days after each earnings announcement. The returns are reported according to the measure of earnings acceleration used, and results are displayed over a short window (one-month long), and a long window (quarter-long). Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

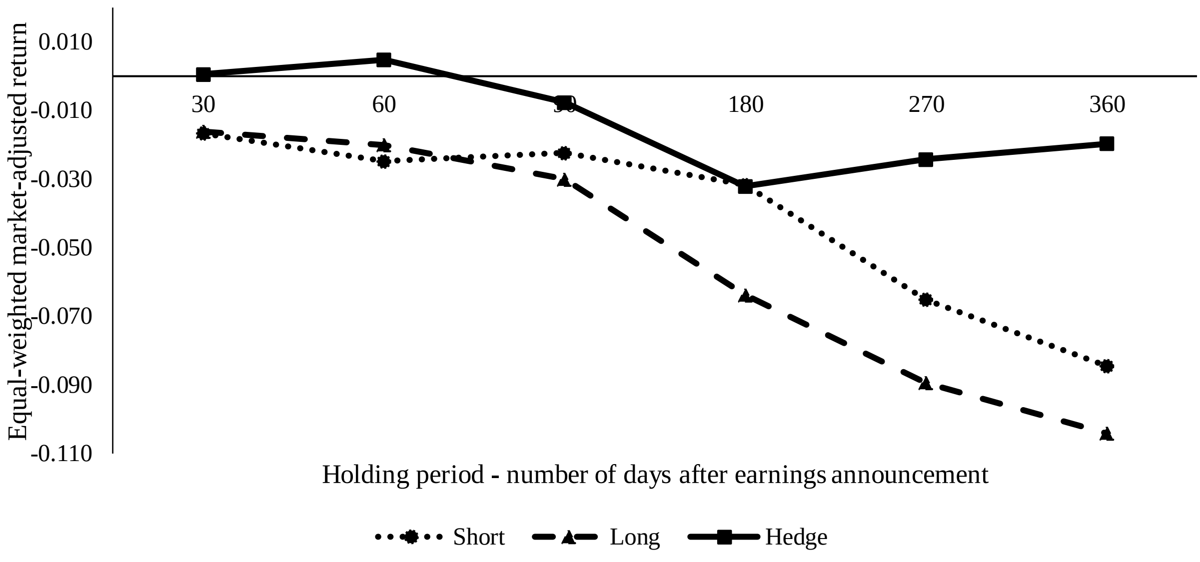

Figure 4: Equal-weighted market-adjusted return across different holding periods. In this figure the market-adjusted returns for the equally-weighted portfolios are displayed according to change in the duration of the holding period, for an earnings acceleration-based strategy on the Stockholm Stock Exchange with accounting figures from the time period 2004-2016. Note that the X-axis is not perfectly scaled. Portfolios are constructed based on dividing companies into earnings acceleration deciles each quarter. Position Long (Short) is a long (short) position in the highest (lowest) earnings acceleration decile. Position Hedge is the combined hedge portfolio i.e. Long minus Short. All positions are taken two days after the earnings announcement date.

Panel A: Month-long holding period						
	Position Long		Position Short		Position Hedge	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.019***	-0.014**	-0.021**	-0.012	-0.003	-0.002
	(-2.740)	(-2.090)	(-2.140)	(-1.290)	(-0.250)	(-0.140)
RMRF	1.185***	1.166***	0.958***	0.935***	-0.060	-0.066
	(6.110)	(5.960)	(5.000)	(5.230)	(-0.230)	(-0.250)
SMB	0.958***	0.955***	0.957***	0.947***	0.032	0.293
	(7.170)	(7.480)	(5.000)	(4.680)	(0.110)	(0.010)
HML	-0.456**	-0.734***	0.429	-0.008	-0.769*	-0.838**
	(-2.240)	(-3.010)	(1.040)	(-0.003)	(-1.830)	(-2.010)
MOM		-0.219**		-0.371***		-0.056
		(-2.010)		(-2.550)		(-0.310)
Observations	122	122	127	127	115	115
Adj R-squared	0.305	0.342	0.313	0.323	0.017	0.009
Panel B: Quarter-long holding period						
	Position Long		Position Short		Position Hedge	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-0.008**	-0.006**	-0.003	0.000	-0.004	-0.005
	(-2.950)	(-1.970)	(-0.410)	(-0.020)	(-0.650)	(0.790)
RMRF	0.810***	0.799***	0.649***	0.634***	0.128	0.132
	(12.210)	(12.170)	(4.560)	(4.540)	(1.150)	(1.180)
SMB	0.952***	0.943***	0.933***	0.920***	0.049	0.053
	(11.030)	(10.910)	(5.360)	(5.080)	(0.250)	(0.260)
HML	0.146	0.023	0.337*	0.159	-0.139	-0.092
	(1.430)	(0.180)	(1.890)	(0.890)	(-0.860)	(-0.550)
MOM		-0.103*		-0.150***		0.399
		(-1.740)		(-2.870)		(0.570)
Observations	158	158	159	159	158	158
Adj R-squared	0.258	0.263	0.596	0.603	-0.014	-0.020

Table 8: Monthly excess return regressions. The table presents the results of calendar time series monthly excess equal-weighted portfolio return regressions for an earnings acceleration-based strategy on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Portfolios are constructed based on dividing companies into earnings acceleration deciles each quarter. Position Long (Short) is a long (short) position in the highest (lowest) earnings acceleration decile. Position Hedge is the combined hedge portfolio i.e. Long minus Short. All positions are taken the last day of the month in which the earnings announcement took place and then held for 30 and 90 days, respectively. For each position and holding period, we run two regression, first using the Fama-French Three Factor Model and second using the Carhart Four Factor Model. The factors were retrieved from the Swedish House of Finance, and the methodology for how these were calculated are reported in section 4.3.3. Standard errors are estimated with Newey-West correction for up to six lags. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

In table 8 above, we present the results of monthly excess portfolio return regressions for a holding period of 30- and 90-days. Overall, the results from these regressions confirm the results from previous tests in this section; an earnings acceleration strategy as described by He and Narayanamoorthy (2020) was highly unsuccessful on the Swedish Market during the time period 2004-2016. The hedge position generates negative but insignificant abnormal return in the Fama-French model and in the Carhart model as well as for both the 30- and 90-days holding periods. The earnings acceleration strategy is, however, substantially better at finding future losers than future winners, especially in the month-long holding period. In the Fama-French regression, the short position (lowest decile) yields a -2.1% monthly abnormal return, significant at the 5% level, which corresponds to an annual abnormal return of -28.3%. The corresponding figures in He and Narayanamoorthy's research are -0.4% and -4.9%, respectively. Driven by a decreasing HML coefficient, the short position is, however, unable to generate significant abnormal return as we use the Carhart model. Most noticeably, the long position (highest decile) is more often than not underperforming the short position. One important aspect behind this finding is that the long position has higher exposure to fluctuations in market returns, in other words a higher beta coefficient. The abnormal return from undertaking this long position on the Swedish stock market 2004-2016 is negative across both asset pricing models and holding periods. The negative abnormal return is also consistently significant at either the 1% or the 5% level.

Table 9 below details the results from our regression in relation to other anomalies and risk factors for both the month-long and quarter-long strategies. The model to the left-hand side controls for earnings acceleration deflated by price (EAP), the PEAD strategy (EGP), and market capitalization (SIZE). The model to the right includes six additional controls for selected anomalies and risk factors. The regression coefficient for our earnings acceleration variable EAP, on a month-long basis is 1.3%, significant at the 10%-level regardless of regression model. Given the fact that we have divided our deciles to have a range of one and a mean of zero, this coefficient can be interpreted as a hedge return of 1.3%. As such, in contrast to previous tests, the strategy seems to have a significant positive association with future returns in the 30-day horizon. While being less significant than in He and Narayanamoorthy, the hedge return is of similar magnitude as they find a coefficient of 1.6% in the month-long window. Interestingly we find that when moving to a quarter long basis the return is lower (-0.2% and 0.8%) and not significantly different from zero, showing that the ideal return is found in the shorter term. Although principally these results are similar to the ones documented by He and Narayanamoorthy (2020) in the sense that they also find the month-long window to return higher annualized returns, our results still differ in magnitude. He and Narayanamoorthy find that the quarter-long window generates abnormal returns over 2% for both regression models, whilst also being significant at the 1%-level. In comparison, the earnings acceleration strategy when applied to the Swedish market generates considerably lower returns and at a level that is not significantly different from zero.

Conversely, we see that the PEAD (EGP) strategy returns poor results for the short window and positive returns for the long window, however, when controlled for other anomalies and risk factors the return becomes negative even over the quarter-long window. The PEAD coefficient is furthermore not significant in any regression, which brings the question of whether this anomaly existed on the Swedish stock market in our sample period 2004-2016. This is to some degree a contradiction to previous literature studying PEAD on the Swedish market (e.g. Chordia and Shivakumar, 2006; Setterberg, 2011a), as the results from our sample would lead to the conclusion that employing a PEAD strategy on the Swedish market is not a worthwhile investment. In section 5.2, we test this indication in further detail.

	One-month market-adjusted returns (EMAR)		Quarter-long market-adjusted returns (EMARQ)	
Variables	(1)	(2)	(3)	(4)
Constant	-0.004***	-0.004**	-0.002	-0.002
	(-2.830)	(-2.230)	(-0.650)	(-0.700)
EGP	-0.002	-0.001	0.013	-0.004
	(-0.360)	(-0.090)	(1.260)	(-0.330)
EAP	0.013*	0.013*	-0.002	0.008
	(1.890)	(1.820)	(-0.180)	(0.700)
SIZE	0.016***	0.011*	0.016*	0.013
	(2.910)	(1.750)	(1.690)	(1.170)
TREND		-0.005		0.019*
		(-0.860)		(1.780)
BTM		0.004		0.019
		(0.680)		(1.580)
PASTRET		-0.002		0.033***
		(-0.320)		(3.060)
GPQ		0.016***		0.042***
		(2.730)		(3.690)
VOL		-0.016***		-0.060***
		(-2.750)		(-5.420)
AG		0.008		-0.002
		(1.020)		(0.160)
Observations	14,777	12,741	14,591	12,587
Adj R-squared	0.001	0.003	0.000	0.008

Table 9: Regression of equal-weighted market-adjusted returns in relation to anomalies and risk factors. This table shows the results of regressions, testing the relation between equal-weighted market-adjusted returns and scaled decile ranks of earnings acceleration as well as range of other risk factors and anomalies outlined in section 4.4. Every anomaly and risk factor are divided into deciles each quarter and then converted to scaled ranks of -0.5 to 0.5, as described in section 4.4.2. The sample includes all non-utility and non-financial firms listed on the Stockholm Stock Exchange, with accounting figures from 2004-2016. Standard errors are estimated with Newey-West correction for up to six lags. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

Moreover, we find that the gross profit anomaly generates high and significant (1%-level) hedge returns, returning 1.6% on a month-long basis and 4.2% on a quarter-long basis. Thus, it outperforms the earnings acceleration variable in both holding periods. This is a stronger result than the one documented by He and Narayanamoorthy (1.2% and 1.8% respectively). The annualized hedge return of the quarter-long holding window is 17.9%, which is also well above the return Novy-Marx (2013) finds of 8.5%. This suggests that the gross profit anomaly is quite prevalent on the Swedish market and could make for a worthwhile investing strategy.

