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# QUALITY INVESTING STRATEGIES:
## Empirical Evidence from the Helsinki Stock Exchange

Master's thesis in
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## ABSTRACT

This master's thesis focuses on whether the company's quality measured by profitability affects its yield and risk in the Finnish Stock Exchange 2009-2017. In other words, can portfolios formed by gross profitability and Ebitda/TA yield better than market. Every year, I rank all OMX Helsinki companies in order of both quality metric. The top 30 percent of the companies are selected in to the Long-portfolio and the bottom 30 percent are selected in to the Short-portfolio. In the United States, studies focusing on profitability strategy have come up with surprising results that challenge traditional investing strategies. In Finland, the topic has not been extensively studied.

The empirical results indicate that gross profitability and Ebitda/TA portfolios clearly outperform the market index. The average annual return for the gross profitability portfolio is 19,23 % and for the Ebitda/TA portfolio is 21,11 %, while the market index produces 16,12 % on average during the sample period. Additionally, both quality portfolios' Sharpe-ratios are higher than the Sharpe-ratio of the market portfolio. The result is statistically significant for Ebitda/TA portfolio, which generates 4,64 % annual alpha, but not for the gross profitability portfolio after controlling risk adjusted methods such as Fama French five-factor model.

**KEYWORDS:** Quality investing, profitability, OMX Helsinki, Fama French five-factor model

## 1. Introduction

Corporate shares have been traded globally for centuries. For example, one of the world's largest stock exchanges, Frankfurt Stock Exchange, was opened in 1585. Stock trading is very extensive among both institutional and private investors. This is no wonder, as in the long run, shares have historically produced the best compared to other asset classes. Basically, anyone can be a stock trader these days, because the internet has made trading stocks very easy for ordinary citizen. A private person only needs to open book-entry account and trades can be executed, for example, through his own bank.

Naturally, investors are characterized by their desire to maximize their returns. The stock market has been explored extensively and efforts have been made to develop various strategies that would allow an investor to make a better return on what the market produces on average. One of the most well-known and most studied investment strategies that have been proven to generate excess return is value investing. In this investment style, an investor aims to buy underpriced shares and believes that the market fixes the mispricing. In this paper, however, I focus on a quality investing, which is relatively new investment strategy.

The idea behind quality investing is that investor focus on buying only first-class companies without paying overprice. After purchasing, investor only needs to wait for the company to pay bigger dividends year after year with its profitably growing business. If the quality stock is purchased at decent price, investor can expect additional returns from the price appreciation of a stock. Quality investing is thereby closely related to value investing, but value strategy takes only stock price in to the account. (Novy Marx 2014)

On a long-term basis, it can be found clearly underpriced shares from the exchanges, but usually there is a reason why stock is remarkably cheap. In this case, the quality of the company is not necessarily at a satisfactory level, whereby the low price is justified. Quality companies are typically strong in their market position and have clear competitive advantages over smaller players or new entrants in the industry. The cash flow of such first-class companies is strong, which often means little investment needs for business maintenance. Profitability of quality companies is stable over time, because their cash flow is not so dependent on the economic cycle. Therefore, they can also generate profits during

economic downturn. The quality of the companies is stable, for example, due to limited dependency on service cycles. Quality companies are managed owner-driven whereby profitability is always ahead of the excessive growth. Growth is, of course important, but it is carried out carefully, not because they must grow. In addition, the quality companies are very solid, so their balance sheets are not full of dept. (Novy Marx 2014)

In this study, I focus on one aspect of quality investing, the company's profitability, and how changes in profitability affects stock returns on the Finnish stock exchange. As a measure of company's profitability, I use gross profitability and Ebitda/TA ratio. Novy Marx (2013) finds in his research that by investing in high profitable firms measured by gross profitability, it is possible to yield excess returns over time. Novy Marx also argues that the gross profitability strategy's returns are significantly negatively correlated with value strategy's returns, thus providing excellent hedge for value investors. Gross profitability is a very raw indicator of company's profitability that reflects the company's profits right after the cost of goods sold. Ebitda is a comparatively new measurement, which is located lower in the company's income statement than gross profits. Therefore, Ebitda/TA describes the company's financial position more specifically than gross profitability. Leivo & Pätäri (2009) find promising results in the Finnish stock exchange during 1993-2009, as EV/Ebitda generates the highest alpha among other investment strategies and I want to test power of Ebitda in the post-crisis period.

