UNIVERSITY OF GOTHENBURG
SCHOOL OF BUSINESS, ECONOMICS AND LAW

Return Differences on the Swedish Stock Market When Incorporating Different Value-Factors

Viktor Lindström and Johan Hellström

Supervisor: Aineas Mallios

Contact information:

Viktor Lindström: guslinvih@student.gu.se

Johan Hellström: gusheljok@student.gu.se

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Graduate School, School of Business Economics and Law at the University of Gothenburg

Abstract

In this paper, we investigate the predictability in stocks return on the Swedish equity market between 2006 and 2017. Answering the question, what is the differences in using Fama-French three-factor model when applying different constructed portfolios? Previous literature examines this topic on the American stock market. Since the American market differ from the Swedish, for instance in terms of size, supply of securities and liquidity, we found it intriguing to investigate if the same outcome occurs on the Swedish market. We use Fama-French three-factor model regressions for 21 portfolios, sorted on earnings-to-price and book-to-price individually as well as combining them both. Also, we conduct a GRS-test to compare the different sets of regressions and evaluate the performance. We find that the earnings-to-price ratio enhances the return predictability on the Swedish stock market. Further, we conclude that the joint sorted portfolios do not describe the stock returns more accurately than the earnings-to-price or the book-to-price ratio used individually.

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Contents

1 Introduction

The continuous evaluation for accurate description regarding the variability in stock returns has been a million-dollar question for researchers in many years. Yet, there are several different asset pricing models that have been tested over the years, but still, none of the most widely models are able to predict stock returns accurately. Previous studies, such as Fama and French (1992, 1995) and Penman and Reggiani (2013), state that there are several different factors that impact the stock returns. Sharpe (1964) and Lintner (1965), providers of the CAPM model, indicated that there shall be a linear relationship between the expected returns and the market risk for the respective securities. Also, Fama and French (1992, 1995) concluded that additional external factors such as size and value ratios of firms fundamentals shall affect returns. However, there is evidence that other external factors, such as asymmetric information and market inefficiency also affect the market returns, yet these are not incorporated into the most widely used asset pricing models (Easley and O'hara, 2004; Fama and Malkiel, 1970). Moreover, recent studies among Penman and Reggiani (2013) as well as Asness et al. (2015) found evidence that the Fama and French (1992, 1996) models yields the best results by combining the book-to-price (B/P) ratio and the earnings-to-price (E/P) ratio as value ratios, also stating that other quantitative variables shall be incorporated.

In this paper, we investigate the predictability in stocks returns on the Swedish equity market between 2006 and 2017. Fama and French (1992, 1995) focus on using the B/P ratio when constructing the Fama-French models. However, the value effect could be measured by different fundamental ratios. Based on studies in later years, applying the Fama-French models, constructing portfolios by jointly considering E/P and B/P may enhance the results (Penman and Reggiani, 2013, 2018; Asness et al., 2015). In the light of these more recent studies, we aim to investigate if the same outcome is detected for the Swedish stock market. Considering the B/P and E/P ratios jointly, may imply in an innovation of the traditional fundamental ratios, hence this may contribute with a new way of analyzing stocks and hopefully enhance the returns. We proceed this paper by trying to answer the question, what is the differences in using Fama-French three-factor model when applying different constructed portfolios? More precisely portfolios constructed based on E/P and B/P ratios individually as well as portfolios constructed using them both jointly. Previous literature is divergent in their findings (Fama and French, 1992, 1995; Penman and Reggiani, 2013, 2018; Asness et al., 2015). However, one common subject is that all relevant previous literature examines this on the American stock market. Henceforth, we found it interesting to investigate this topic on the Swedish equity market. The Swedish market is rather smaller than the American stock market in terms of size, supply of securities, liquidity and also in terms of analyst coverings. Therefore, we found it intriguing to investigate if these among other differences applies in similarities or distinctions on the Swedish stock market.

In order to conduct this analysis, we use the above mentioned portfolios in the Fama-French three-factor model. We conclude that the E/P ratio outperforms the B/P ratio when used as value ratio. Thus, our results are not in line with Fama and French (1992, 1995) findings on the US market, which argues that the B/P ratio yields the best result. Further, the expansion of the model using the joint portfolios enhance the results with respect to the magnitude of the excess return (alpha). Thus, implies that investors that seeking for attractive risk-adjusted returns shall be tilted towards pure value-stocks or towards stocks that are value-neutral but consist of high profitability. However, we further conduct a GRS-test to detect potential differences among the regressions conducted in this paper. The results of the GRS-test show that using the jointly sorted portfolios do not enhance the ability to capture the variations in the excess returns in the Fama-French three-factor model. Accordingly, contradicting Penman and Reggiani's (2018) findings. Therefore, we are able to conclude that the Fama-French three-factor model yields the best predictability using the E/P ratio rather than the B/P ratio or a combination of them both, when applied on the Swedish stock market.

2 Literature Review

This section covers previous studies that have been prominent within this topic and that also have contributed to further research and knowledge on the subject. Moreover, the different aspects and conclusions regarding these studies are crucial in order for us to answer proceed our analysis.

Fama and French (1992, 1995) analyzed the relationship of different firm characteristics and their respective stock returns. They found specific results regarding past returns when incorporating the size effect in the Fama-French models. Accordingly, Fama and French (1992, 1995) states that the size of the firm is negatively correlated with its stock returns. Hence, indicating that small-cap stocks outperform large-cap stocks over time. Moreover, other external factors are analyzed. When including the fundamental ratio book-to-market (B/P) in their model, Fama and French (1992, 1995) found evidence that stocks with high B/P ratio is most commonly associated with abnormal expected returns due to the ”value” effect. Arguing that those securities is priced at an irrational level and thereby states that the B/P ratio is positively associated with expected returns. Fama and French (1992,1995,1996) further analyzed different fundamental ratios as potential value effect and also found evidence that the E/P ratio predict returns. In addition, Fama and French (1992, 1995) concluded that the B/P ratio is a more accurate predictor for large-cap stocks while the E/P ratio is more accurate for small-cap stocks. This is due to different risk exposure, among volatility in the fundamentals and also due to liquidity risks. Hence, Fama and French (1992, 1995) stated that securities consisting of high E/P and B/P ratios are associated with superior returns.

Asness et al. (2015) identified different facts and fictions about value investing strategies. The authors found evidence that value investing strategies work best in conjunction with other factors, which may show the risk-based explanations for value. This is most properly measured by multiple variables rather than single fundamental ratios. These evidence are found by replicating Fama and French's (1992, 1995) different factor models, in the time frame of 1963 until 2013 on the American market. Furthermore, Asness et al. (2015) argued that the value factor (HML) in Fama and French (1992, 1995) models is redundant, implying the other incorporated factors in the model explain the entire return for the value factor (HML). However, Asness et al. (2015) further argued that the value measurement is useful, but it is important to bear in mind that lagged prices gives an unfair explanation of the effect. Since, Fama and French (1992, 1995) incorporated 6-12 month lagged prices, there may be differences. This is further proved when Asness et al. (2015) constructs an alternative model of Fama and French's (1992, 1995) by adjusting the value factor and incorporate one months lagged prices instead. The results from this factor is seen as positive instead of negative.