Two other variables to produce positive returns over the two windows are the book-to-market ratio and market capitalization, however these values are not significantly different from zero. Moreover, in contrast to what is suggested by a majority of previous research on the Swedish market, there seems to exist a significant momentum effect over a quarter-long holding period. The momentum coefficient (PASTRET) for this duration is 3.3%, which is significant at the 1%-level. This is also a direct contradiction to He and Narayanamoorthy results, as they find a negative coefficient that is not significantly different from zero. This showcases the different factors and anomalies at play between the two markets. Another documented anomaly that seems to be present on the Swedish market based on this regression is earnings volatility, which in contrast to the other strategies involves taking a long (short) position in decile 1 (10). As such, the negative and significant coefficients (1%-level) of -1.6% and -6.0%, respectively, should be interpreted as that it yields positive hedge return.

In addition to the tests tabulated in this section, we perform a series of other tests for robustness purposes, found in appendix B. Firstly, we test the performance of a strategy that involves taking position at the last day of the month in which the earnings announcement took place, instead of two days after the announcement. We do this for holding periods of 30-, 60-, 90-, 180-, 270- and 360-days, and find that the strategy is unable to separate future winners from future losers also when employing such a strategy. The long position is once again generating a negative market-adjusted return and there is no significant difference between the market-adjusted return of the top and bottom decile. Secondly, we use value-weighted instead of equal-weighted market-adjusted returns, however, no improvement in performance is found. Thirdly, we test the strategy when excluding all stocks that are not considered large or mid cap according to the current definition on Stockholm Stock Exchange, i.e. has a market capitalization below 150 MEUR, but once again without a significant difference in results. Fourthly, we test the strategy by using a 12-month trailing measure of EPS instead of one based on quarterly earnings. Although this results in a positive hedge return across all EA-measures and both the month- and the quarter-long window, the highest decile is still underperforming and there is no significant difference between the top and bottom decile. Finally, we perform a series of two-way sorting tests between earnings acceleration and other anomalies, some of which are untabulated. With these tests we also examine whether moving from deciles to quintiles have any impact on our results (also see table 13, section 5.3). We observe a slight improvement when using quintiles instead of deciles, however, the difference between the long and short portfolios remains insignificant. Furthermore, the tests do not indicate that earnings acceleration can be explained by a specific documented anomaly in the 30-day window. The only noticeable result is that we see a slight improvement in performance of the earnings acceleration strategy as we move up the PEAD quintiles. However, the only significant difference (at the 10%-level) between the top and bottom earnings acceleration quintile is found within the fourth PEAD quintile. This amounts to 1.6% in the month-long window.

5.2 Other Earnings Anomalies

To further our understanding of anomalies on the Swedish market, we perform additional testing to examine the market-adjusted returns of other earnings anomalies. For anomalies that are based on dividing firms into equal large groups, we use quintiles instead of deciles in this section. This is due to sample size, given that we later in this paper present the results from combining the EA strategy with these anomalies. Using deciles in such a scenario would simply imply too few observations on the Swedish market.

The results from this testing can be seen below in table 10. With the exception of PEAD, we find strong evidence, i.e. positive hedge returns significant at the 1% level for several holding periods, for most of the other anomalies. Moreover, we find that the two strategies that generate the highest hedge returns are the gross profit anomaly and focusing on a combination of profitability and volatility. The gross profit anomaly entails dividing the sample into 5 quintiles based on gross profitability and going long on the highest decile while shorting the lowest decile. Following this strategy, a hedge return of 19.4% can be achieved over a year-long holding period. Similarly, if you follow the strategy of going long on profitable firm that are low in in terms of earnings volatility, whilst shorting non-profitable firms that have a high volatility, it generates a hedge return of 24.2% over a year. The magnitude of the figures 19.4% and 24.2% are significantly larger than what previous research using U.S. data suggests, which in both cases correspond to single-digit numbers (Novy-Marx, 2013; Cao and Narayanamoorthy, 2012). On the contrary to Setterberg (2011a), we can tell that the PEAD strategy is the worst performing of the ones we study, interestingly this is also the anomaly that is closest related to the earnings acceleration strategy. From this one could draw parallels to the poor performance of the earnings acceleration strategy observed in section 5.1. PEAD strategy is for any given holding period, even the longer ones, unable to create a positive hedge return at any commonly accepted level of statistical significance. The returns from table 10 are further evidenced in figure 5, where we plot the anomalies against each other to better visualize hedge returns over different holding periods.

Panel A: PEAD

	Equal-weighted market-adjusted returns					
	30	60	90	180	270	360
Long	-0.010	-0.014	-0.009	-0.006	-0.033	-0.033
Short	-0.009	-0.012	-0.014	-0.026	-0.033	-0.042
Long-Short	-0.001	-0.002	0.005	0.020	-0.001	0.009
	(-0.175)	(-0.276)	(0.540)	(0.919)	(-0.033)	(0.418)

Panel B: PROVOL

	Equal-weighted market-adjusted returns					
	30	60	90	180	270	360
Long	0.002	0.003	0.020	0.035	0.056	0.083
Short	-0.013	-0.028	-0.039	-0.059	-0.111	-0.158
Long-Short	0.015***	0.031***	0.059***	0.094***	0.167***	0.242***
	(4.083)	(6.424)	(8.187)	(5.810)	(8.987)	(15.748)

Panel C: TREND

	Equal-weighted market-adjusted returns					
	30	60	90	180	270	360
Long	0.007	-0.002	0.007	0.014	0.020	0.028
Short	0.000	-0.007	-0.017	-0.026	-0.045	-0.040
Long-Short	-0.007	0.005	0.024***	0.039***	0.065***	0.068***
	(-1.330)	(0.706)	(2.374)	(2.799)	(3.714)	(2.867)

Panel D: GPQ

	Equal-weighted market-adjusted returns					
	30	60	90	180	270	360
Long	0.000	0.000	0.017	0.033	0.053	0.068
Short	-0.015	-0.025	-0.040	-0.051	-0.083	-0.126
Long-Short	0.015***	0.025***	0.057***	0.083***	0.136***	0.194***
	(3.000)	(3.900)	(5.738)	(3.694)	(5.168)	(8.883)

Panel E: Pattern

	Equal-weighted market-adjusted returns					
	30	60	90	180	270	360
Long	0.002	0.003	0.016	0.018	0.020	0.032
Short	-0.011	-0.015	-0.010	-0.010	0.004	-0.011
Long-Short	0.013***	0.018***	0.025***	0.029**	0.017	0.043**
	(2.818)	(2.982)	(2.727)	(2.213)	(0.656)	(2.076)

Table 10: Hedge return of other earnings anomalies. This table presents the equal-weighted market-adjusted return for different strategies based on earnings anomalies on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. For the PEAD, TREND and GPQ strategies the sample is each quarter divided into quintiles, where we go long in the highest quintile and short the lowest quintile. For the PROVOL strategy the sample is divided into 4 groups based on whether or not they are profitable (positive or negative EPS) and if volatility is high or low (higher or lower than the median volatility that quarter). We go long in firms of the group that is profitable and has low volatility, and go short in firms of the group that is non-profitable and high in volatility. For the Pattern strategy we follow the patterns described in section 4.5.1. Here we go long in the first group and short in the fifth group. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