## 1.1. Purpose of the study

The purpose of this master’s thesis is to investigate if there is quality anomaly in the Finnish stock market after the 2008 financial crisis. As previous literature states, profitability is one of the main factors of quality, which the empirical part of this research is focused on. It is possible to implement profitability strategy by using several different financial ratios and measures, but in this paper, it is used Ebitda/TA (earnings before interest, taxes, depreciation and amortization scaled by total assets) and company’s gross profitability as quality metrics to find out which stocks I should purchase into my portfolio. Earlier studies, for example

Novy Marx (2013), finds that profitability has as much explanatory power as traditional value metrics when predicting future returns of stocks, which I also want to test in the Finnish Stock market.

I will implement the study by forming the observation data in portfolios according to the financial figures of the stocks. Every year, I rank all OMX Helsinki companies in order of both quality metric, Ebitda/TA and gross profitability. The top 30 percent of the companies are selected in to the Long-portfolio and the bottom 30 percent are selected in to the Short-portfolio. Also, Long-Short portfolio is formed, meaning that I investigate three portfolios each year per financial figure. Data of this paper covers years 2009-2017, so all together there are 24 portfolios during the period per quality metric. As Fama and French (1992), Chan et al. (1995) and Davydov et al. (2016), the start date of each holding period is the last trading date of June each year, but the portfolio formation is based on the previous year ending figures. This operation is done to make the study less exposed to the look-ahead bias.

In the first empirical part of this paper, I calculate the annual and average returns of these three different model portfolios and compare them with market index. I also calculate annual volatility and Sharpe ratios for each portfolio, so that I can compare portfolio returns against the risk.

In the second part of the empirical study, a statistical test is performed by the regression analysis. Regression analysis is used to prove that findings of the study are statistically significant. First, the simple OLS regression model is performed, where there is only one explanatory variable per model. Regression analysis will then determine whether the selected quality metrics, Ebitda/TA and gross profitability, can explain returns statistically. For the test, the following hypotheses are set:

*H1: Stock returns are dependent on the company's Ebitda/TA figure*

*H2: Stock returns are dependent on the company's Gross Profitability*

Additionally, I regress Fama French five-factor model (Fama & French 2014) against portfolios' monthly returns, to see if the returns can be explained by market, value, size, profitability or investment factors. Thus, the hypothesis for Fama French five-factor model regressions are:

*H3: Quality stock returns cannot be explained by the risk factors*

## 1.2. Structure of the study

The rest of this paper is organized in the following way: The second chapter introduces theoretical framework of efficient market. In the third chapter, common anomalies are presented, and financial figures related to them. Securities pricing models are introduced in chapter four. The fifth chapter concentrates to the previous literature of investing strategies and the most relevant studies are introduced. Hypotheses, data and methods are presented in chapter six. After that, it is gone through empirical results of this study, including quality portfolio returns and risk levels. Also, it is presented risk-adjusted performance of portfolios by Sharpe ratio. The eight chapter consist linear regression model results. The purpose of this part is to find out if the results are statistically significant. Finally, chapter six includes summary and conclusion of this paper.

# 2. Efficiency of financial markets

According to Malkiel (2003), the operation of the financial markets cannot be explained by a single theory and there are several complementary and alternative theories explaining financial markets. However, common features between theories can be found. One of the most relevant feature is that theories are based on inputs that are not realistic and thus do not work in the real financial world. It is still necessary to have hypotheses and presumptions, because that way it is possible to examine how financial markets work. Theories aim to provide tools to explore the effects of certain factors on the whole. Perhaps, one of the most well-known theory of explaining market efficiency, is theory about market perfection and inefficiency of the market.

Important prerequisite for an efficient market is that all investors act rationally. Rationality here means that investors make the right decisions based on the information available and also use all the arbitrage opportunities and hence the compelling prices to the correct, rational level. An efficient market can also be used as the term of rational market. (Malkiel 2003)

## 2.1 Efficient market hypothesis

One of the most crucial factor when examining different investment strategies and their functionality, is market efficiency. Eugene Fama is the first person who introduced the hypothesis of market efficiency in 1970s and after that, it has become a key theory of examining market behavior. According to Fama (1970), there are three distinct levels of market efficiency: weak, semi-strong and strong.