Asness et al. (2015) further ran isolated tests using the value ratios, B/P, E/P and cash flow-to-price (C/P). All results showed consistency across the different metrics and produced positive returns. However, when combining the value factors (HML) with momentum in the Fama French model, the returns improved significantly and also showed less variation. Hence, Asness et al. (2015) argued once again that different value ratios predict returns and that returns predictability shall be measured by combining variables.

Kok, Ribando and Sloan (2017) further discussed different value investing strategies. Historically, value strategies have been provided as a simple and efficient strategy for achieving superior returns and outperforming the market by identifying underpriced securities. However, Kok et al. (2017) stated that previous strategies do not use a comprehensive approach to identify temporarily underpriced securities and have actually systematically failed to incorporate this. Further, they analyzed the performance of the value factor from Fama and French (1992, 1995), based on the B/P ratio on the American market between 1926 and 2015. Kok et al. (2017) found small evidence that value strategies deliver superior returns, the major reason is that the undervalued securities systematically tend to identify securities with inflated accounting numbers. For example, securities identified by the B/P ratio tend to be associated with overstated book values that are being written down, implying a negative effect on earnings. Also, the trailing E/P ratio identifies securities with temporarily high earnings that tend to decline over time due to higher degree of subsequent one-off charges that negatively impact the net earnings. Hence, in order to detect inflated accounting numbers Kok et al. (2017) argued that the standard Fama and French (1992, 1995) models shall be combined with momentum, quality and profitability measures in order to avoid "value traps". However, it is important to bear in mind that Fama and French (1992, 1995) incorporated six months lagged prices while Kok et al. (2017) used non-lagged prices which may mislead the result.

Penman and Reggiani (2013) investigated if the earnings yield (E/P) and the B/P ratio predict stock returns on the US market between 1963 and 2006. By analyzing stock prices, book value of equity and earnings before extraordinary items, Penman and Reggiani (2013) strengthened their hypothesis that prediction of stock returns is most accurately done through analyzing the E/P and B/P ratio jointly. According to Penman and Reggiani (2013), standard formulas show that investors required return equals the earnings yield (E/P). This is consistent with the notion since expected future earnings are uncertain and comes with risk, hence, the E/P ratio is seen as the price of purchasing future earnings that are considered as risk. Furthermore, it is also seen that given the forecast of the B/P ratio, the E/P ratio do incorporate both the future expected earnings growth and the future returns that are given by the E/P ratio. Therefore, the B/P and E/P ratio has a positive relation in cross sections as the earnings yield has a positive relation with consequent returns. However, important to mention is that for the given earnings yield, the B/P ratio further identifies growth that the market tend to price as higher future returns (Penman and Reggiani, 2013).

Penman and Reggiani (2013) further found evidence that the earnings yield do predict returns, in line with findings of Basu (1977). The results are consistent with the notion that future expected earnings are risky and that current stock prices discounts future risk. In addition, their major result imply that the B/P ratio indicate that future returns are correlated with expected growth in earnings. This is since for a given earnings yield (E/P), the B/P ratio yield extra expected returns, thus explaining that the B/P ratio implying risky growth. Thus, Penman and Reggiani (2013) argued that prediction of expected returns is best examined by jointly using the B/P and E/P ratio. This is the case since the expected returns do incorporate the riskiness of the growth and thereby identifying potential value traps.

Moreover, Penman and Reggiani (2018) further investigated this topic in order to provide further evidence and explanations. Given the E/P ratio, a high B/P ratio imply that future growth may not be reached, hence a high B/P stock may be considered as cheap, however it is a risk that those stocks could be a value trap. In addition, Penman and Reggiani (2018) observed that the B/P ratio predict returns for small companies while the E/P ratio is more accurate at predicting returns for large-cap companies due to the different risk exposure. Their results are derived from historical average annual returns on the US stock market from 1963 until 2015.

Furthermore, Penman and Reggiani (2018) created portfolios jointly sorted on the E/P and B/P ratio. Firstly, companies are ranked and sorted based on their E/P ratio, from highest to lowest, than within each of the subgroups they are further sorted on the B/P ratio, also from highest to lowest, and thereby they incorporated the risk of future earnings growth. These results are similar to what Penman and Reggiani (2013) found regarding using E/P and B/P jointly. Penman and Reggiani (2018) concluded that purchasing value stocks may lead to purchasing risky earnings and increasing the risk of falling into the value trap. This is since a lower return on equity implies a higher B/P ratio, therefore cheap value stocks could be classified as low-quality firms with a low profitability. Thus, investors shall be aware of the risk of value stocks.

3 Theoretical Framework

This section covers description, findings and challenges regarding the most applied asset pricing models used to evaluate and predict returns. Also, other aspects that may impact the returns but yet are not incorporated as variables in the asset pricing models are further discussed.

3.1 Asset pricing models

The CAPM-Model is predominately the most used asset pricing model and was founded by William Sharpe (1964) and John Lintner (1965). Their findings are derived from the model on portfolio optimization by Markowitz (1991). The purpose with the CAPM model is to find an optimal portfolio in terms of expected return and risks. The Sharp-Lintner standard CAPM-model:

$$E[R_i] = R_f + \beta(E[R_m] - R_f) \tag{1}$$

where $E[R_i]$ is the expected stock return for the individual security i, R_f is the risk-free rate and $E[R_m]$captures the expected market return. $Beta$ defines the risk of the individual securities compared to the market risk. For instance, a beta value higher than one indicate that the individual security is more volatile and riskier than the market, while a security with a beta of less than one, fluctuate less than the market and thereby is less risky.

Fama and French (1992, 1995) argued that the CAPM model was based on several unrealistic assumptions and that it did not incorporate external factors that may impact the expected returns. Fama and French (1992, 1995) analyzed the covariance between returns and two external factors, size and value. The value factor, high-minus-low (HML), is measured in terms of the firm's book value of common equity, to the market value. Hence, high B/P stocks are referred to as cheap "value" securities. While the size factor, small-minus-big (SMB), is the difference between the return of small-cap stocks and large-cap stocks. In general, Fama and French (1992, 1995) provided evidence that value-stocks and small-cap stocks outperformed the market. The Fama-French three-factor model is defined as the following:

$$R_{it} - R_f = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \epsilon \tag{2}$$

where R_{it} is the return for individual securities, R_f is the risk-free rate. SMB defines the return differences among small and large corporations and HML defines the return differences based on the value factor, in this case the book-to-price ratio. $Alpha$ is the intercept, also referred to as the excess return, and $Beta$ indicate the slope coefficients.

However, as several studies, among them Titman et al. (2004), Novy-Marx (2013) and Asness et al. (2015) found results regarding the incompleteness of the Fama-French three-factor model in equation. They argued that where a high amount of missing variations in average returns that are related to the firm's investments and profitability. Further, they argued that profitable firms generate higher returns on their investments, which increases the likelihood of higher returns regardless the size of the firm. Moreover, Titman et al. (2004) found evidence that firms with a higher degree of capital investments tend to generate future abnormal returns, as higher capital investments increases the likelihood of a higher sustainable growth rate. Following this Fama and French (2015) extended the three-factor model by incorporating the profitability and capital investments as external factors.