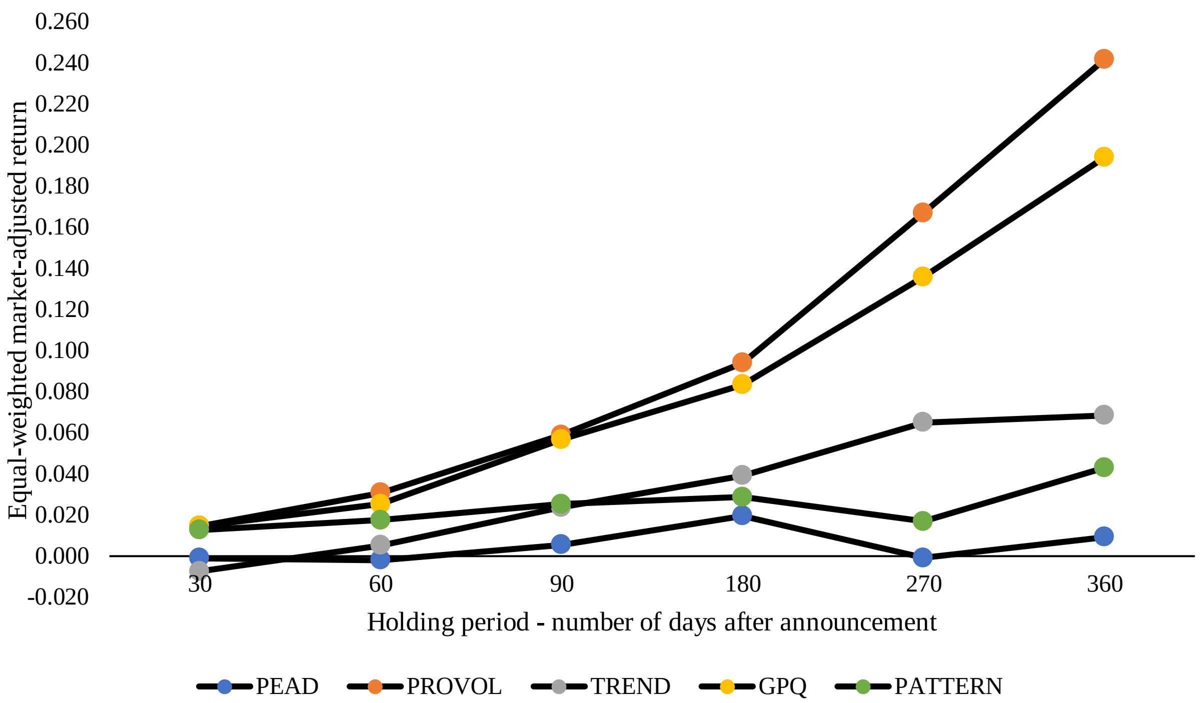

Figure 5: Hedge return of other earnings anomalies. This figure shows the equal-weighted market-adjusted return for different strategies based on earnings anomalies on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Note that the X-axis is not perfectly scaled. The return is from the hedge portfolio of each anomaly, meaning that we take the return from the long strategy less the short strategy. For the PEAD, TREND and GPQ strategies the sample is divided into quintiles, where we go long in the highest quintile and short the lowest quintile. For the PROVOL strategy the sample is divided into 4 groups based on whether or not they are profitable (positive or negative EPS) and if volatility is high or low (higher or lower than the median volatility that quarter). We go long in firms of the group that is profitable and has low volatility and go short in firms of the group that is non-profitable and high in volatility. For the Pattern strategy we follow the patterns described in section 4.5.1. Here we go long in the first group and short in the fifth group.

Upon analyzing the results from table 10, we have summarized the results of optimal holding period in table 11 that also compares our findings to previous research on the U.S. market. We find that the ideal holding period, defined as the holding period that generates the highest annualized hedge return, for most of these anomalies are on the longer term. The shortest period is for the pattern anomaly (described in section 4.5.1) amounting to 30 days. The next shortest holding period is for the PEAD anomaly of 180 days. The corresponding numbers are 270 days for the trend anomaly and 360 days for the gross profit, and the profitability contra volatility strategies. This indicates that earnings anomalies tend to take a longer time on the Swedish market before accumulating returns. This reaffirms the findings of Setterberg (2011a) as she claims that when studying the PEAD anomaly on the Swedish market, the drift effect is more prolonged compared to the U.S. market. Our findings suggest that this prolonged effect may hold true for other earnings anomalies as well. In figure 5, we can see that most anomalies experience a high return post the 180-day mark, with the two notable exceptions being the PEAD and PATTERN strategies. It is important to note that the X-axis is not perfectly scaled in this figure, however this does not affect the conclusions one can draw from it.

Anomaly	U.S. Market	Swedish Market
PEAD	60 days (Bernard and Thomas, 1989)	180 days
PROVOL	90 days (Cao and Narayanamoorthy, 2012)	360 days
TREND	30 days (Akbas et al., 2017)	270 days
GPQ	180 days (Novy-Marx, 2013)	360 days
Pattern	30 days (He and Narayanamoorthy, 2020)	30 days

Table 11: Optimal holding period for other earnings anomalies. Here we detail the ideal holding period for different anomalies. Information regarding the U.S. Market is based on previous literature, and information regarding the Swedish market is based on testing conduced in this study. Optimal holding period is defined as the highest annualized hedge return. Our sample period consists of all non-financial and non-utility stocks on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016.

We also perform the same regression as in section 5.1 of equal-weighted market-adjusted portfolio returns in relation to anomalies including earnings acceleration and risk factors to better understand performance at different holding periods. The results from these tests are presented in table 12. Here we can clearly see that although the earnings acceleration variable generates positive abnormal returns over all but two holding periods, the magnitude of returns as well as the significance level is quite poor, especially in comparison to the results found by He and Narayanamoorthy. A recurring theme throughout our results is that the gross profit and volatility anomalies generate the highest returns, which is again found to be true in this regression, showcasing a return over 360 days of 15.7% and 27.0%, respectively. These anomalies yield the highest returns and are consistently significant at the 1%-level over all holding periods. From this we can deduce that these two anomalies should be highlighted as highly prevalent and potentially profitable on the Swedish market. Although we do not test these anomalies in relation to an asset pricing model, it is highly unlikely that such regression would be able to explain the magnitude of hedge returns which our tests show. Also keeping in line with previous results, we find that the PEAD anomaly is among the worst performing anomalies, again showing that this would not be a worthwhile strategy to purse on the Swedish market.

Interestingly, when comparing the results from these regressions earlier results, we notice that a) the magnitude of the hedge return is in most cases lower and b) the TREND anomaly is less significant. This reaffirms the idea that one need to study these related anomalies simultaneously rather than in isolation. Moreover, we again find that the highest annualized hedge returns for several strategies, including GPQ, VOL and TREND, are found on the longer term (>270 days).

	Equal-weighted market-adjusted returns					
Variables	30	60	90	180	270	360
Constant	-0.004**	-0.005***	-0.002	0.002	0.000	0.000
	(-2.230)	(-2.530)	(-0.700)	(0.330)	(-0.040)	(0.030)
EGP	-0.001	-0.012	-0.004	0.010	-0.011	-0.010
	(-0.090)	(-1.150)	(-0.330)	(0.460)	(-0.380)	(-0.310)
EAP	0.013*	0.019**	0.008	0.007	-0.013	0.013
	(1.820)	(2.030)	(0.700)	(0.380)	(-0.640)	(0.580)
SIZE	0.011	0.016*	0.013	0.015	0.031	0.046
	(1.750)	(1.850)	(1.170)	(0.070)	(0.910)	(1.320)
TREND	-0.005	0.006	0.018*	0.034*	0.053*	0.044
	(-0.860)	(0.880)	(1.780)	(1.730)	(1.940)	(1.290)
BTM	0.004	0.006	0.019	0.051***	0.094***	0.106***
	(0.680)	(0.730)	(1.580)	(2.500)	(3.360)	(3.040)
PASTRET	-0.002	0.013	0.033***	0.042**	0.062***	0.068***
	(-0.032)	(1.570)	(3.060)	(2.090)	(2.600)	(2.410)
GPQ	0.016***	0.021***	0.042***	0.061***	0.100***	0.157***
	(2.730)	(2.920)	(3.690)	(2.530)	(3.380)	(4.630)
VOL	-0.016***	-0.035***	-0.060***	-0.119***	-0.192***	-0.270***
	(-2.750)	(-4.330)	(-5.422)	(-6.170)	(-6.540)	(-7.370)
AG	0.008	0.005	-0.002	0.011	0.067	0.049
	(1.020)	(0.048)	(-0.160)	(0.550)	(1.630)	(1.590)
Observations	12,741	12,741	12,587	12,739	12,737	12,405
R-squared	0.003	0.005	0.008	0.006	0.013	0.026

Table 12: Regression of equal-weighted market-adjusted returns in relation to anomalies and risk factors. This table shows the results of a regression testing the relation between equal-weighted market-adjusted returns and scaled decile ranks of earnings acceleration as well as range of other risk factors and anomalies outlined in section 4.4. The columns represent different holding periods ranging from a month to a year. The sample includes all non-utility and non-financial firms listed on the Stockholm Stock Exchange 2004-2016. Standard errors are estimated with Newey-West correction for up to six lags. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

5.3 Combining the Earnings Acceleration Strategy with Other Earnings Anomalies

In this section we aim to find out if we can further build on the earnings acceleration strategy to enhance its performance, which we attempt to do by combining the earning acceleration with other earnings anomalies. The idea of combining two strategies, is that one takes a long (short) position only in firms where both strategies give buy-(sell-)signal. Thus, the number of positions taken is fewer, which is why we use quintiles instead of deciles.

Panel A: EAP						
	Equal-weighted market-adjusted returns					
	30	60	90	180	270	360
Long	-0.005	-0.007	-0.011	-0.011	-0.043	-0.037
Short	-0.014	-0.017	-0.013	-0.017	-0.024	-0.049
Long-Short	0.008	0.010	0.002	0.006	-0.019	0.012
	(1.497)	(1.398)	(0.227)	(0.297)	(0.769)	(0.555)
Panel B: EAP combined with PEAD						
	Equal-weighted market-adjusted returns					
	30	60	90	180	270	360
Long	-0.011	-0.015	-0.015	-0.009	-0.049	-0.042
Short	-0.012	-0.015	-0.012	-0.020	-0.019	-0.042
Long-Short	0.001	0.000	-0.003	0.011	0.030	0.000
	(0.069)	(0.026)	(-0.242)	(0.317)	(0.789)	(0.001)
Panel C: EAP combined with PROVOL						
	Equal-weighted market-adjusted returns					
	30	60	90	180	270	360
Long	0.002	-0.002	0.035	0.040	0.096	0.156
Short	-0.017	-0.024	-0.026	-0.055	-0.074	-0.149
Long-Short	0.020*	0.023	0.061**	0.094***	0.170**	0.305***
	(1.791)	(1.605)	(2.312)	(2.729)	(2.079)	(5.651)
Panel D: EAP combined with TREND						
	Equal-weighted market-adjusted returns					
	30	60	90	180	270	360
Long	-0.016	-0.008	-0.009	-0.023	-0.027	-0.033
Short	-0.012	-0.030	-0.033	-0.057	-0.084	-0.092
Long-Short	-0.004	0.022	0.024	0.003	0.057	0.059
	(-0.362)	(1.540)	(1.254)	(1.307)	(1.554)	(1.313)
Panel E: EAP combined with GPQ						
	Equal-weighted market-adjusted returns					
	30	60	90	180	270	360
Long	-0.008	-0.013	-0.001	0.020	0.043	0.061
Short	-0.028	-0.045	-0.056	-0.086	-0.075	-0.182
Long-Short	0.020*	0.032**	0.054***	0.106***	0.118	0.242***
	(1.609)	((2.210)	(2.752)	(3.742)	(1.208)	(5.784)
Panel F: EAP combined with PATTERN						
	Equal-weighted market-adjusted returns					
	30	60	90	180	270	360
Long	-0.007	-0.010	-0.002	-0.031	-0.047	-0.042
Short	-0.017	-0.020	-0.007	-0.012	0.010	-0.022
Long-Short	0.010	0.010	0.005	-0.019	-0.057	-0.020
	(1.100)	(0.828)	(0.233)	(-0.723)	(-0.958)	(-0.457)