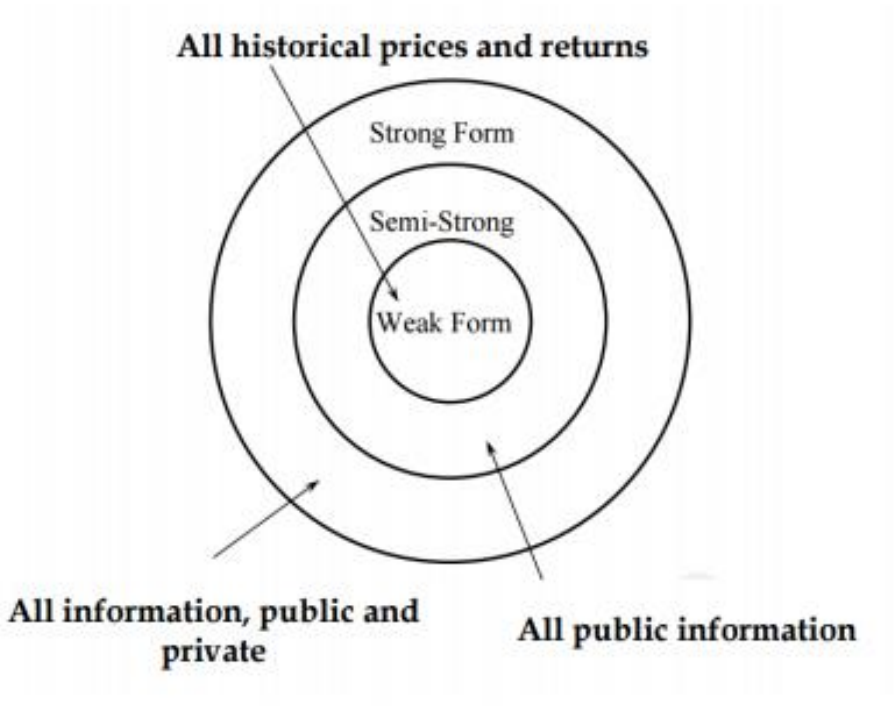
In weak efficiency markets, all historical information is added to the stock price, for example past performance of stock or trading volume. According to Fama (1970), investor is not able to use technical analysis to forecast development of stock price. This is because stock price follows random walk, and history does not tend to repeat itself with easily noticeable yield patterns.

In semi-strong efficiency markets, securities prices include not only all the current publicly available information, but also historical information. This is due to the

fact that past prices and trading volumes are publicly available information. If every criterion of the semi-strong markets is fulfilled, all public information such as profit forecasts, dividends and financial statements are already priced in the current level of stock prices. This can be deducted that investors are not able to make abnormal returns by utilizing technical analysis or fundamental analysis. Fama (1970)

In strong efficiency market, stock prices reflect all historical and public information that investor can have. Additionally, it assumes that all undisclosed information is shown in the price of a stock. According to theory, even insider information doesn't help investor to generate abnormal returns. However, strong efficiency markets also have regularities, but their exploitation is not attractive due to risks included. (Fama 1970)

Figure (1.) Levels of Market Efficiency




Empirical studies still continue to use Fama's levels of market efficiency. According to Fama (1970), levels of efficency are also dependent on each other. First,

market must fulfill the weak conditions to meet the semi-strong conditions. Thus, semi-strong conditions must be met in order to reach full conditions. Without going through all the levels, equity prices could not reflect all information that are relevant.

On the other hand, a plenty of studies regarding the efficiency of stock markets have proven that efficiency levels are not fulfilled at all in the real world. Based on these studies, can be noted that markets are actually inefficient. This means that stock prices do not reflect all available information. For example, Urquhart & McGroarty (2016) found in their global research that stock prices predictability varies over time and predictability is dependent on market conditions. The fact that prices are predictable, is contrary to the hypothesis of Fama. Also, former studies such as Lo (2004), Lim & Brooks (2011), Smith (2012) and Urquhart & Hudson (2013) find related results.

## 2.2 The modern portfolio theory

The financial sector took the leaps forward in the 1950s when Harry Markowitz developed the modern portfolio theory. Markowitz published his research in 1952 which created the base for developing the CAP-model. The result of Markowitz (1952) study was the theory of creating an investment portfolio. The assumption of the portfolio theory is that investor wants to avoid return fluctuation, but on the other hand, it also seeks high returns. Markowitz justify his theory by an example: if the investor uses only a high expected return as a rule of portfolio formation, investor select one stock with highest expected return to the portfolio. Only in a special case where the expected return on shares would be exactly the same, it would be wise to hold more than one share in the portfolio. Thus, Markowitz added the assumption of minimizing the variance of returns to his theory. With this assumption, he was able to derivate a portfolio formation rule, where diversification would bring additional benefit to the investor. Markowitz states that diversification must be done in a correct way. For example, by investing in companies in different industries, it is possible to achieve lower covariance between

investments. Low covariance between investments makes possible to create a portfolio with lower variance than its individual stocks' variances. (Markowitz 1952)

### 2.1.1 Securities pricing in an efficient market

Assuming the financial market is efficient, the question remains about how the securities are priced. From the 1950's, researchers have constructed and tested various models in which the price formation of securities can be explained. Treynor (1962), Sharpe (1964), Lintner (1965a, 1965b) and Mossin (1966) has made the greatest impact on finance, when they developed CAP-model (Capital Asset Pricing Model) in the 1960s. The CAP-model and other securities pricing models are examined more specifically in the chapter four.