3.2 Market efficiency

The efficient market hypothesis has been one of the essentials motions in finance. Fama and Malkiel (1970) concluded that in an efficient financial market, prices do always reflect the available information. Hence, in accordance with the findings of Fama and Malkiel (1970), the average investor are not able to outperform the market benchmark over time. Thereby, suggesting that it would be more efficient to hold a market portfolio. Fama (1965) also distinguish regarding three different types of stale information. Firstly, the weak-form efficiency indicate that it is impossible to earn abnormal risk-adjusted profits based on the available information of past prices and returns. The semi-strong form of the theory states that investors are unable to earn abnormal risk-adjusted returns by using any public information. Furthermore, the strong-form of the theory states that investors are unable to earn abnormal risk-adjusted returns since insider information leaks and incorporates in the market prices. However, Fama and French (1992, 1996) found evidence that small growth-stocks as well value-stocks deliver superior returns. Also, Basu (1977) concluded that superior returns are achievable when analyzing the predictability of the P/E ratio and security prices. Basu (1977) further concluded that the available information was not fully reflected in the security prices and that the security prices lagged the available information. Thus, Fama and French (1992, 1996) as well as Basu (1977) findings contradict the market efficient theory.

Grossman and Stiglitz's (1980) considered that asymmetric information has a crucial role within the financial markets as it exhibits that one of the parties in a transaction could have an information advantage over the counterpart, which whom could take advantage on in the trade. Thereby creating inefficient markets. Further, Easley and O'hara (2004) concluded that there are multiple corporate decisions that affect the capital structure of the firm, which are unknown for outside investors. This could potentially increase the cost of capital for firms, thus increasing the required return for outside investors regardless of their knowledge. Hence, increased asymmetric information shall impact security prices. However, none of these factors are incorporated when determining the required return in asset pricing models. For instance, in the models created by Fama and French (1992, 1995). Easley and O'hara (2004) further argued that the differences among public and private information do impact the cost of capital, where investors demand higher returns in order to keep stocks with a higher degree of private information, this is due to that more informed investors are quicker to re-balance their portfolio weights in order to incorporate new information.

Moreover, Easley and O'hara (2004) developed an asset pricing model where they found evidence that the available information impacts the required returns and that private information shall be considered as a systematic risk that investors shall require compensation for. In addition, Easley and O'hara (2004) concluded that firms may affect their cost of capital by influencing the quantity and rigor of the available information. For instance, the choice of accounting standards as well as active analyst coverings of the firm's stock could reduce the cost of capital. Yet, these factors are not incorporated in asset pricing models which may be one of several reasons why superior excess returns can be achieved.

4 Hypotheses

In this paper we aim to investigate the return differences and its underlying components when applying different constructed portfolios in the Fama-French three-factor model. This is done by adjusting the fundamental value ratio in order to detect any possible relationship singularly or jointly. Hence, we aim to find evidence regarding the different models and ratios that may disclose which of the models that predict the returns most accurately.

Previous literature within this subject is divergence. Fama and French (1992, 1995, 1996) found evidence that value and small-cap stocks deliver superior returns. In addition, Fama and French (1992, 1996) concluded that the B/P ratio is the most accurate value ratio to incorporate when evaluating returns. However, more recently Asness et al. (2015) instead argued that the E/P ratio captures the returns in the Fama-French three-factor model at best due a higher capturing of the risk-premium. Furthermore, Penman and Reggiani (2018) stated that the value ratios shall be estimated commonly due to a higher visibility in case of purchasing risky growth.

Based on previous literature, we found the following two hypotheses interesting, which shall be tested in order to answer our research question:

H1: Earnings-to-price ratio enhances the return predictability, compared to book-to-price ratio, in the Fama-French three-factor model on the Swedish stock market.

H2: Earnings-to-price and book-to price considered jointly describes the stock returns on the Swedish stock market better than earnings-to-price and book-to price considered individually.

5 Data and Methodology

This section covers data descriptions, variable definitions as well as methods used to derive our results. Further, we discuss the constructions of the Fama-French factors and the respective portfolios used in our regressions. The sample data in this paper covers companies listed on the Swedish stock market between 2006 and 2017. Important to mention is that our sample contain less companies and a shorter time period than the previous studies mentioned in the literature review segment, such as Penman and Reggiani (2018). Hence, this may lead to potential differences compared to previous studies. We use this time period due to a lack of consistent data on fundamentals of the Swedish companies before 2006 and non sufficient data for the period after 2017.

The required data for our analysis are daily stock prices, shares outstanding, book value of equity and net earnings, all items are retrieved from the Compustat global database (WRDS). From the initial data set we first excluded companies without any available data for stock prices, shares outstanding, equity and earnings. This is in line with previous studies, such as Fama and French (1992) and Penman and Reggiani (2018). Moreover, we also excluded companies that solely consists of negative equity or earnings. In addition, the Swedish stock market consists of several companies with multiple traded securities, the initial data set contained all different types of shares, such as A-class and B-class shares. In order to prevent the issue and risk of incorporating duplicate observations, the share with the highest trading volume was kept in the final data set (most often the B-share). In total, this gave us a data set of 899 companies and 1 324 799 observations in total.

Further, following the process of Fama and French (1995) we, each year, only included companies that exist when the year started. Lastly, we excluded companies with stock prices less than 0.9 SEK. The results were first conducted including companies with stock prices below 0.9 SEK, this yields a similar result. However, in the final data set, companies with such a small stock price were excluded following the process of data collection used by Penman and Reggiani (2013). This is in order to avoid large standard deviation in returns of the companies with such a low stock price. This gave us a final data sample of 605 companies over the 12 year time-period and 966 182 observations in total.

Year	Freq.	Percent	Cum.
2006	59,289	6.14	6.14
2007	64,956	6.72	12.86
2008	64,748	6.70	19.56
2009	72,132	7.47	27.03
2010	77,991	8.07	35.10
2011	79,095	8.19	43.28
2012	78,712	8.15	51.43
2013	79,916	8.27	59.70
2014	82,840	8.57	68.28
2015	92,217	9.54	77.82
2016	106,116	10.98	88.80
2017	108,170	11.20	100.00
Total	966,182	100.00	

Table 1: Overview of the total frequency in our sample data, estimated over the 12-years time period. The frequency is in absolute value while the percent and cumulative percentage are stated in basis points.

After the initial cleaning of the data, some of the observations for earnings and equity were detected as missing values. In order to adjust for this, these missing variables were set equal to the company mean of the variable in question. In addition, outliers in the final data sample were taken into consideration by using the ”Winsorization”. In this case, the values below the 1st and the values above the 99th percentile were set equal to the value of the 1st respectively the 99th percentile.

5.1 Variable definitions

Data on prices and the outstanding shares have been retrieved on daily basis within the time interval January 2006 until December 2017. The security prices were retrieved on daily basis in order to detect possible variations and to reach the highest possible frequency in our sample data. The share price and shares outstanding in Compustat (WRDS) are not adjusted for different company events, such as stock splits. However, Compustat includes an adjustment variable that accounts for such events, labeled adjustment factor. Thus, by dividing the share price with this adjustments variable, we were able to get the adjusted share price. In addition, it was also necessary to adjust the shares outstanding, this was done by multiplying the current shares outstanding with the adjustment factor. Moreover, the market value of the respective firms was calculated by multiplying the price with its outstanding shares. In order to calculate returns based on Compustat prices in a correct manner, it was also required to adjust for cash equivalent distributions along with reinvestment of dividends and the compounding effect of dividends paid on reinvested dividends. The variable used to adjust for this is also available in the Compustat database, labeled daily return factor.