Table 13: Combining EAP with other anomalies. This table presents the equal-weighted market-adjusted return for the earnings acceleration strategy when combined with other earnings anomalies on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. EAP is divided into quintiles and is combined with the PEAD, TREND and GPQ strategies, which are also divided into quintiles. We go long (short) in firms that is in the highest (lowest) quintile of both (one is not enough) EAP and accompanying anomaly. For the PROVOL strategy the sample is divided into 4 groups based on whether or not they are profitable (positive or negative EPS) and on if volatility is high or low (higher or lower than the median volatility that quarter). We go long in the group that is profitable, low in volatility and in the highest quintile of EAP, and go short in the group that is non-profitable, high in volatility and in the lowest quintile of EAP. For the Pattern strategy we follow the patterns described in section 4.5.1. Here we go long in firms with the first pattern group that is also in the highest quintile of EAP and short in the fifth group that is also in the lowest quintile of EAP. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

The results of combining the earnings acceleration strategy with other anomalies are presented in table 13, with Panel A showing the results of just the earnings acceleration strategy for reference. Again, the results are presented over different holding periods. The results show that the strategy could be greatly enhanced by combining it with the gross profit anomaly, as returns increase impressively over all holding periods. Over a year-long holding period the hedge returns amount to 24.2%. Incorporating the combination of profitability and volatility also improves the return significantly, with a corresponding year-long return of 30.5%. Interestingly, when incorporating both PROVOL and GPQ, the hedge return is higher than solely using EA for all holding periods. To some degree this is expected, given that we in previous results have seen that these anomalies perform well in our sample. However, what is interesting is that the returns also improve for both the GPQ and the PROVOL strategies when incorporating earnings acceleration. For example, the 360-day hedge return increased from 19.4% and 24.2% to 24.2% and 30.5% for GPQ and PROVOL, respectively.

In contradiction to He and Narayanamoorthy (2020), we find that focusing on certain earnings growth patterns can negatively affect the performance of the strategy. We observe a slight but insignificant increase in magnitude in the short run up until the 90-day holding period, while for the holding periods longer than this we see that the return drops of and becomes negative. We also find that a market-adjusted return actually decreases when the earnings acceleration strategy is combined with the PEAD strategy, only exceptions being in the 180-day and the 270-day windows. Lastly, we observe a slight but insignificant improvement using TREND.

Table 14 shows the result of two-way sorting between the earnings acceleration strategy and selected anomalies with a holding period of 30 days. The aim of these tests is to perform robustness tests in relation to other anomalies i.e. test whether the EA anomaly is a manifestation of another anomaly. The reason we decide to examine the 30-day holding period in more detail is that previous results show that this holding period return the strongest results for the earnings acceleration strategy (see table 12). We delve deeper into the gross profit anomaly and studying the profitability and volatility of firms as previous testing show that these two strategies return the highest and most significant returns of the anomalies we examine.

The result of our testing is interesting as we find that although both GPQ and PROVOL are significant in isolation, they are not as strong as expected when controlling for earnings acceleration. Instead we find that significance and magnitude of the hedge returns generated from these strategies vary throughout each earnings acceleration quintile and that most values are not significantly different from zero at even the 10%-level. Therefore, our results indicate that the EAP variable does in fact have some bearing on the hedge returns achieved.

Panel A: Two-way sorting EAP and GPQ									
			EAP quintiles						
		GPQ effect	Lowest	2	3	4	Highest	Highest-Lowest
GPQ	Lowest	0.015***	-0.280***	-0.008	-0.002	0.010	-0.023***	0.005
		(3.408)	(-3.255)	(-0.794)	(-0.147)	(0.945)	(-2.683)	(0.411)
	2	0.001	-0.005	-0.015***	-0.006	-0.003	0.002	0.008
		(0.033)	(-0.746)	(-3.869)	(-1.238)	(-0.717)	(0.341)	(0.764)
	3	0.002	-0.014***	-0.001	0.002	0.011	0.001	0.014
		(0.634)	(-2.412)	(-0.127)	(0.682)	(1.524)	(0.085)	(1.139)
	4	0.002	0.000	-0.004	-0.002	0.005	0.016	0.017
		(0.536)	(-0.023)	(-0.890)	(-0.608)	(1.182)	(0.839)	(0.799)
	Highest	0.000	-0.005	-0.001	0.002	0.008*	-0.008	0.007
		(0.991)	(-0.649)	(-0.174)	(0.561)	(1.833)	(-1.140)	(0.290)
	Highest-Lowest	0.015***	0.023	0.007	0.003	0.002	0.015	
		(2.999)	(1.711)	(0.679)	(0.385)	(0.219)	(1.272)	

Panel B: Two-way sorting EAP and PROVOL								
			EAP quintiles					
Profitability	Volatility	Group effect	Lowest	2	3	4	Highest	Highest-Lowest
High	Low	0.002	-0.016***	0.003	0.001	0.006**	0.002	-0.018*
		(1.439)	(-2.759)	(1.059)	(0.766)	(2.270)	(0.320)	(-1.826)
Low	Low	-0.005	-0.014*	-0.012*	-0.015*	0.022*	0.008	-0.023
		(-0.912)	(-1.852)	(-1.694)	(-1.756)	(1.703)	(0.410)	(-1.182)
High	High	-0.004**	-0.007	-0.007***	-0.004	-0.001	-0.004	0.002
		(-2.281)	(-1.576)	(-2.666)	(-1.496)	(-0.265)	(-1.043)	(0.399)
Low	High	-0.013***	-0.017***	-0.012	0.023	0.004	-0.019***	-0.002
		(-3.124)	(-2.702)	(-1.270)	(1.196)	(0.378)	(-2.410)	(-0.160)
	Highest-Lowest	0.015***	0.002	0.016**	-0.021***	0.002	0.021*	
		(4.083)	(0.124)	(2.013)	(-2.487)	(0.236)	(1.861)	

Table 14: Two-way sorting. Here two-way sorting tables are presented between the equal-weighted market-adjusted return for an earnings acceleration-based strategy and selected anomalies or strategies on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Positions are taken 2 days after earnings announcement and held for 30 days. EAP and GPQ are divided into quintiles each quarter based on magnitude. For the PROVOL strategy the sample is divided into 4 groups based on whether or not they are profitable (positive or negative EPS) and if volatility is high or low (higher or lower than the median volatility that quarter). Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

5.4 An Alternative Strategy Based on Earnings Acceleration

In section 5.1 we replicate the main tests performed by He and Narayanamoorthy (2020) and concluded that with few exceptions, the results indicate that an earnings acceleration strategy based on taking a long (short) position in the highest (lowest) decile was highly unsuccessful on the Swedish stock market 2004-2016. However, we find some indication through table 9 and 14 that the earnings acceleration strategy could in fact have a positive association with future market-adjusted returns. Furthermore, we notice that the poor performance we observe in section 5.1 is largely driven by poor performance in the long position, which across multiple holding periods and asset pricing models performed worse than the short position. Overall, the results indicate that the market reacted negatively to the average company earnings announcement in the extreme earnings acceleration deciles, independent of being positive (decile 10) or negative (decile 1). With this in mind, we alter the strategy described by He and Narayanamoorthy and divide companies into three groups based on earnings acceleration decile ranks as follows:

Group 1: Extreme decile ranks – 1 and 10

Group 2: Lower half of decile ranks – 2 to 5

Group 3: Upper half of decile ranks – 6 to 9

In this section, we aim to test the performance of a strategy, from here on referred to as EAP_G, that is based on taking a long position in Group 3 and a short position in Group 1. We argue that the reasoning behind such strategy is that investors in Sweden overreact to extreme earnings acceleration announcements, regardless of being positive or negative, while the positive association with future return indicate that the measure provide value-relevant information that investors can exploit in decile 6-9. We acknowledge that this raises concerns of data-snooping, however, we test the strategy using two different sub-sample periods to mitigate such concerns. Also, we do not interpret any potential abnormal return as market mispricing, but rather aim to test if earnings acceleration provides value-relevant information.

In table 15, we present the results for equal-weighted market-adjusted returns for this strategy using six different holding periods. For visualization, we also include figure 5 further below that shows the same results in a different format (note that the X-axis is not perfectly scaled in this figure). The results indicate that the long (short) portfolio across all holding periods produce positive (negative) market-adjusted returns. For the short portfolio the negative market-adjusted return is consistently significant at the 1%-level, while the long portfolio produces a significant (at least 5%-level) market-adjusted return in all durations except the 60-days window. Furthermore, the difference in market-adjusted return between the two portfolios is significant at the 1%-level across all holding periods, ranging from 2.1% for the 30-day window to 13.3% for the 360-day window. The 30-day holding period produce the largest annualized hedge return of approximately 28.3%. These returns are greater than the ones generated by He and Narayanamoorthy (2020) of 18.2%, albeit this relates to an altered earnings acceleration strategy.