# 3. Investment Anomalies Based on Financial Figures

In this chapter, it is presented investment anomalies that are based on financial figures of companies. The examined strategies are value investing and quality investing. According to Kallunki (1996), recurring predictability of returns is considered as an anomaly, a reversed phenomenon of effective markets. For example, value stocks and high-quality stocks generate better returns on average than other stocks without higher risk.

Although previous studies observe that the market efficiency hypothesis is very solid in the long term, in the 1970s researchers began to doubt whether the stock price reactions can really be the result of changed expectations. An effective market hypothesis was then considered critically. As a result, it was found deviation from the effectiveness of the market. From the investors point of view, the most interesting aspect are regular deviations from the market efficiency assumption, i.e. anomalies. Based on anomalies, different investment strategies are being created that are historically very productive. According to Nikkinen et. al (2002), the well-known anomalies are for example:

- Value stocks produce higher returns than growth stocks
- Low P/E ratio companies produce high returns
- Small companies produce higher returns than big companies
- Momentum anomaly
- January anomaly

## 3.1 Value anomaly

### 3.1.1 Price to earnings ratio

Value stocks can be identified by various number of measures, but probably the most used measure is price to earnings (P/E) ratio, when making investment decisions. P/E-ratio is widely used when making investment decisions. It describes the relationship between the price of the share and earnings per share. P/E-ratio can be calculated either on a per-share level or at company level (company's market value / net profit). Principally, in both cases the P/E value is the same.

P/E-ratio tells how many years it takes the company to make profit as much as its market value is, if profit remains unchanged. The P/E-ratio varies by industry. Usually, the P/E-ratio is higher for growth companies because investors are willing to pay for future expectations. Correspondingly, for low growth companies and industries, the P / E ratio usually gets lower than the average.

Effectiveness of the P/E ratio in support of investment decisions has been studied already in 1960s. Nicholson (1968) proves in his paper that low P/E ratio shares generated better returns than shares with high P/E ratio. Comparable results are also available in Basu (1977) paper. Additionally, the study shows that stock's beta correlates positively with P/E ratio. This can be concluded that better returns generated by low P/E ratio shares are not due to increased risk. Athanassakos (2009) investigated the impact of P/E ratio and P/B ratio on stock returns on the Canadian stock market in 1985-2005. Based on his research, shares with low figures profited better than other stocks. However, low P/E ratio stocks were more successful than low P/B ratio stocks.

Earnings of the previous fiscal year or estimate of the future earnings are generally used as divider of the P/E ratio. When used figures based on the future, the problem is how to estimate earnings correctly. Because it is very difficult to make accurate estimates, most often actual earnings of the previous year is used as a divider when calculating the P/E ratio.

In the perfect and stable market, the stock price is comprised of the present value of future cash flows. On the other hand, dividends will form the future cash flow in the long term. According to Gordon's (1962) model of continuous growth, the P/E ratio is defined as follows:

(1)¶ ¶ $$P/E = K/(r - g)$$

Where:

K = dividend ratio
r = the expected return of the share
g = the expected growth rate of dividends

Generally considered main factors that are influencing P/E ratio are level of long interest rates and level of inflation, especially when studying the whole market. Also, the growth of domestic product, dividend percentage, earnings growth, short-term interest rate and volatility of earnings impact on the prevalent P/E ratio in the market. Because of previously mentioned reasons, markets overall P/E ratio should be evaluated in the light of these factors. On the other hand, when viewing a single company, it is not meaningful to compare P/E ratios between companies from different industry. Growth expectations varies from industry to industry, so P/E ratios should be compared between similar companies. (White 2000)

### 3.1.1 P/D ratio

The P/D ratio is calculated by dividing the market price of the stock by a dividend paid by the company. In practice, P/D ratio thus tells the investor how much he has to pay for a dividend of one euro. This indicator allows the investor to compare the dividend yield of his equity investment with a interest rate investment and it's return. In an efficient market, when the growth level of interest rate and dividend yield remains unchanged, the P/D ratio can be derived from Gordon's (1962) formula:

(2) $$D/P = r - g$$

Where:

r = expected return of a stock
g = the fixed growth rate of dividends

However, naturally the dividends growth rate or interest rate are not fixed in the real world. According to Campbell & Shiller (1988), companies are not able to manipulate the PD ratio by accounting measures, which is considered as huge advantage compared to profit based financial indicators. For example, depreciation or write-downs made by the company in the previous fiscal year has impact on its net profits and that way it effects on the P/E ratio. There is not the same

problem when using P/D ratio. Due to the fact, professional investors often prefer the P/D ratio over other indicators. Additionally, companies do not want to cut dividends, which might secure future returns of an investment. Also, companies with high dividend yield are broadly considered as profitable investments.
The D/P ratio is affected by several factors, and the values of this indicator can vary greatly depending on the company's situation. Generally, value company's goal is not to grow, so it can pay more of its profits as dividends to the investors. Similarly, growth company needs its profits for growing, in other words, to make better returns in the future. When an investor uses dividend yield as a support of investment decisions, it should be noted that an exceptionally low ratio may mean a poor result, i.e. the company is not economically successful. (Campbell & Shiller 1988)

## 3.2 Quality anomaly

According to Novy Marx (2014), there is no universally accepted definition for “quality” in finance. However, several different quality measures can be obtained, such as earnings quality (Sloan 1996), F-score (Piotroski 2000), profitability (Novy Marx 2013). Quality companies are typically strong in their market position and have clear competitive advantages over smaller players or new entrants in the industry. For example, these advantages are the brand, share of the market and skilled management. The cash flow of such first-class companies is strong, which often means little investment need for business maintenance. Quality companies’ profits are both stable and predictable, and even in a weak market situation, they can maintain their cash flow. Moreover, these kinds of firms are managed on a proprietary basis, whereby profitability is always more important than excessive growth. Growth is of course important, but it is implemented carefully. In addition, the quality firms are remarkably solvent, so there is not too much debt in their balance sheets. (Norges Bank 2015)

When investing in quality companies, the price of a stock is not the most essential factor. Instead of the stock price, investor should emphasize company's profitability and low debt. Of course, if the price of quality company's stock is low, it could be even better investment. However, after 2008 financial crisis it has been major bull market and stock prices have risen to the all-time high level, so it is very difficult for investor to find undervalued quality stocks. (Norges Bank 2015)

### 3.2.1 Gross profitability

The gross profitability ratio has recently gained popularity among investors, as it is believed to be an excellent indicator for identifying quality shares. Novy-Marx (2013) finds that company's gross profitability can significantly predict relative performance of a single stock and has approximately as much explaining power as book-to-market ratio.

If company has high gross profitability ratio, it roughly means that the company success better than its competitors inside the industry. To achieve success, the company must have some sort of competitive advantage, which it can use to benefit (Novy Marx 2013). Gross profitability can be calculated as follows:

(3) Gross profitability = (Revenues – Cost of goods sold) / Assets

### 3.2.2 EBITDA

Earnings before interest, taxes, depreciation and amortization is measure of company's profitability. Above all, it measures firm's operational profitability, because it takes into the account only those costs and expenses that are essential to run the business. In this paper, I use Ebitda premium, which means that Ebitda is scaled by total assets of a company, as Novy Marx (2013) scales gross profits in his study.

One of the first academic studies where Ebitda-figure is examined as investment strategy, were Leivo & Pätäri (2009) in the Finnish stock market. According to the paper, a portfolio based on Ebitda/EV figure has the second highest annual return among four different strategies, and it generated highest returns measured by risk-adjusted method. Gray & Vogel (2012) find even better results, as their study shows 17,66 % annual returns and 2,91 % annual three-factor alpha for Ebitda/TEV porftolio during 1971-2010.

### 3.2.3 F-score

Piotroski (2000) F-score is an investment strategy that seeks to find the most "healthiest" companies among value stocks based on nine financial ratios. Based on these indicators, Piotroski divides the stocks to winners and losers. Piotroski sorts those nine indicators into three groups that describe 1) profitability, 2) debt, liquidity and the source of funds, and 3) efficiency of operations. Each of these indicators gets value zero or one, of which the F-score is calculated. The highest score denotes the most attractive investment.

Piotroski (2000) points out that F-score intention is not to look for an optimal set of key figures for selecting stocks. Instead, by implementing F-score, investors are able to remove those stocks from the portfolio, which future expectations are weak. According to the study, the benefits of the method are mostly seen in small and medium-sized companies, which is probably due to a fact that large companies are extensively followed by analysts and pricing errors can be rarely found.