The fundamentals of our data set, were also collected from Compustat database between January 2006 until December 2017. Moreover, the incorporated fundamentals were net income before extraordinary items (earnings) and book value of equity. These were collected on a quarterly basis, since it is the highest frequency that is achievable. This gave us a difference in time interval between stock prices and the company fundamentals. In order to adjust such that the variables had the same frequency, we used the same fundamental value for all days within each quarter. Also, to complement some of the necessary fundamental variables that were missing in Compustat, we also retrieved data from Bloomberg or from the companies interim / annual reports if available. Moreover, the B/P ratio was derived from dividing the book value per share with the current price per share. In addition, the E/P ratio was derived in the same standard but incorporates the net income before extraordinary items instead.

The variables used in the analysis, based on the above mentioned data, defined in the following way :

$$Price\ per\ share\ (adjusted) = \frac{Price\ per\ share}{Adjustment\ factor} \tag{3}$$

$$Daily\ return = \frac{Price\ per\ share\ (adjusted)_t\ *\ Return\ factor_t}{Price\ per\ share\ (adjusted)_{t-1}\ *\ Returnfactor_{t-1}} - 1 \tag{4}$$

$$Shares\ outstanding\ (adjusted) = Shares\ outstanding\ *\ Adjustment\ factor \tag{5}$$

$$Market\ capitalization = Price\ per\ share\ *\ Shares\ outstanding \tag{6}$$

$$Earnings\ to\ price\ ratio\ (E/P) = \frac{Earnings\ per\ share}{Price\ per\ share} \tag{7}$$

$$Book\ to\ price\ ratio\ (B/P) = \frac{Book\ value\ of\ equity\ per\ share}{Price\ per\ share} \tag{8}$$

Further, estimates of the risk-free rate and the market return were essential to conduct our analysis. We used the Swedish one-month treasury bill as a proxy for the risk-free rate. The data for the risk-free rate were collected from Riksbankens webpage with a frequency of daily data between January 2006 until December 2017. Historically, the one-month treasury bill is the most widely used risk-free rate in Fama-French models. The market return we incorporated in our analysis was the return of the $OMXRSPI$ index, a Swedish index that include re-investments of paid dividends. This is the index available in the Fama-French models section of the Swedish house of finance and collected from their database called ”Finbas”. This was also retrieved on daily basis between January 2006 until December 2017.

5.2 Methodology

To construct the portfolios used in the analysis, we followed a similar process as Fama and French (1992, 1995). Each asset is divided into a portfolio in June each year, afterwards the asset was allocated to that specific portfolio for the following 12 months. Six portfolios in total were constructed, firstly by dividing the assets into two portfolios based on the size of the companies market capitalization, big and small, with the median as the cut of point. Further, within both of these portfolios three portfolios were created by dividing the assets in to low, medium and high value portfolios based on the B/P ratio of the company. The cut of points were the 30th and 70th percentile. The latter was then repeated using the E/P ratio of the company.

	Small-cap	Big-cap
Low value	S/L	B/L
Medium value	S/M	B/M
High value	S/H	B/H

Table 2: Six different portfolios were constructed based on each of the two value ratios (B/P and E/P), which gave us 12 portfolios in total. First sorted on market capitalization, than, either on the B/P or E/P ratio in order to disclose the value effect.

Following the method of Penman and Reggiani (2013, 2018), we also constructed portfolios based on a joint sorting of the E/P and B/P ratio. Firstly, we sorted the assets in to three portfolios based on the E/P ratio, from highest to lowest. We than conducted an additional sorting on the B/P ratio, also from highest to lowest, within the original E/P portfolios. This gave us nine different portfolios, illustrated in table 3. Considering the 12 portfolios sorted on B/P and E/P ratio individually as well as the 9 portfolios sorted on E/P and B/P jointly, our analysis in total consist of 21 portfolios. Important to mention is that the nine joint portfolios analyzed in this paper, are less than the 25 different portfolios that Penman and Reggiani (2013, 2018) incorporated in their analysis. Hence, this may lead to differences between the results. The reason behind the lower number of portfolios in this paper is the smaller data sample existing on the Swedish stock market.

	Low (E/P)	Medium (E/P)	High (E/P)
Low (B/P)	L/L	M/L	H/L
Medium (B/P)	L/M	M/M	H/M
High value (B/P)	L/H	M/H	H/H

Table 3: Nine different portfolios were created. Firstly sorted on the E/P ratio, from lowest to highest. Further, the portfolios were sorted on the B/P ratio within the given E/P portfolio. Also, from lowest to highest. Hence, these portfolios exclude size and solely focus on growth versus value.

In order to conduct the Fama-French three-factor model regressions the small-minus-big (SMB) and high-minus-low (HML) factors were constructed. For both the SML and HML factors, we created one separate factor for each of the two different value factors (B/P and E/P). Moreover, the SMB factor, illustrated in equation 9, was constructed based on the returns of the portfolios illustrated in table 2. Calculated as the average return of the three small-size portfolios minus the average return of the three big-size portfolios.

$$SMB = \frac{(R_{S/L} + R_{S/M} + R_{S/H)}}{3} - \frac{(R_{B/L} + R_{B/M} + R_{B/H})}{3} \tag{9}$$

For the construction of the HML factor, illustrated in equation 10, the observations were divided into two portfolios based on the value factor (E/P and B/P). Then, within each of the high and low value portfolios two additional portfolios were created based on the market capitalization of the firms. Furthermore, the HML (value) factor were calculated as the average return of the two high value portfolios minus the two low value portfolios.

$$HML = \frac{(R_{S/H} + R_{B/H})}{2} - \frac{(R_{S/L} + R_{B/L})}{2} \tag{10}$$

In the Fama-French three-factor model regression, illustrated in equation 11, the return in excess of the risk-free rate for each of the 21 portfolios was regressed on the different Fama-French factors as well as the market excess return.

$$R_{it} - R_{ft} = \alpha + \beta_1(R_{mt} - R_{ft}) + \beta_2 SMB_t + \beta_3 HML_t + \epsilon \tag{11}$$

Where, R_{it} is the average return for each portfolio at time t, R_{ft} is the risk-free rate at time t,

R_{mt} is the market return at time t, SMB_t is the small-minus-big factor at time t, HML_t is the high-minus-low, value factor at time t, ϵ is the error term, $Alpha$ is the intercept, also referred to as the excess return, and $Beta$ indicate the slope coefficients.

Further, we conducted a GRS test created by Gibbsons et al. (1989). This is in order to investigate if our estimated intercepts (alpha) in the regressions were jointly indistinguishable from zero. Thereby, enabled us to compare the different set ups of the model to each other. This test also enabled us to detect how well the variance of the returns was captured, which also enhanced the conclusions regarding which of the set ups that performed the best.

6 Results

This section covers the results of our analysis, where the Fama-French three-factor model regressions are used in order to detect potential return predictability. Further, this section include a GRS-test to detect potential differences regarding the capturing of the variance in returns between the different portfolios created. However, we first start by presenting the descriptive statistics in order to give an outline of the variables used in the analysis.

6.1 Descriptive statistics

Table 4 illustrates different descriptive statistics for the incorporated independent variables. The first table illustrate the different returns for the independent variables on a daily frequency. Showing that average as well as the median of the market excess return is positive. However, analyzing the median and the mean for the Fama and French factors, the majority of the variables are negative. Suggesting that those factors are the factors that are discounted in equities. Furthermore, the table illustrate that the value factor based on the B/P ratio is negative while the E/P ratio is positive. Illustrating that the E/P ratio is a further explanatory variable of the returns. Also, the average explanatory variables of the returns are lower for the B/P ratio compared to the E/P ratio regarding the differences among small- versus large-cap stocks.