	Equal-weighted market-adjusted returns					
EAP_G	30	60	90	180	270	360
Lowest	-0.016***	-0.022***	-0.026***	-0.047***	-0.077***	-0.094***
	(-3.637)	(-4.056)	(-3.263)	(-4.423)	(-6.327)	(-5.6855)
2	-0.006***	-0.005	0.001	0.004	0.014	0.013
	(-3.722)	(-2.204)	(0.443)	(0.926)	(1.252)	(1.610)
Highest	0.004**	0.003	0.007**	0.023***	0.020***	0.039***
	(2.173)	(1.052)	(2.2575)	(2.371)	(3.120)	(4.889)
Highest-	0.021***	0.025***	0.033***	0.070***	0.097***	0.133***
Lowest	(4.923)	(4.720)	(4.600)	(4.516)	(7.806)	(8.187)

Table 15: Equal-weighted market-adjusted return for different holding periods. This table present the equal-weighted market-adjusted return for an earnings acceleration-based strategy on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Portfolios are constructed based on dividing companies into earnings acceleration deciles each quarter. Group 1 (lowest) consists of firms in the deciles 1 and 10, group 2 includes decile 2-5, and group 3 (highest) decile 6-9. The strategy involves taking a long position in group 3 and a short position in group 1. Positions are taken two days after the earnings announcement date and held for 30, 60, 90, 180, 270 and 360 days, respectively. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

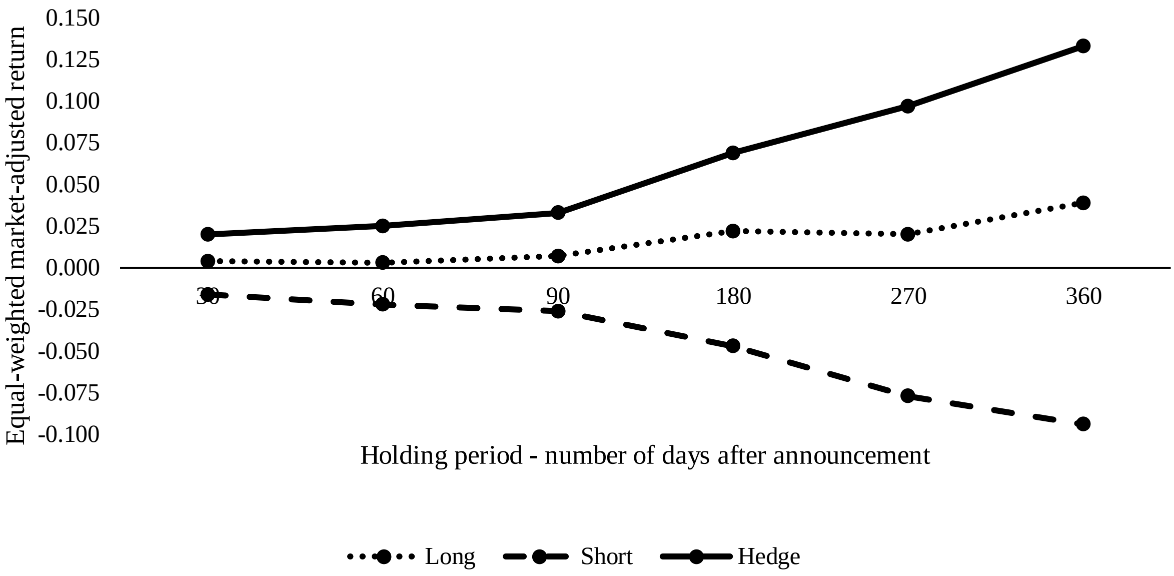

Figure 6: Equal-weighted market-adjusted return for different holding periods. This table presents the equal-weighted market-adjusted return for an earnings acceleration-based strategy on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Note that the X-axis is not scaled. Portfolios are constructed based on dividing companies into earnings acceleration deciles each quarter. Group 1 consists of firms in the deciles 1 and 10, group 2 includes decile 2-5, and group 3 decile 6-9. The strategy involves taking a long position in group 3 and a short position in group 1. The hedge position is simply the long position minus the short position. Positions are taken two days after the earnings announcement date and held for 30, 60, 90, 180, 270 and 360 days, respectively.

This indicates that the use of an earnings acceleration inspired strategy could generate positive abnormal returns on the Swedish market. Another interesting note is that for holding periods shorter than 180 days, the hedge return is largely driven by returns from the short portfolio.

Of course, the implementability of the revised strategy we outline is questionable. Going short in decile 10 does speak directly against previous literature, as it should in theory be the best performing decile. The fact that this decile consistently produces negative market-adjusted returns could indicate that investors on the Swedish market overreact to high movements in earnings acceleration no matter the direction. Nevertheless, we find that given how counter intuitive this revised strategy is, it is sensible to divide our sample up over two equally long periods to examine whether these results are robust over time rather than sample-specific. The results from this testing is presented in table 16. Our results indicate that the strategy works over both time periods, and that although the more recent period generates slightly larger returns over all holding periods, we still see that the positive hedge returns are consistently significant at the 1%-level throughout both timespans and all six holding periods. Also, with only one exception, 60-day horizon in sub-sample 1 (Q1 2004 to Q2 2010), the long portfolio produces a positive market-adjusted return. Overall, the results indicate that the earnings acceleration variable is value relevant on the Swedish market. Moreover, given our portfolio selection criteria, this reaffirms our suspicions that the Swedish market tends to react negatively to extreme earnings acceleration measures, and also that there is a prolonged reaction for above average earnings acceleration measures.

	Equal-weighted market-adjusted returns							
	Q1 2004 – Q2 2010				Q3 2010 – Q4 2016			
Holding period	Lowest	2	Highest	Highest - Lowest	Lowest	2	Highest	Highest - Lowest
30	-0.013***	-0.005**	0.004	0.016***	-0.019***	-0.007***	0.005*	0.024***
	(-2.527)	(-2.087)	(1.310)	(3.150)	(-2.746)	(-3.143)	(1.734)	(3.825)
60	-0.025***	-0.011***	-0.005	0.020***	-0.021***	0.000	0.009***	0.029***
	(-3.848)	(-3.304)	(-1.415)	(2.922)	(-2.436)	(-0.008)	(2.399)	(3.723)
90	-0.029***	-0.005	0.003	0.032***	-0.024*	0.006	0.011***	0.035***
	(-3.624)	(0.875)	(0.574)	(3.804)	(-1.839)	(1.379)	(2.369)	(3.097)
180	-0.054***	-0.008	0.005	0.060***	-0.042***	0.014**	0.036**	0.078***
	(-4.610)	(-1.157)	(0.848)	(4.814)	(-2.502)	(2.212)	(2.219)	(3.010)
270	-0.079***	-0.023	0.002	0.081***	-0.075***	0.043**	0.034***	0.109***
	(-5.226)	(-0.272)	(0.232)	(5.052)	(-4.140)	(2.267)	(3.699)	(5.996)
360	-0.087***	-0.022**	0.018*	0.105***	-0.101***	0.043***	0.056***	0.156***
	(-4.456)	(-2.238)	(1.669)	(5.055)	(-3.919)	(3.442)	(4.918)	(6.455)

Table 16: EAP_G in two different sample periods. This table present the equal-weighted market-adjusted return for an earnings acceleration-based strategy on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Results are reported in two different sample periods, each covering 26 quarters. Portfolios are constructed based on dividing companies into earnings acceleration deciles each quarter. Group 1 (lowest) consists of firms in the deciles 1 and 10, group 2 includes decile 2-5, and group 3 (highest) decile 6-9. The strategy involves taking a long position in group 3 and a short position in group 1. Positions are taken two days after the earnings announcement date and held for 30, 60, 90, 180, 270 and 360 days, respectively. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

For further robustness regarding the performance of the revised earnings acceleration strategy, we perform regressions of monthly excess portfolio returns for a holding period of 30-, 90- and 180- days, respectively, reported in table 17. The long portfolio yields a positive abnormal return in all six regressions, but the significance level varies across holding period and asset pricing model. It is only significant at the 1% level for the 180-days holding period using Fama-French three factor model and the 90-days holding period using Carhart four factor model. It is significantly positive at least at the 10%-level in five of the six regressions.

A similar story could be made with regard to the short portfolio, which although it produces a negative abnormal return in all six regressions, have varying significance. It performs the weakest (lowest alpha) in the 30-day holding period, with monthly abnormal returns of -1.9% and -1.2% using the Fama-French and Carhart models, respectively. The corresponding returns for the long portfolio are 1.0% in both asset pricing models, although it is only significant when using the Fama-French three factor model. Noticeably, the hedge portfolio produces a positive and significant abnormal return (1%-level) in the 30-days and 180-days holding period using both asset pricing models. Although it is only using the Fama-French model in the 30-day window where the abnormal return is significant above Harvey et al. (2016) suggested t-statistic hurdle of 3.0. In the 30-day window, an investor is able to generate a monthly abnormal return somewhere between 2.3% to 2.8%, when employing a strategy as described in this section on the Swedish market. This corresponds to annualized abnormal returns of 31.4% and 39.3%, respectively. The comparable figures from He and Narayanamoorthy research are 19.6% and 19.5%. For the 180-day holding period, the annualized abnormal returns are in the range of 23.9% to 29.8%. We notice that the RMRF-coefficient is very low in the 180-day short portfolio regression, which could indicate some kind of error. However, if it was higher, the abnormal return would have been even larger for the hedge portfolio.

Panel A: Month-long holding period						
	Position Long		Position Short		Position Hedge	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.010**	0.010	-0.019***	-0.012*	0.028***	0.023***
	(1.980)	(1.390)	(-2.560)	(-1.830)	(3.970)	(2.700)
RMRF	0.747***	0.748***	1.050***	1.039***	-0.184	-0.153
	(8.280)	(7.620)	(5.970)	(6.130)	(-1.120)	(-0.980)
SMB	0.541	0.541	0.996***	0.997***	-0.299**	-0.323**
	(0.920)	(0.730)	(8.420)	(8.460)	(-2.040)	(-2.300)
HML	0.128	0.130	0.009	-0.333	0.025	0.302
	(0.920)	(0.730)	(0.040)	(-1.470)	(0.080)	(1.130)
MOM		0.002		-0.286		0.236
		(0.020)		(-2.540)		(1.430)
Observations	132	132	134	134	124	124
Adj R-squared	0.412	0.407	0.345	0.371	0.007	0.036
Panel B: Quarter-long holding period						
	Position Long		Position Short		Position Hedge	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.002*	0.003***	-0.004	0.000	0.005	0.002
	(1.950)	(2.510)	(-0.770)	(-0.060)	(0.950)	(0.430)
RMRF	0.797***	0.793***	0.759***	0.743***	0.043	0.055
	(19.440)	(19.800)	(7.960)	(8.130)	(0.440)	(0.560)
SMB	0.683***	0.679***	0.997***	0.983***	-0.309***	-0.299***
	(11.470)	(11.760)	(11.560)	(11.090)	(-2.650)	(-2.460)
HML	-0.014	-0.062	0.284***	0.097	-0.296**	-0.158
	(-0.260)	(-1.140)	(2.450)	(0.760)	(-2.250)	(-1.190)
MOM		-0.041**		-0.156***		0.116***
		(-2.110)		(-3.300)		(2.560)
Observations	159	159	159	159	159	159
Adj R-squared	0.550	0.565	0.864	0.866	0.056	0.069
Panel C: Half year-long holding period						
	Position Long		Position Short		Position Hedge	
Variables	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.009***	0.011**	-0.011**	-0.012*	0.018***	0.022***
	(2.360)	(2.230)	(-2.120)	(-1.920)	(2.750)	(2.740)
RMRF	0.819***	0.810***	0.455***	0.457***	0.319**	0.297**
	(8.610)	(8.120)	(2.940)	(3.010)	(2.130)	(2.050)
SMB	0.621***	0.616***	0.490	0.491	0.058	0.042
	(5.830)	(5.500)	(1.340)	(1.350)	(0.140)	(0.011)
HML	-0.255	-0.344*	0.699***	0.713**	-0.901***	-1.134***
	(-1.880)	(-1.770)	(2.550)	(2.230)	(-2.700)	(-2.760)
MOM		-0.075		0.012		-0.199*
		(-0.520)		(0.130)		(-1.650)
Observations	165	165	162	162	162	162
Adj R-squared	0.189	0.186	0.210	0.205	0.052	0.062