# 4. Securities pricing and evaluation of stock performance

The stock performance, as well as the factors influencing, can be examined from many different points of view and based on diverse number of models. Next, it is presented most used securities pricing models and popular ways to evaluate the stock performance.

## 4.1 Capital Asset Pricing model

The CAP-model (Capital Asset Pricing Model) is one of the most principal factors in the modern financial theory. It is initially developed by William Sharpe (1964), for which he was also awarded the Nobel Prize. According to the CAP-model, the return of capital is achieved by adding a market risk premium multiplied by the company's beta coefficient to the risk-free interest rate. The model indicates the long-term average return on asset required by investors. It is important to notice that the model estimates required or expected return, not a guaranteed return. This is due to the fact that volatility causes deviations from the expected return in the short term. According to the theory, in very long term the CAP-model return is the same as the real return. (Nikkinen et al. 2002, 68)

According to Nikkinen et al (2002, 68-69), there are some basic assumptions when using the CAP-model:

1. There are no transaction costs
2. Investment objects can be divided into extremely small parts
3. There are no taxes
4. The market is perfect, so investor is not able to impact prices
5. The expected return and the standard deviation serve as a base for investment decisions
6. There are no limits for short selling
7. Investor can invest in risk free rate with no limits
8. Investors act homogenously

9. All capital assets can be traded

Naturally, most of the expectations of the CAP-model are not realized in real life. However, the model illustrates well the stock returns on the market. The key factor is how much investors are willing to put their investments in the market portfolios and how much into the risk-free investments. The risk premium (Erm - rf) and standard deviation of the market portfolio determine together the tolerance between risky and riskless investments. It is essential to find out the market risk for investing in certain types of shares. In practice, the risk premium of a share depends only on the beta factor (describes market risk). For example, if the stock's beta doubles, also the risk premium should double. (Kallunki et al. 2007)

The CAP model thus represents the expected stock return. The risk premium represents how much stock return exceeds the risk-free rate and the beta factor reflects the stock's systematic risk. Presented by Sharpe (1964), the CAP- model can be described by the following formula:

(1) $$E_{ri} = r_f + \beta_i(E_{rm} - r_f)$$

Where:

$E_{ri}$ = Stock's expected return
$r_f$ = The risk-free rate
$\beta_i$ = Stock's beta
$E_{rm}$ = Expected return of the market portfolio

## 4.2 Jensen's Alpha

Capital Asset Pricing Model (Sharpe 1964, Lintner 1965) serves as a base for many different models, such as Jensen´s (1968) model. Alpha of Jensen´s model describes abnormal returns over the CAP model returns. Thus, a positive and

statistically significant alpha indicates the stock´s risk-adjusted excess returns. The Jensen´s model can be described by the formula:

(2) $$R_{it} - r_f = a_i + \beta_i(R_{mt} - r_f) + \varepsilon_{it}$$

Where:

$R_{it}$ = the stock i return at time t
$r_f$ = the risk-free rate
$\alpha_i$ = the stock alpha
$\beta_{mt}$ = the stock's beta
$R_{mt}$ = return of the market portfolio
$\varepsilon_{it}$ = an error term of the model

From this equation it is possible to empirically estimate alpha by OLS-regression.

## 4.3 Fama French factor models

Eugene Fama and Kenneth French (1993) developed the three-factor model based on the CAP-model, as several studies reveal that the CAP-model has problems explaining stock returns. The basic idea behind the model is that predetermined factors explain the returns of stocks. In the original model, there are three factors, which are selected based on Fama and French (1992) study. These factors are market return over the risk-free rate, size factor and value factor. In 2015 they added two more factors to the model, profitability and investment (Fama & French 2015).

In this paper I focus on a five-factor model, which can be presented by the following formula:

(3) $R_{it} - R_{ft} = \alpha_i + \beta_i(R_{Mt} - R_{ft}) + s_i SMB_t + h_i HML_t + r_i RMW_t + c_i CMA_t + e_{it}$

Where:

$R_{it}$ = the stock i return at time t
$R_{ft}$ = the risk-free rate at time t
$R_{Mt} - R_{ft}$ = the excess market return
$SMB_t$ = the size factor (the return spread of small minus large stocks)
$HML_t$ = the value factor (the return spread of cheap minus expensive stocks)
$RMW_t$ = the profitability factor (the return spread of profitable firms over unprofitable fims)
$CMA_t$ = the investment factor (the return spread of conservatively and aggressively investing firms)
$\beta_i$ , $s_i$ , $h_i$ , $r_i$ and $c_i$ = factor loadings
$\alpha_i$ = the intercept
$e_{it}$ = the error term

## 4.4 Sharpe ratio

The most important indicators describing the success of the investment are realized return and how much risk the investment involves. Income is measured for example in percentages and risk by standard deviation or volatility, i.e., the change in value of the asset. The first mistake that a beginner investor often does is to follow only the return of his investment, but not the risk involved. This does not give appropriate picture how the investment is performing. That is why investor should always take risk into the account. In theory, the best portfolio is one that produces high return at a very low risk. However, this kind of portfolio is very difficult to construct in practice.