	Market excess return	SMB (B/P)	HML (B/P)	SMB (E/P)	HML (E/P)
Mean	.0004074	-3.63e-06	-.0002726	-.0000126	.0003896
Median	.0007588	-.0000911	-.0002303	-.0000864	.0003563
Max	.0903221	.0273862	.0169414	.0265236	.0147277
Min	-.0780811	-.0242234	-.0206255	-.0257442	-.0219098
SD	.013439	.0061206	.0038683	.006155	.0042374
Skewness	.0070253	-.0275884	.0139913	-.0525302	-.1370292
Kurtosis	8.135353	4.124655	3.802996	4.174654	3.692402

Table 4: Descriptive statistics for the market beta and Fama-French factors, both for the E/P and the B/P ratios separately. These are the independent variables incorporated in the regressions of our analysis.

Moreover, the standard deviation across the variables are positive, the results based on the different factors are also rational, as small-stocks tend to fluctuate more than large-stocks over time. In addition, the standard deviation is larger for some of the B/P ratios, which may not be the common picture. However, a possible reason for this is potential asset write downs that may influence the volatility. Furthermore, as the kurtosis illustrate, the data set follows a normal distribution, as the values changes between three and four. Yet, the value above four in the excess returns column is most likely due to fat tails in the distribution. Regarding the skewness, the data is fairly symmetrical as the majority of the variables are ranging between 0.5 to -0.5.

Table 5 and 6 detect the correlations among the independent variables. The most intriguing correlation that is detected from these tables are the different correlations between HML and SMB depending on the value ratio. The B/P ratio detect a small negative correlation between SMB and HML, while the E/P ratio detect a medium positive correlation. Hence, the components of the equity returns may indicate that the derivation of the two factors could be similar.

	Market excess return	SMB (B/P)	HML(B/P)
Market excess return	1.0000		
SMB (B/P)	-0.6194	1.0000	
HML(B/P)	-0.1267	0.2964	1.0000

Table 5: Correlation among the market beta, value factor and size factor for the B/P ratio.

	Market excess return	SMB (E/P)	HML (E/P)
Market excess return	1.0000		
SMB (E/P)	-0.6357	1.0000	
HML (E/P)	0.2625	-0.5726	1.0000

Table 6: Correlation among the market beta, value factor and size factor for the E/P ratio.

6.2 Results incorporating B/P as value factor

The mean annualized returns for the B/P ratio in table 7, show that the average returns decreases along with a higher value factor (B/P). Thus, implying a negative value effect. Further, we see that the differences are larger between the different B/P portfolios than it is between the small and big-cap portfolios. The highest return exhibited among the portfolios sorted on B/P is the small-cap/low-value portfolio.

	Low (B/P)	Medium (B/P)	High (B/P)
Small-cap	17.16	10.47	4.87
Big-cap	14.27	11.38	7.13

Table 7: Annualized average returns (in percent) for the different portfolios using B/P as the value factor.

	Market beta	SMB	HML	Alpha	R^2
B/H	0.685112	-0.113353	0.290901	0.000050	0.816836
t-value	*(87.341126)*	*(-6.336748)*	*(12.986335)*	*(0.603264)*	
B/M	0.711484***	-0.049480***	-0.063418***	0.000113	0.863704
t-value	*(1.06e+02)*	*(-3.219617)*	*(-3.295340)*	*(1.582342)*	
B/L	0.614126***	-0.032069*	-0.231864***	0.000222***	0.761509
t-value	*(74.132510)*	*(-1.697489)*	*(-9.800974)*	*(2.538740)*	
S/H	0.760975***	1.137408***	0.999714***	0.000126	0.710943
t-value	*(74.363723)*	*(48.739522)*	*(34.209861)*	*(1.168693)*	
S/M	0.541092***	0.579705***	-0.077028***	0.000144	0.567954
t-value	*(61.829641)*	*(29.047371)*	*(-3.082204)*	*(1.563370)*	
S/L	0.708656***	1.087986***	-0.927067***	0.000114	0.731841
t-value	*(84.539456)*	*(56.914332)*	*(-3.87e+01)*	*(1.286702)*	

Table 8: Regression output, using Fama-French three-factor model regressions for each of the six portfolios. The B/P ratio is incorporated as value factor. SMB is the difference between small and large-cap stocks, while HML is the difference between value and growth-stocks. Alpha is the intercept, also referred to as excess return. While R^2 illustrate the explanatory power. The values in parenthesis represent the t-statistics. *** $p<0.01$, ** $p<0.05$, *$p<0.1$

The results from the regressions, in table 8, when incorporating the B/P ratio as value factor, imply that all of the subgroups have a positive alpha. However, it is only the portfolio consisting of B/L stocks that is statistically significant ($p<0.01$). The daily alpha of 0.000113 basis point implies an annualized alpha of approximately 2.8 percent using 250 trading days per year. Moreover, the R^2 for each portfolio range between 0.57-0.86, implying that the independent variable is well explained by the dependent variables.

The results from the regression clarify that the portfolio consisting of S/M stocks has a lower market beta compared to the B/M portfolio, while both display the same significance level ($p<0.01$). Moreover, the S/L and B/L portfolios are both statistically significant for the market beta ($p<0.01$) and the market beta differences among them are rather low. Hence, this is not in line with CAPM findings, that small-cap stocks fluctuate more than large-cap stocks. As table 8 further illustrate, large-cap portfolios have a slightly higher average exposure towards value stocks than the small-cap stock portfolios. Furthermore, all of the different small-cap portfolios are statistically significant ($p<0.01$) regarding their different exposure towards the Fama-French factors. Rationally, the S/H portfolio has a high exposure to small-cap stocks and overweight value. In addition, the S/M portfolio is also overweighted towards small-cap stocks but has higher exposure towards growth-stocks. In general, there is no large return differences among the large (B) and small-cap (S) stocks in our regressions. However, it is only the B/L that is statistically significant (p<0.01) regarding its excess return (alpha).

6.3 Results incorporating E/P as value factor

The mean annualized returns for the E/P ratio in table 9, show that the returns increases along with a higher value factor. Thus, implying a positive value effect. Further, just as with the B/P portfolios, we see that the differences are larger between the different E/P portfolios than it is between the small and big-cap portfolios. However, among the portfolios sorted on E/P it is the small-cap/high-value portfolio that show the highest average return.

	Low (E/P)	Medium (E/P)	High (E/P)
Small-cap	-2.95	14.29	19.69
Big-cap	3.60	13.77	14.61

Table 9: Annualized average returns (in percent) for Fama-French portfolios using E/P ratio as value factor.