Table 17: Monthly excess return regressions. The table presents the results of calendar time series monthly excess equal-weighted portfolio return regressions for an earnings acceleration-based strategy on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Portfolios are constructed based on dividing companies into earnings acceleration deciles each quarter. Position Long is a long position in firms in earnings acceleration deciles 6-9. Position Short is a short position in firms in earnings acceleration deciles 1 and 10. Position Hedge is the combined hedge portfolio i.e. Long minus Short. All positions are taken the last day of the month in which the earnings announcement took place and then held for 30, 90 and 180 days, respectively. For each position and holding period, we run two regression, first using the Fama-French Three Factor Model and second using the Carhart Four Factor Model. The factors were retrieved from the Swedish House of Finance, and the methodology for how these were calculated are reported in section 4.3. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

Like in section 5.1, we run a series of robustness tests to strengthen the validity of our results. These are tabulated in Appendix C. When employing a monthly rebalancing adjustment to the strategy, the equal-weighted market-adjusted hedge returns are of the same magnitude as in the main strategy for holding periods of 30-, 60-, 90-, 180-, 270- and 360-days, respectively. The difference in market-adjusted returns between the long and the short portfolio is also significant at the 1%-level across all these time spans. Furthermore, when using value-weighted instead of equal-weighted market-adjusted returns, our conclusions remain largely intact although the size of the returns reduce quite significantly. In the 180- and 360- day window these amount to 3.3% and 3.9%, respectively, compared to 9.7% and 13.3% in our primary testing. They are still, however, significant at the 1%-level. Moreover, we test the new strategy using the two other measures of earnings acceleration (EAA and EAV) and with the exception of EAV in the 360-day window, we find that the strategy is able to create a positive hedge return, significant at the 1%-level. Once again, we also test the performance of the strategy when excluding firms with market capitalization lower than 150 MEUR. Similar to when using value-weighted market-adjusted returns, we observe a decrease in magnitude of the hedge returns, but the difference between the long and short portfolio remain positive and significant at the 1%-level. Finally, we test the strategy when calculating EAP based on 12-trailing EPS instead of quarterly EPS. Interestingly, we find that the hedge return is similar for holding periods up to 180 days, while it increases slightly for 270-day window. The difference in market-adjusted returns between the long and the short portfolio is also significant at the 1%-level across all these time spans when using 12-month trailing EPS.

6. Concluding Remarks, Limitations and Future Research

6.1 Conclusions

Given that we aim to explore whether an investor can use earnings acceleration to construct a viable trading strategy, we begin by replicating many of the tests performed by He and Narayanamoorthy (2020). This involves taking a long (short) position in firms within the highest (lowest) earnings acceleration decile. In contrast to previous research, we are not able to observe any clear progressive increase in market-adjusted returns as we move from the lowest to the highest decile. Also, for six different holding periods (30, 60, 90, 180, 270 and 360 days) the long portfolio underperforms the short portfolio, with the only exception being 30- and 60-day windows. Furthermore, we test the strategy in relation to risk factors as well as related anomalies. With regard to risk factors, the hedge position generates a negative but insignificant abnormal return in the Fama-French model and in the Carhart model as well as for both the 30- and 90-days holding periods. This is largely driven by underperformance in the long portfolio which regardless of asset pricing model generates negative abnormal return in both windows, significant at least at the 5% level. However, we find a positive and significant earnings acceleration coefficient when together with a range of other anomalies and risk factors performing regressions of 30- and 60-day equal-weighted market-adjusted returns. Still, several other anomalies, including gross profit, past earnings volatility and momentum have larger and more significant association with future returns. This raises slight concerns of whether the strategy is a manifestation of an already known anomaly. Lastly, we perform a battery of robustness tests including change of EPS measure, using quintiles rather than deciles, exclusion of small stocks, calendar month rebalancing and using value-weighted instead of equal-weighted portfolio returns. With few smaller exceptions, all our tests indicate that an earnings acceleration strategy as described by He and Narayanamoorthy (2020) was highly unsuccessful on the Swedish Market during the time period 2004-2016

Thereafter, we move on to focusing on five previously documented earnings anomalies, namely PEAD, profit trend, earnings growth patterns, gross profitability, and a combination of profitability and earnings volatility (PROVOL). We find strong support for all except PEAD's existence on the Swedish market, particularly PROVOL and gross profit, and interpret these results as indications of market mispricing. Although we do not perform any risk-adjustments using asset pricing models for these anomalies, the magnitude of the hedge return is so large that it is unlikely to be fully explained by incorporating risk factors. Interestingly, in line with previous research on the Swedish market, we find a more prolonged return period with the PEAD, profit trend, gross profit and PROVOL anomalies having a longer optimal holding period compared to previous findings on the U.S. market.

Having shown that several previously documented anomalies are able to separate future winners and future losers on the Swedish stock market, we construct tests of whether the earnings acceleration strategy can be enhanced through combining it with these anomalies. For these tests, we employ quintiles instead of deciles due to sample size. The idea of combining two strategies, is that one takes a long (short) position only in firms where both strategies give buy-(sell-)signal. Overall, our findings suggest that there is large opportunity for improvement, especially for longer holding periods. The strategy is especially strong when combining it with either gross profit or PROVOL. For example, the strategy can be enhanced from an annualized hedge return of 1.2% to 30.5% in the 360-day window when combining it with the PROVOL anomaly.

Having ruled out the viability of a trading strategy that is based on taking a long (short) position in firms within the highest (lowest) earnings acceleration decile, we construct an alternative strategy based on earnings acceleration decile ranks. This involves taking a long position in decile ranks 6-9 and short position in the extreme decile ranks 1 and 10. We argue that the reasoning behind such strategy is that investors in Sweden overreact to extreme EA announcements, regardless of being positive or negative, while the positive association with future return indicate that the measure provide value-relevant information that investors can exploit in decile 6-9. To rule out data-mining concerns, we show that this strategy have been successful for two different sub-sample periods, generating a positive hedge return significant at the 1%-level for six different holding periods in both samples. Thereafter we perform risk-adjustment regressions, in which the hedge portfolio produced a positive and significant abnormal return (1%-level) in the 30-days and 180-days holding period using both the Fama-French and the Carhart factor models. In the 30-day window, an investor is able to generate a monthly abnormal return somewhere between 2.3% to 2.8%, which corresponds to annualized abnormal returns of 31.4% and 39.3%, respectively. When using the Fama-French model in this window, the abnormal return is also significant above Harvey et al. (2016) suggested t-statistic hurdle of 3.0. For the 180-day holding period, the annualized abnormal returns are in the range of 23.9% to 29.8%. Again, we perform a series of robustness tests, which largely confirms our conclusions although the magnitude of returns decreased with exclusion of small market capitalization stocks. Given that we constructed this strategy and that it thus could be sample-specific, we do not interpret the results as indication of market mispricing but rather that earnings acceleration provides value-relevant information.

Hypothesis	Description	Support
H1	Investors can earn a significant abnormal return using a strategy based on taking a long (short) position in the highest (lowest) earnings acceleration decile	None
H2	The abnormal returns generated by the earnings acceleration strategy cannot be fully explained by other known anomalies including PEAD, BTM, SIZE, GPQ, VOL, TREND, MOM and AG	Moderate
H3	Returns from the earnings acceleration strategy can be enhanced by going long (short) in firms with high (low) profitability and low (high) earnings volatility	Strong
H4	Returns from the earnings acceleration strategy can be enhanced by going long in pattern 1 firms and short in pattern 5 firms	None
H5	The earnings acceleration strategy is able to generate abnormal returns after making implementability adjustments, including calendar month rebalancing and exclusion of low market capitalization stocks	None
H6	The anomalies PEAD, TREND, GPQ, PATTERN, and PROVOL are able to separate future winners and future losers	Strong[2]
H7	In comparison to what previous findings on the U.S. market suggests, the optimal holding period for earnings anomalies including earnings acceleration is longer	Strong
H8	The long position contributes significantly more to portfolio returns for earnings anomalies including earnings acceleration	None
H9	The magnitude of the abnormal returns in the earnings acceleration strategy is smaller than in He and Narayanamoorthy (2020)	None

Table 18: Summary results of the hypotheses. In this table we summarize our analyses of the results in relation to our nine hypotheses. No support is defined as that a vast majority of tests are unable to find significant support for the hypothesis. Moderate support means that testing indicate statistical significance, however, there is a lack of robustness or signs of inconsistency. With strong support a vast majority of testing is able to find significant support for the hypothesis. For all definitions, the significance-level is also considered.

6.2 Limitations and Suggestions for Future Research

We have a number of suggestions for future research within the topic of earnings-related stock market anomalies and more specifically earnings acceleration that is beyond the scope of this paper. First, we notice that earnings-related anomalies other than PEAD have received limited attention on the Swedish market. In this paper, our results indicate that not least the gross profitability anomaly and a strategy combining profitability and earnings volatility seem to be successful on this market. However, this requires additional testing e.g. asset pricing model regressions in order to validate our results and rule out the possibility of a risk-based explanation behind their presence. Such research could also potentially support our

[2] PEAD being the exception

found indication that there exists market mispricing on the Swedish market, which investors can exploit in a simple manner. Second, we exhort research to focus on explanations behind these anomalies, including an explanation of why the optimal holding period seem to be significantly longer in Sweden compared to the U.S market. That could, for example, involve tests regarding analyst forecasts, investor underreaction and behavioral finance. Third, given that any conclusion regarding market mispricing is partly a factor of asset pricing model (joint hypothesis problem), we encourage research to include tests in relation to the Fama and French five-factor model, which is a limitation of our paper especially since that model includes a profitability factor. Fourth, we acknowledge that our revised earnings acceleration could be sample-specific given that He and Narayanamoorthy (2020) find different results, particularly in the highest earnings acceleration decile. As such, there is both a need for additional studies on the Swedish market with a different sample period as well as studies on other markets.