The relationship between return on investment and risk can be measured by Sharpe ratio (Sharpe 1966), which is probably the most used risk-adjusted performance meter. The Sharpe ratio compares the expected return with the

volatility. The Sharpe ratio, therefore, tells you how much risk is taken to get returns. Sharpe ratio can be calculated simply by subtracting the risk-free rate from investment return and dividing the result by the volatility of the investment. In this paper I calculate volatilities and Sharpe ratios for every portfolio each year to make conclusions which portfolio performed best when risk is taken into the account. Thus, the higher the Sharpe ratio is, the better the investment has produced related to the risk involved.

Sharpe ratio can be presented by the following formula:

$$S = \frac{E[R - R_f]}{\sigma} = \frac{E[R - R_f]}{\sqrt{Var[R - R_f]}},$$

Where:

$R$ = return of investment

$R_f$ = risk-free rate

$\sigma$ = volatility

# 5. Literature review

## 5.1 Value investing

In value strategy, it is invested in equities whose market price is low compared to the past price of the share or to a variable describing the company's financial position. Value strategy is also known as value anomaly. Several number of studies all over the world have provided robust evidence that the value stocks generate better return than the growth stocks.

As mentioned, value investing is a popular investing strategy that is originated already in 1930s. In year 1934 Graham & Dodd recommended investing in companies whose earnings, book value and dividend yields are relatively high to the price of the share. These kinds of stocks are called value stocks, meaning that they are underpriced, which should lead rising value in the future. The opposite of value stocks are growth stocks, whose prices are relatively high. Also, Nicholson (1968) found in his study that stocks with low price to earnings ratio have better profits than other stocks. Since then, the effectiveness of value investing strategy has been proven in stock markets all over the world.

Basu (1977) published a well-known study in which he discovers that low P/E ratio companies are able to produce better returns than market on average. The paper investigates listed companies in the US between years 1956 and 1971. In this case, one of the first scientific evidence was obtained about the returns of the value investing strategy. The study shows that low P/E ratio companies generated excess returns over high P/E ratio companies.

Another measure of value companies, P/B ratio was studied by Fama and French (1992). Their findings present that low P/B ratio companies can produce excess returns over high P/B ratio companies. Like Basu (1977), they studied listed companies from the US by using time interval 1963-1990. During this period, the value portfolio produced an average of 20% return annually, while the growth portfolio yielded 8% annual return on average. Fama & French (1993) paper continues the research, which is a revolutionary in the financial history, as it argues that the

CAP-model cannot explain the cross-section of stock returns. They present an alternative model, the Fama French three-factor model that include market, size and value factors.

The spread between prices of value and growth stocks is known as value premium. There are divergent opinions about the reasons of value premium. According to Lakonishok et al. (1994) paper, the pricing differential is due to undervaluing less successful companies. Companies that don´t success are not desired among investors, even if their price is low related to the risk. From this interpretation can be deduced that the value premium is due do the fact that investors operate irrationally.

Chen and Zhang (1998) analyzed returns and risks of value stocks in the United States, Japan, Hong Kong, Malaysia, Thailand and Taiwan. The study presents convincing evidence that value investing is profitable strategy in developed countries but not in the quickly developing countries. However, even if the results show that profits of value stocks are relatively high, they are driven by clearly higher risks. This is because value stocks are often companies in trouble in their market segment and their future expectations are weak. Also, their financial situation seems to be relatively weak.

One principal factor in examining the value strategy is the holding period chosen for the investment, so how long the investment will be held before it is sold. There have been differences in holding periods between studies, and the results are also variable. Leivo and Pätäri (2009) examined Finnish stock market returns by using value strategy. According to their paper, it is possible to achieve excess returns by using value strategy, if the holding period is up to five years. Furthermore, they noticed that short investment times don't probably give the best possible returns from the value investing. Comparable results can also be found on the European stock markets. Bird & Casavecchia (2007) results present that value strategy generates best excess returns when the holding period is three years, which was the longest holding period that they used in their paper. However, Bird & Casavecchia (2007) tested different holding periods and excess returns are noticeable even, if the holding period is just a one year

## 5.2 Quality investing

Novy Marx (2014) paper is probably best-known quality investing study made so far, which extensively examines different indicators of quality investing, and how they can predict future stock returns. There is a total of seven quality meters examined, and portfolios are formed in a such way that the best (weakest) 30% goes to the long (short) portfolio according to each meter. Novy Marx uses one year holding period, and after that, portfolio is reformed. I use the same method and holding period in this study.