	Market beta	SMB	HML	Alpha	R^2
B/H	0.720485	-0.090310	-0.000426	0.000255	0.849839
t-value	*(95.831704)*	*(-4.674342)*	*(-0.018969)*	*(3.282720)*	
B/M	0.658391***	-0.082505***	-0.067717***	0.000273***	0.834059
t-value	*(91.076516)*	*(-4.441252)*	*(-3.137039)*	*(3.657987)*	
B/L	0.607015***	-0.347424***	-0.601915***	0.000092	0.791914
t-value	*(73.157118)*	*(-1.63e+01)*	*(-2.43e+01)*	*(1.071811)*	
S/H	0.622256***	0.977899***	0.736715***	0.000224***	0.657469
t-value	*(72.908345)*	*(44.586434)*	*(28.907240)*	*(2.547133)*	
S/M	0.593820***	0.510638***	-0.376879***	0.000448***	0.606312
t-value	*(62.906193)*	*(21.050057)*	*(-1.34e+01)*	*(4.597290)*	
S/L	0.769814***	0.991224***	-1.029894***	-0.000053	0.712225
t-value	*(71.756580)*	*(35.954102)*	*(-3.21e+01)*	*(-0.477202)*	

Table 10: Regression output, using Fama-French three-factor model regressions for each of the six portfolios. The E/P ratio is incorporated as value factor. SMB is the difference between small and large-cap stocks, while HML is the difference between value and growth-stocks. Alpha is the intercept, also referred to as the excess return. While R^2 illustrate the explanatory power. The values in parenthesis represent the t-statistics. *** p<0.01, ** p<0.05, *p<0.1, t-value in parentheses.

The regression results when incorporating the E/P ratio as value factors imply that three out of six portfolios managed to earn statistically significant results with respect to the magnitude of alpha ($p<0.01$). Furthermore, the B/M portfolio has an annualized excess return of approximately 6.8 percentage, while the annualized excess return for the S/H portfolio reaches 5.6 percentage. The best performing portfolio is the S/M portfolio, which generated an annualized excess return of 11.2 percentage. The R^2 for the different portfolios range between 0.61-0.85, indicating well explained variables. Moreover, investigating the market beta for all the portfolios, once again yields the result, that the average market beta is less for small-cap stocks compared to large-cap stocks. Hence, contradicting the CAPM findings, that small stocks are riskier than large-cap stocks.

Table 10 illustrate that the majority of the factors in the results are statistically significant ($p<0.01$). Hence, yields an accurate derivation of the behind return exposure. However, interesting findings from these results are that the S/M portfolio outperformed the B/M portfolio as well as the S/H portfolio by having higher exposure towards small growth-stocks. Hence, the results illustrate that investors shall be seeking exposure towards smaller medium-value stocks in order to create excess return on the Swedish market, when evaluating the E/P ratio as value factor.

6.4 Returns to a joint sort on B/P and E/P

Table 11 illustrate the mean annualized return for the respective joint portfolios, keeping the E/P ratio constant but adjusting the B/P factor. The table illustrate that for each given E/P portfolio, a higher respective B/P yields decreasing returns. Also, the returns increases with the E/P ratio.

	Low (E/P)	Medium (E/P)	High (E/P)
Low (B/P)	8.11	20.53	17.00
Medium (B/P)	1.66	14.56	17.06
High (B/P)	-5.90	9.08	15.50

Table 11: Annualized average returns (in percent) for the different portfolios using the joint sorting of E/P and B/P as the value factor.

Table 12 illustrate the regressions results for our joint portfolios. The joint portfolios are firstly ranked on the E/P ratio while the B/P ratio is further ranked within each of the E/P portfolios.

	Market beta	SMB (B/P)	HML (B/P)	Alpha	R^2
L (E/P) L (B/P)	0.728218	0.984446	-0.930238	-0.000257	0.599797
t-value	(62.352882)	(36.962478)	(-2.79e+01)	(-2.087408)	
L (E/P) M (B/P)	0.628369***	0.502405***	-0.020908	-0.000229*	0.530123
t-value	(55.221760)	(19.360813)	(-0.643408)	(-1.904009)	
L (E/P) H (B/P)	0.852611***	1.168563***	1.182876***	-0.000292***	0.641617
t-value	(63.347122)	(38.071720)	(30.775111)	(-2.051658)	
M (E/P) L (B/P)	0.610457***	0.158959***	-0.317488***	0.000451***	0.703236
t-value	(69.016132)	(7.880529)	(-1.26e+01)	(4.834796)	
M (E/P) M (B/P)	0.623350***	0.212707***	-0.299033***	0.000213***	0.709109
t-value	(71.742520)	(10.734971)	(-1.21e+01)	(2.316821)	
M (E/P) H (B/P)	0.615872***	0.097024***	0.148503***	0.000118	0.736195
t-value	(75.330691)	(5.203958)	(6.360630)	(1.366867)	
H (E/P) L (B/P)	0.668784***	0.228367***	-0.313233***	0.000288***	0.741938
t-value	(77.980668)	(11.676407)	(-1.28e+01)	(3.178634)	
H (E/P) M (B/P)	0.644180***	0.070324***	0.089739***	0.000410***	0.757582
t-value	(78.552619)	(3.760382)	(3.831964)	(4.732333)	
H (E/P) H (B/P)	0.636870***	0.264770***	0.377837***	0.000430***	0.630667
t-value	(62.477218)	(11.389747)	(12.979554)	(3.991651)	

Table 12: Regression output, using Fama-French three-factor model regressions for each of the nine portfolios. SMB is the difference between small and large-cap stocks, while HML is the difference between value and growth-stocks. Alpha is the intercept, also referred to as the excess return. While R^2 illustrate the explanatory power. The values in parenthesis represent the t-statistics. *** p<0.01, ** p<0.05, *p<0.1, t-value in parentheses.

Regarding the excess returns (alphas) in table 12, the results of 7 out of 9 portfolios are statistically significant (p<0.01 or p<0.1). Further, the market beta for all of the different portfolios are below one, implying that the portfolios are less volatile than the market and, in that sense, yields attractive risk adjusted returns. The portfolios consisting of stocks that from the E/P perspective are classified as growth-stocks but from the B/P perspective classified as value-stocks (low (E/P) and high (B/P)) underperforms the market by 7.3 percent annualized. Whereof, the portfolios had a high exposure to small-cap stocks and value stocks. However, bear in mind that the R^2 are at 0.64, lower than the previous regressions, and the t-statistics are volatile.

Furthermore, the medium E/P portfolios show different excess return depending on the various B/P portfolios, value (H), medium (M) or growth (L). As table 12 illustrate, the medium E/P and low B/P portfolio all show a high significance level on all variables (p-value<0.01). The annualized excess return from this portfolio is 11.2 percent. Moreover, this portfolio managed to earn this alpha by having a small overweight towards small-cap and a heavily overweight towards growth-stocks. The portfolios sorted on high E/P ratio, but different B/P ratio, are all are statistically significant (p-value<0.01) with respect to alpha. However, their returns differ slightly. The table emphasize that the high E/P and low B/P portfolios earned an annualized return of 7.2 percentage. The excess return is derived form an overweight of small-cap and growth-stocks. Furthermore, the high E/P and medium B/P portfolio earned and annualized excess return of 10 percent. Their alpha is derived from having a neutral portfolio of small- and large-cap stocks as well as neutral weight between value and growth-stocks. This portfolio does also have the highest R^2 among the entire portfolio base. Also, an interesting aspect of this portfolio is that it consist of high-quality companies as the inverse of the B/P ratio yields the return on equity. Moreover, the portfolio that consists of high E/P and high B/P stocks, classified as a value portfolio, earned annualized excess return of 10.75 percent. In addition, the excess return is generated by having a higher exposure to small value-stocks.