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Appendices

Appendix A. Thomson Reuter's Datastream

Sector
Alternative energy
Banks
Electricity
Gas, water and multiutilities
Life insurance
Non-life insurance
Real estate investment and services
Real estate investment trust

Table 19: Sector names. List of Thomson Reuter's Datastream's sector names excluded in our sample building

Variable ID	Variable Name
RI	Total Return Index
P	Price – Trade
WC05905A	Earnings per share report date fiscal period end
WC10010A	Earnings per share basic fiscal
WC18264A	Trailing twelve months earnings per share
WC08001A	Market Capitalization
WC09304A	Price/book value ratio close
WC01001A	Net sales or revenue
WC01051A	Cost of goods sold (excl depreciation)
WC02999A	Total assets
WC01751A	Net income available to common
WC05192A	Common shares used to calculate basic EPS
WC05491A	Book value outstanding shares fiscal

Table 20: Variable list. Variables collected from Thomson Reuter's Datastream

Appendix B. Additional Tests Related to Section 5.1

EAP deciles	Equal-weighted market-adjusted rebalancing returns (EMAR_RR)					
	30	60	90	180	270	360
Lowest	-0.015***	-0.029***	-0.035***	-0.037	-0.065	-0.080
	(-2.770)	(-4.266)	(-4.202)	(-2.101)	(-3.234)	(-2.570)
2	-0.009***	-0.011*	-0.008	-0.006	0.014	0.018
	(-2.337)	(-1.918)	(-0.844)	(-0.550)	(0.361)	(0.537)
3	-0.007**	-0.009**	-0.009	-0.014	-0.008	0.005
	(-2.197)	(-2.110)	(-1.565)	(-1.480)	(-0.645)	(0.287)
4	0.001	0.004	0.009	0.027***	0.025**	0.040***
	(0.280)	(0.939)	(1.546)	(2.787)	(2.039)	(2.452)
5	-0.001	0.001	0.007	0.009	0.018**	0.020*
	(-0.304)	(0.123)	(1.167)	(1.327)	(2.001)	(1.798)
6	0.007***	0.006	0.009**	0.018***	0.033***	0.045***
	(2.450)	(1.563)	(2.025)	(2.427)	(2.755)	(3.230)
7	0.005*	0.006	0.004	0.013	0.022**	0.032**
	(1.803)	(1.412)	(0.654)	(1.514)	(2.046)	(2.301)
8	0.005	0.005	0.005	0.022**	0.028*	0.050***
	(1.236)	(0.870)	(0.619)	(2.109)	(1.899)	(2.704)
9	0.007	0.006	0.007	0.040	0.007	0.029
	(1.357)	(0.824)	(0.961)	(1.094)	(0.477)	(1.614)
Highest	-0.011**	-0.020***	-0.031***	-0.060***	-0.084***	-0.102***
	(-2.179)	(-3.061)	(-3.843)	(-5.270)	(-5.471)	(-5.515)
Highest-	0.004	0.009	0.004	0.023	-0.020	-0.022
Lowest	(0.479)	(0.942)	(0.325)	(-1.058)	(-0.788)	(-0.606)

Table 21: Monthly Rebalancing. This table present the equal-weighted market-adjusted return for an earnings acceleration-based strategy on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Portfolios are constructed based on dividing companies into earnings acceleration deciles each quarter. The strategy involves taking a long position in decile 10 and a short position in decile 1. Positions are taken at the last day of the month in which the earnings announcement took place and held for 30, 60, 90, 180, 270 and 360 days, respectively. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

EA deciles	One-month market-adjusted returns (EMAR)			Quarter-long market-adjusted returns (EMARQ)		
	EAP	EAA	EAV	EAP	EAA	EAV
Lowest	-0.006	0.004	-0.005	0.003	-0.006	-0.007
	(-1.395)	(0.794)	(-1.276)	(0.370)	(-0.737)	(-1.086)
2	-0.007*	-0.010***	-0.003	-0.018***	-0.012*	-0.004
	(1.746)	(-2.538)	(-1.024)	(-2.526)	(-1.662)	(-0.527)
3	-0.002	-0.003	0.002	0.002	-0.001	-0.003
	(-0.709)	(-0.933)	(0.556)	(0.317)	(-0.096)	(-0.497)
4	0.000	0.001	-0.001	0.009	0.005	0.005
	(-0.106)	(-0.270)	(-0.261)	(1.462)	(0.794)	(0.699)
5	-0.001	0.006	-0.004	0.004	0.007	0.011
	(-0.414)	(1.582)	(-1.116)	(0.582)	(1.186)	(1.620)
6	0.004	0.001	0.005	0.012*	0.014***	0.014**
	(1.349)	(0.167)	(1.202)	(1.807)	(2.357)	(2.113)
7	0.008**	0.005	0.009***	0.016***	0.019***	0.180***
	(2.241)	(1.638)	(2.456)	(2.530)	(2.943)	(2.628)
8	0.008**	0.010***	0.009**	0.015**	0.012*	0.021***
	(1.963)	(2.549)	(2.267)	(2.164)	(1.947)	(2.492)
9	0.009***	0.007	0.002	0.005	0.004	0.016*
	(2.675)	(1.630)	(0.515)	(0.669)	(0.478)	(1.901)
Highest	-0.007*	-0.005	0.002	-0.008	0.008	-0.020***
	(-1.659)	(-1.091)	(0.396)	(-0.848)	(0.919)	(-2.695)
Highest-	-0.001	-0.008	0.007	-0.012	0.014	-0.012
Lowest	(-0.181)	(-1.311)	(1.172)	(0.894)	(1.172)	(-1.280)

Table 22: Exclusion of small stocks. This table reports the average market-adjusted returns for equally-weighted portfolios based on each quarter dividing firms into earnings acceleration deciles on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016.. All stocks with a market capitalization below 150 MEUR are excluded. The returns are reported according to the measure of earnings acceleration used, and results are displayed over a short window (one-month long), and a long window (quarter-long). Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively

EA deciles	One-month market-adjusted returns (EMAR)			Quarter-long market-adjusted returns (EMARQ)		
	EAP	EAA	EAV	EAP	EAA	EAV
Lowest	-0.018***	-0.011***	-0.009*	-0.033***	-0.015*	-0.010
	(-3.308)	(-2.786)	(-1.899)	(-3.737)	(-1.906)	(-1.163)
2	-0.005	-0.004	-0.010***	-0.003	-0.004	-0.020***
	(-1.320)	(-1.005)	(-2.802)	(-0.375)	(-0.602)	(-3.426)
3	-0.005	-0.009***	-0.007**	0.003	-0.011*	-0.002
	(-1.253)	(-2.663)	(-1.965)	(0.477)	(-1.654)	(-0.360)
4	-0.003	0.005	0.000	-0.004	0.009	-0.007
	(-1.339)	(1.002)	(-0.021)	(-0.740)	(0.737)	(-1.197)
5	0.001	-0.008***	-0.005	-0.002	-0.002	-0.005
	(0.181)	(-2.411)	(-1.351)	(-0.363)	(-0.341)	(-0.945)
6	0.003	0.001	0.000	0.011**	0.008	0.017***
	(1.041)	(0.329)	(0.095)	(2.267)	(1.191)	(2.478)
7	0.000	-0.004	0.000	0.007	-0.003	0.000
	(-0.015)	(-1.214)	(0.115)	(1.455)	(-0.541)	(0.074)
8	0.003	0.003	-0.002	0.010*	0.004	0.002
	(1.099)	(0.805)	(-0.619)	(1.776)	(0.502)	(0.310)
9	0.003	-0.002	-0.001	-0.001	0.004	0.009
	(0.542)	(-0.446)	(-0.251)	(-0.158)	(0.561)	(0.698)
Highest	-0.014**	-0.003	-0.002	-0.005	-0.001	-0.005
	(-2.168)	(-0.710)	(-0.455)	(-0.336)	(-0.110)	(-0.578)
Highest-	0.005	0.008	0.006	0.028*	0.014	0.005
Lowest	(0.575)	(1.309)	(0.897)	(1.648)	(1.299)	(0.434)

Table 23: 12-Month Trailing EPS. This table reports the average market-adjusted returns for equally-weighted portfolios based on each quarter dividing firms into earnings acceleration deciles on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. The returns are reported according to the measure of earnings acceleration used, and results are displayed over a short window (one-month long), and a long window (quarter-long). Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively

	One-month market-adjusted returns (VMAR)			Quarter-long market-adjusted returns (VMARQ)		
EA deciles	EAP	EAA	EAV	EAP	EAA	EAV
Lowest	-0.018***	0.009***	-0.002	-0.022***	-0.013***	-0.012***
	(-10.441)	(5.258)	(-0.695)	(-7.006)	(-6.125)	(-8.787)
2	-0.003**	-0.001	0.005***	0.009***	-0.017***	0.007***
	(-2.041)	(-0.361)	(4.818)	(4.322)	(-9.619)	(4.955)
3	-0.004**	-0.012***	-0.008***	-0.015***	-0.005***	-0.026***
	(-2.158)	(-15.720)	(-13.188)	(-10.470)	(-2.924)	(-16.536)
4	0.001	-0.001	-0.002***	0.006***	0.004***	0.002
	(1.176)	(-1.272)	(-2.503)	(4.250)	(2.961)	(1.229)
5	0.002***	-0.001	-0.001	0.001	-0.011***	-0.001
	(2.665)	(-0.969)	(-1.183)	(0.284)	(-10.522)	(-0.277)
6	0.004***	0.003***	-0.004***	-0.004***	0.003**	-0.001
	(6.056)	(4.089)	(-5.020)	(-2.653)	(2.307)	(-0.610)
7	0.003***	0.008***	0.007***	0.000	0.009***	0.005***
	(5.097)	(11.136)	(10.780)	(0.065)	(7.567)	(3.430)
8	0.004***	0.004***	0.005***	0.002	0.017***	0.003
	(6.187)	(3.999)	(6.723)	(1.173)	(6.490)	(1.510)
9	0.009***	0.003***	0.011***	0.020***	0.004*	0.009***
	(11.045)	(2.605)	(17.471)	(7.869)	(1.897)	(5.575)
Highest	-0.014***	-0.007***	0.001*	-0.032***	-0.010***	-0.002
	(-10.796)	(-5.948)	(1.767)	(-12.445)	(-4.881)	(-1.181)
Highest-	0.003	-0.017***	0.003	-0.009**	0.003	0.010***
Lowest	(1.479)	(-7.648)	(1.152)	(-2.225)	(1.011)	(4.693)