To further investigate the excess return and what drives it, we follow the method of Penman and Reggiani (2018) to analyze the average earnings growth for the joint portfolios. The result in table 13 indicates that no general pattern for the portfolios is present in our sample. The average annualized earnings growth rate for the medium E/P portfolios can not be interpreted as following any specific pattern, while the low E/P portfolio is decreasing in earnings growth rate as B/P increase and vice versa for the high E/P portfolios. This non existing pattern might be due to the shorter time period used in the paper compared to Penman and Reggiani (2018) as well as the differences in the data frequency, yearly compared to our frequency being quarterly. Further, the difference between the Swedish stock market and the US might explain the differences between the results. Also, the smaller sample used in our analysis do not enable us to compare the same number of portfolios compared to Penman and Reggiani (2018).

	Low (E/P)	Medium (E/P)	High (E/P)
Low (B/P)	22.17	-14.53	3.28
Medium (B/P)	17.18	4.70	7.66
High (B/P)	-14.51	-32.74	10.04

Table 13: Average annualized earnings growth rate (in percent) 2 periods ahead, calculated as $\frac{Earnings_{t+2} - Earnings_{t+1}}{(|Earnings_{t+2}|+|Earnings_{t+1}|)/2}$, following the method of Penman and Reggiani (2018).

6.5 Comparing performance based on GRS test

Panel A in table 14 show that the regressions conducted with portfolios sorted on E/P are jointly statistically significant (p-value$<$0.01). For the regressions with portfolios sorted on B/P, we detect a non-statistically significant relationship, hence, we cannot reject that the intercepts are indistinguishable from zero. The average adjusted R^2 for the three sets of regression range between 0.67-0.74, indicating that the Fama-French three-factor model explains a substantial part of the excess returns of the portfolios. However, the R^2 in panel A show the same value, indicating that none of the regressions have higher explanatory power than the other. Further, In panel B, the p-value of the regressions for the portfolios jointly sorted on E/P and B/P, also indicate that we can reject that the intercepts of the regressions are jointly indistinguishable from zero. However, a lower average adjusted R^2 indicate less explanatory power compared to regressions in panel A.

	GRS	p-value	Avg abs α	Avg adj R^2
Panel A, sort on B/P and E/P alone :				
R_M–R_f *SMB(B/P) HML(B/P)*	0.057	0.140	0.00012818	0.742
R_M–R_f *SMB(E/P) HML(E/P)*	0.111	0.000	0.000224	0.742
Panel B, joint sort on E/P and B/P:				
R_M–R_f *SMB HML*	0.178	0.000	0.00029851	0.672

Table 14: Output from GRS test of the three sets of regressions in table 8, 10 and 12. Including the GRS test statistic, p-value, average absolute value of the intercept (α) and average adjusted R^2.

Further, the average absolute value of the intercept (alpha) in table 14 is lowest for the set of regressions incorporating the B/P ratio as value factor and increases with the E/P ratio as value factor as well as with the joint portfolios. However, it is only the regressions using the E/P ratio and the joint portfolios that are statistically significant (p-value$<$0.01). Among these two, the average absolute alpha when using the E/P ratio is lower, indicating that this set up captures the variance in the excess returns better than in the regression using the joint portfolios.

7 Analysis

In this section we analyze and discuss the results of our study. We interpret the findings from the results section and connect it to previous literature presented in section 2. We start by discussing the results from each of the three sets of Fama-French three-factor model regressions in table 8, 10 and 12. Then, we proceed by comparing our results to previous studies and comparing the different set ups used in our analysis.

The results from the regressions yields some disparity regarding the different value ratios. As illustrated in table 8 and table 10, the small-cap portfolios differ when incorporating diverse value ratios (B/P or E/P). Whereof the excess return for the small-cap portfolios are only statistically significant (p-value$<$0.01) when using E/P as value ratio. However, regarding the Fama-French factors (SMB and HML), all are statistically significant, either for the B/P or the E/P portfolios. Moreover, comparing the results for the large-cap portfolios and their respective value ratios also yields discrepancies. The annualized excess return is only statistically significant (p-value$<$0.01) for the B/L portfolio of the B/P ratio. While the E/P ratio only illustrate a statistically significant excess return for the B/M portfolio (p-value$<$0.01). Also, the annualized excess return is higher for the E/P ratio. Further, the Fama-French factors have a higher average statistical significance level when incorporating the E/P ratio as value ratio. Further, the results in table 8 and 10 show that the B/P portfolios have a higher average exposure towards small-cap stocks compared to the E/P portfolios. In addition, a further finding regarding the small-cap portfolios is that the E/P portfolios also have a lower exposure towards value-stocks compared to the small B/P portfolios. Thus, indicating that the E/P portfolios all have a more market neutral exposure on average. Moreover, the market beta is on average lower for the B/P portfolios rather than the E/P portfolios, which also is the most likely outcome as earnings tend to fluctuate more than book value of equity in the short-term. Regarding the differences among large-cap portfolios, the excess returns of the E/P portfolios are derived from a slightly higher exposure towards large-cap stocks and growth-stocks. The results also emphasize that the large-cap E/P portfolios have a higher market beta than the large B/P portfolios on average, implying that the E/P portfolios are riskier than the B/P portfolios.

Regarding the results from the joint portfolios, the portfolios exclude size differences and only consider value versus growth portfolios. As the table 12 illustrates, the annualized excess returns (alpha) increases when using the joint sorted portfolios, in comparison to the individual E/P and B/P portfolios. Also, a larger portion of the regressions intercepts in table 12 are statistically significant (p-value$<$0.01) compared to table 8 and 10. Henceforth, the results show that pure value portfolios have outperformed pure growth portfolios within our sample period.

The results from our analysis emphasizes that the E/P ratio has a higher probability of predicting returns and also in delivering excess returns for different portfolios rather than the B/P ratio on the Swedish stock market. This contradicts the findings of Fama and French (1992, 1996), where they state that the B/P ratio is a more accurate predictor due to less fluctuations in the fundamentals. In addition, Fama and French (1992, 1996) conclude that the E/P ratios explanatory power decreases when incorporating the size factor as well as the B/P ratio in their model. Hence, the E/P ratio does most likely predict returns from a strong correlation between the B/P and the E/P variable. This is however not the case in our results and henceforth our study is not in line with Fama and French (1992, 1996) findings. Accordingly, this result imply that we found evidence regarding our first hypothesis. Indicating that the E/P ratio enhances the return predictability on the Swedish stock market. Moreover, Fama and French (2012) found implicit evidence that the B/P ratio as a value ratio, tend to be weaker for large companies due to different risk exposure. They also found evidence that the value premium is larger for small-cap stocks, most likely due to liquidity sensitivity. Our results lack sufficient statistically significant results regarding this conclusion. However, even if all the results are not statistically significant, it is clear that the value premium is larger for small-cap stocks even in our case. In conjunction with Fama and French (1992, 1996), our results suggest that investors that are seeking for excess returns shall be tilted towards small-cap stocks and value-stocks. The different exposure and premiums may also be explained by a less liquid Swedish market and a lower supply of stocks within the different subgroups.

Kok et al. (2017) concludes that value strategies do not deliver superior returns due to a large extent of inflated accounting numbers. They further concludes that value factors shall be measured with other dependent variables. Our results imply that value strategies could deliver superior return even without including other dependent variables in the regressions, in order to detect potential redundancy. Henceforth our results differ slightly from the results of Kok et al. (2017). However, important to notion is that Kok et al. (2017) solely focus on the B/P ratio as value factor. In our model, the B/P factor has a limited period of excess returns, hence we are not be able to conclude that our result are in line with the statements of Kok et al. (2017). However, our results using the joint portfolios sorted on both E/P and B/P do enhance the magnitude of the excess returns and therefore could somehow confirm that value factors are best used combined when trying to reach higher levels of alpha.

Furthermore, Asness et al. (2015) stated that value factors do deliver superior returns, but are most efficient used in combination of other quantitative variables such as momentum. Our results regarding the joint portfolios which enables us to combine value factors, are in line with the findings of Asness et al. (2015). Thus, our results suggest that value factors deliver excess returns, as the joint portfolio of E/P and B/P improving the excess returns. Hence, the same conclusion regarding the combination of the value factors are notable.

As Penman and Reggiani (2013, 2018) incorporated portfolios jointly sorted on E/P and B/P, they found enhanced results with respect to the magnitude of alpha. Our results show a similar increase in alpha for the portfolios jointly sorted on E/P and B/P. Moreover, Penman and Reggiani (2013, 2018) found evidence that portfolios with high B/P (value) stocks yields higher future earnings growth, contradicting the common perception that low B/P (growth) shall consist of higher growth. Our findings in table 13 show that this is true for the high E/P portfolio but not for the low and medium E/P portfolios. Hence, we are unable to conclude similar findings regarding a general pattern in the earnings growth rate on the Swedish market and do not find support for the statement of Penman and Reggiani (2018) arguing that the common view of value versus growth should be revised.

Results based on Fama-French three-factor model in the study of Penman and Reggiani (2013) show that excess returns for portfolios increases along with a higher B/P ratio, holding E/P portfolio constant. Our results in table 12 do not enable us to detect the same pattern. While this is true for the high E/P portfolio it is however not true for the other two E/P portfolios (low and medium). Thus, we cannot conclude that this applies for our sample. However, Penman and Reggiani (2013) found that the excess returns increases with higher E/P (same as low LTE in their article). This pattern is present in our result as well, where we are able to see that alpha is negative in the low E/P portfolios and increasing in the medium and the high E/P portfolios.

This result is statistically significant for seven of the nine portfolios. Penman and Reggiani (2013, 2018) further found that, given E/P, the portfolios sorted on the B/P is positively correlated with earnings growth. Thus, contradicting the common theoretical framework stating that value stocks shall rather be defined as low profitability and low growth stocks, referred to as low B/P and low E/P stocks. However, this pattern, or any other specific pattern, is not detected in our results. Thus, we are not able to conclude if this view on value versus growth applies for our sample on the Swedish market. Reasons for this may be the shorter time period and smaller number of portfolios used in the test compared to Penman and Reggiani (2013, 2018). This is due to a lower supply of securities on the Swedish market compared to the US.

From the results of the GRS-test in table 14, we are not able to find support for our second hypothesis. Thus, implying that the portfolios jointly sorted on the E/P and B/P ratio, do not describe the returns better compared to the portfolios individually sorted on the E/P and B/P ratios. This is mainly based on the results in table 14, showing a higher average absolute alpha for the joint portfolios rather than the E/P portfolios. This indicates that the joint set up portfolios do not capture the variances in the return more accurately than the individual sorted portfolios. Also, a higher explanatory power, measured as the average adjusted R^2, is shown for the set of regressions based on the E/P and B/P portfolios individually, compared to the joint sorted portfolios. This implies that the Fama-French factors more accurately explains the excess returns of the portfolios when sorted individually on the E/P and B/P ratio. Thus, we conclude that the usage of the Fama-French three-factor model on the Swedish market should be considered based on the E/P ratio. This is not in line with the findings of Penman and Reggiani (2013, 2018), arguing that the joint sorted portfolios enhance the results of the Fama-French three-factor model. There are numerous possible reasons to why our results differ from the ones of Penman and Reggiani (2013, 2018).

Despite the large difference regarding supply of securities, exchange-traded-funds, and liquidity (Asness et al., 2015; Penman and Reggiani, 2013, 2018) there may also be several other aspects that may demonstrate the differences. For instance, higher liquidity enhances the market efficiency (Chordia et al. 2008) which shrinkage the possibility of delivering superior returns. Further, as the Swedish market is a smaller market in terms of size, liquidity and especially within analyst-coverings there are several factors that may demonstrate the potential differences in our findings. Leuz et al. (2003) concluded that companies earnings management differ significantly around the world. Where countries with large economies and stock markets such as United states and United Kingdom display low level of earnings management. While smaller ”insider” economies such as Sweden, enforces higher degree of earnings management. Thus, implying in different investment climate which imply in global differences. An additional fact that may demonstrate differences are that US stocks trade on higher average / median earnings multiples rather than European stocks (Bloomberg). Thus, implying in difference ratios in the Fama-French models.

8 Conclusion

The considerable findings from our results and analysis are that the B/P portfolios have a higher average exposure towards small-cap stocks in contrast to the E/P portfolios. Also, further findings regarding the small-cap portfolios are that the E/P portfolios have a lower exposure towards value-stocks compared to the small B/P portfolios. However, the large-cap portfolios clarify that the E/P portfolios returns are derived from a slightly higher exposure towards large-cap and growth stocks. Thus, indicating that the E/P portfolios all have a more market neutral exposure on average.

Further, we test how the Fama-French three-factor model performs when portfolios are sorted based on the B/P respectively the E/P ratio, in order to detect potential return differences among the portfolios. Here we find that the E/P method enhance the results, compared to the B/P method, with respect to the magnitude of alpha. Thus, indicating that the E/P ratio captures the market risk-premium more accurately. This conclusion contradicts the results of Fama and French (1992, 1996), that found evidence that their three-factor model is more efficient with portfolios sorted on the B/P ratio. This is due to a lower volatility in the book value of equity compared to earnings.

Also, to test if the jointly sorted portfolios can enhance the results, we further construct Fama-French three-factor model regressions with 3x3 joint portfolios. The results illustrate an increase, regarding the statistically significant values among the alphas (7 out of 9 portfolios). However, the GRS-test constructed to compare the different regressions, clarify that the joint portfolios have a lower average adjusted R^2 and a higher average absolute alpha. Thus, indicating that the regressions from the joint portfolios have a lower average explanatory power than the individual E/P portfolios. In addition, the Fama-Fench three-factor regressions using the joint portfolios do not capture the variance in the excess returns in the same magnitude as with the E/P ratio. Hence, we can not statistically ensure that the joint portfolios enhance the returns with respect to alpha.

We find evidence to support our first hypothesis, concluding that the E/P ratio enhances the return predictability on the Swedish stock market. Further, we do not find results to support our second hypothesis. Thus, we can conclude that the joint sorted portfolios do not describe the stock returns more accurately than the E/P or B/P individually sorted portfolios.

Considering the analysis of value versus growth, mainly discussed by Penman and Reggiani (2013), our result does not enable us to draw conclusions based on this. Further research in this area may look at a longer time period or a larger sample, such as the Nordic markets combined. This might enhance the ability to conclude how value versus growth should be considered when investing in the Swedish, or similar, markets. Further improvements could also be done by extending the Fama-French three-factor model into the Fama-French five-factor model and potential other asset pricing models. This could lead to improved results of how models perform with different portfolios sorted on different value ratios.

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