Table 24: Value-Weighted portfolio returns. This table reports the average market-adjusted returns for valued-weighted portfolios based on each quarter dividing firms into earnings acceleration deciles on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. The returns are reported according to the measure of earnings acceleration used, and results are displayed over a short window (one-month long), and a long window (quarter-long). Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

			EAP quintiles					
		TREND effect	Lowest	2	3	4	Highest	Highest-Lowest
TREND	Lowest	0.001	-0.012	-0.003	0.001	0.012	0.002	0.014
		(0.081)	(-1.433)	(-0.452)	(0.166)	(1.167)	(0.118)	(0.807)
	2	-0.006***	-0.015*	-0.006	-0.006*	0.005	-0.011	0.004
		(-2.552)	(-2.084)	(-1.519)	(-1.798)	(0.973)	(-1.493)	(0.398)
	3	-0.001	-0.017**	-0.004	0.001	0.005	0.011	0.027*
		(-0.215)	(-1.990)	(-0.971)	(0.331)	(1.201)	(0.871)	(1.821)
	4	-0.005*	-0.019***	-0.005	0.001	0.002	-0.010	0.009
		(-1.944)	(-2.545)	(-0.774)	(0.362)	(0.450)	(-1.534)	(0.910)
	Highest	-0.007**	-0.008	-0.006	-0.003	0.007	-0.016**	-0.008
		(-2.300)	(-1.039)	(-1.197)	(-0.525)	(1.073)	(-2.241)	(-0.744)
	Highest-Lowest	-0.007	0.004	-0.003	-0.004	-0.005	-0.018	
		(-1.330)	(0.340)	(-0.359)	(-0.469)	(-0.446)	(-1.069)	

Table 25: EA and TREND two-way sorting. This table reports the average market-adjusted returns for equally-weighted portfolios based on each quarter dividing firms into earnings acceleration and TREND quintiles. The calculation of these measures is outlined in section 4.4. Accounting figures cover the period 2004-2016 and the sample includes all non-financial and non-utility stocks on the Stockholm Stock Exchange. The returns are calculated over a short window (one-month long). Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

			EAP quintiles					
		PEAD effect	Lowest	2	3	4	Highest	Highest-Lowest
PEAD (EGP)	Lowest	-0.009**	-0.012***	-0.013**	-0.016	-0.008	0.009	0.021
		(-2.265)	(-2.423)	(-2.107)	(-1.358)	(-0.830)	(0.390)	(1.390)
	2	-0.005***	-0.009	-0.004	-0.009***	-0.001	0.000	0.009
		(-2.404)	(-1.307)	(-1.106)	(-2.467)	(-0.184)	(-0.006)	(0.683)
	3	0.001	-0.011	-0.004	-0.001	0.010**	0.011	0.022
		(0.365)	(-0.999)	(-0.978)	(-0.632)	(2.224)	(0.829)	(1.273)
	4	0.004	-0.016*	0.000	0.010**	0.007	0.000	0.016*
		(1.457)	(-1.783)	(0.026)	(2.294)	(1.789)	(0.034)	(1.636)
	Highest	-0.010***	-0.023***	-0.008	0.020	0.005	-0.011**	0.012
		(-2.858)	(-2.805)	(-0.671)	(0.915)	(0.601)	(-2.292)	(1.135)
	Highest-Lowest	-0.001	-0.011	0.005	0.036	0.013	-0.020	
		(-0.175)	(-1.126)	(0.387)	(1.560)	(0.970)	(-1.345)	

Table 26: EA and PEAD two-way sorting. This table reports the average market-adjusted returns for equally-weighted portfolios based on each quarter dividing firms into earnings acceleration and PEAD quintiles. The calculation of these measures is outlined in section 4.4. Accounting figures cover the period 2004-2016 and the sample includes all non-financial and non-utility stocks on the Stockholm Stock Exchange. The returns are calculated over a short window (one-month long). Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

Appendix C. Additional Tests Related to Section 5.4

EAP decile groups	Equal-weighted market-adjusted rebalancing returns (EMAR_RR)					
	30	60	90	180	270	360
Lowest	-0.013***	-0.025***	-0.033***	-0.049***	-0.074***	-0.091***
	(-3.512)	(-5.207)	(-5.695)	(-4.559)	(-5.871)	(-4.981)
2	-0.004***	-0.004	0.000	0.004	0.012	0.020*
	(-2.421)	(-1.615)	(-0.139)	(0.8515)	(1.124)	(1.947)
Highest	0.006***	0.006**	0.006*	0.023***	0.022***	0.039***
	(3.102)	(2.107)	(1.957)	(2.352)	(3.433)	(4.816)
Highest-Lowest	0.019***	0.030***	0.039***	0.072***	0.096***	0.129***
	(5.021)	(5.956)	(6.441)	(4.536)	(7.530)	(7.531)

Table 27: Monthly Rebalancing EAP_G. This table present the equal-weighted market-adjusted return for an earnings acceleration-based strategy on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Portfolios are constructed based on dividing companies into earnings acceleration deciles each quarter. The strategy involves taking a long position in decile ranks 6-9 and a short position in decile 1 and 10. Positions are taken at the last day of the month in which the earnings announcement took place and held for 30, 60, 90, 180, 270 and 360 days, respectively. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

EA decile groups	180-days market-adjusted returns (VMAR180)			360-days market-adjusted returns (VMAR360)		
	EAP	EAA	EAV	EAP	EAA	EAV
Lowest	-0.034***	-0.011***	-0.008***	-0.049***	-0.032***	0.006***
	(-16.173)	(7.702)	(-5.981)	(-12.608)	(-15.368)	(2.890)
2	-0.004***	-0.013***	-0.008***	-0.007***	-0.013***	-0.018***
	(-6.623)	(-19.459)	(-13.271)	(-7.275)	(-12.593)	(-18.108)
Highest	-0.001	0.003***	-0.001***	-0.010***	-0.008***	-0.013***
	(-1.271)	(4.558)	(-2.403)	(-9.322)	(-8.560)	(-15.398)
Highest-Lowest	0.033***	0.014***	0.006***	0.039***	0.023***	-0.019***
	(18.228)	(10.121)	(5.438)	(12.677)	(11.620)	(-9.977)

Table 28: Value-weighted returns EAP_G. This table present the value-weighted market-adjusted return for an earnings acceleration-based strategy on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Portfolios are constructed based on dividing companies into earnings acceleration deciles each quarter. The strategy involves taking a long position in decile ranks 6-9 and a short position in decile 1 and 10. Positions are taken two days after each earnings announcement. The returns are reported according to the measure of earnings acceleration used, and results are displayed over a 180-day window (one-month long), and 360-day window (quarter-long). Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

EAP decile groups	Equal-weighted market-adjusted returns (EMAR)					
	30	60	90	180	270	360
Lowest	-0.007**	-0.005	-0.003	-0.013	-0.008	-0.011
	(-2.150)	(-1.260)	(-0.381)	(-1.454)	(-0.677)	(-0.776)
2	-0.003	-0.004	-0.001	0.011**	0.015***	0.024***
	(-1.583)	(-1.367)	(-0.257)	(2.320)	(2.349)	(2.465)
Highest	0.007***	0.009***	0.012***	0.016***	0.027***	0.030***
	(4.136)	(3.539)	(3.494)	(2.843)	(3.153)	(3.151)
Highest-Lowest	0.014***	0.014***	0.015**	0.029***	0.035***	0.041***
	(4.201)	(3.046)	(2.177)	(2.861)	(2.380)	(2.445)

Table 29: Exclusion of small stocks EAP_G. This table present the equal-weighted market-adjusted return for an earnings acceleration-based strategy on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Portfolios are constructed based on dividing companies into earnings acceleration deciles each quarter. All stocks with a market capitalization below 150 MEUR are excluded. The strategy involves taking a long position in decile ranks 6-9 and a short position in decile 1 and 10. Positions are taken two days after each earnings announcement. The results are displayed over holding period of 30-, 60-, 90-, 180-, 270- and 360-days period. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.

EAP decile groups	Equal-weighted market-adjusted returns (EMAR)					
	30	60	90	180	270	360
Lowest	-0.016***	-0.024***	-0.019**	-0.043***	-0.086***	-0.099***
	(-3.824)	(-4.327)	(-2.255)	(-3.723)	(-7.022)	(-5.801)
2	-0.003*	-0.004	-0.002	0.002	0.018	0.024***
	(-1.924)	(-1.554)	(-0.416)	(0.459)	(1.525)	(2.690)
Highest	0.002	0.001	0.007***	0.025***	0.025***	0.034***
	(1.283)	(0.246)	(2.431)	(2.514)	(4.015)	(4.700)
Highest-Lowest	0.018***	0.024***	0.026***	0.068***	0.111***	0.133***
	(4.764)	(4.822)	(3.618)	(4.189)	(9.034)	(8.399)

Table 30: 12-month trailing EPS EAP_G. This table present the equal-weighted market-adjusted return for an earnings acceleration-based strategy on the Stockholm Stock Exchange, with accounting figures from the time period 2004-2016. Portfolios are constructed based on dividing companies into earnings acceleration deciles each quarter. The earnings acceleration is calculated using 12-month trailing EPS. The strategy involves taking a long position in decile ranks 6-9 and a short position in decile 1 and 10. Positions are taken two days after each earnings announcement. The results are displayed over holding period of 30-, 60-, 90-, 180-, 270- and 360-days period. Two-sided t-statistics are reported in parentheses. The symbols ***, **, and * show statistical significance at the 1%-, 5%- and 10%-level, respectively.