One of the most important findings of the study is that almost all quality measures are negatively correlated with traditional value strategy (book to price), when gross profitability strategy returns are the most negatively correlated (-0,68). Earnings quality and defensive strategies are exceptions, they tilt towards value strategy. These findings suggest that investing in high profitable firms is an effective hedge for value investors. Additionally, Novy Marx also presents statistically significant evidence that investing in firms with high gross profitability, generates excess returns over the market index. Regression against Fama French three-factor model shows even better result: gross profitability has over 5% alpha, which is also statistically significant. For long only investors, results are quite similar as long-short investors (Novy Marx 2014). Asness et. al (2013) study supports these findings as it provides evidence that a quality-minus-junk (QMJ) portfolio earns significant risk-adjusted excess returns globally. Additionally, it shows that quality stocks tend to be more expensive, but the price of quality varies over time. Moreover, a low price of quality predicts high returns for quality stocks in the future and vice versa. In this paper I will use the same methodology as Novy Marx, but I will use Fama-French five-factor model as well for controlling risk-adjusted returns.

In recent years, it has been a great debate why gross profitability better explains future stock returns than other profitability metrics, such as net income, cash flows and dividends. Ball et al (2014) paper investigates if the source of gross profitability's explaining power lies in the numerator or alternatively in the deflator of the formula used. Their findings show that if deflators are equal, gross profit and net income has the same power of explaining future stock returns. In previous studies, net income is usually deflated by market or book value of equity, but gross profits are deflated by total assets. They also find that operating profitability is even better measure that either gross profitability or net income, and it can predict returns even 10 years ahead. (Ball et al 2014)

Jiang et al (2018) studied profitability premium in the Chinese stock market from year 2001 to 2014. They use gross profits, return on assets and return on equity of approximately 1500 firms as profitability measures. Their study proves that there is significant profitability premium in the Chinese stock market, similarly as Novy Marx (2013) is able to capture profitability premium among the US stocks. Additionally, Jiang et al (2018) show that there is clear negative correlation between gross profitability and value and size factors, which means that profitability strategy work as a powerful hedge against value strategy.

According to Marx (2014), strategy proposed by Greenblatt (2006, 2010), Magic Formula, can be seen as a strategy that combines features from quality and value investing. Return on invested capital represents quality and earnings yield represents value. Davydov et al. (2016) investigated how magic formula and cash flow-augmented magic formula performs against traditional value investing strategies in the Finnish stock market during 1991-2013. Davydov et al (2016) study shows that portfolio formed by pure Magic Formula is not able to generate higher returns than portfolio formed by traditional value measures in the Finnish stock market. However, these strategies generate 19,26% and 20,17% annual returns on average, while the best obtained value strategy (Ebit/EV) earns 20,57% on average.

Piotroski (2000) investigated whether it is possible to gain excess returns over the market index and traditional value strategies by picking up the most profitable companies from the value stocks during 1976-1996. He developed F-score, which measures the company's financial status with nine variables. The variables are binary, i.e. they get either value one or zero, depending on whether the observation is positive or negative signal from the state of the company. F-score includes nine variables that describe the company's profitability, debt, liquidity, the source of assets and the effectiveness of the operations. F-score value is obtained by summing the individual signals together. Based on the results, high F-score companies generated 13,4% excess returns over the market and 7,5% better returns than traditional value strategy constructed by price to book ratio.

Tikkanen & Äijö (2018) examine if different traditional value strategies' performance can be improved with Piotroski's (2000) F-score in the European stock exchanges during 1992-2014. The studied ratios are B/M, E/M, D/M, EBITDA/EV and Nov Marx (2013) profitability ratios. According to the results, adding F-score screening method to these strategies significantly enhances the returns of portfolios. The results indicate that the EBITDA/EV strategy is the most powerful among medium and small sized companies, yielding 19,86% and 19,98% compounded annual returns, while Novy-Marx's profitability portfolio generates only 15,13% (small companies) returns or lower. Also, Loughran & Wellman (2011) find strong relationship between Ebitda and stock returns. Their results show that EM portfolio (equity value + dept + preferred stock – cash divided by Ebitda) yields 1,92% yearly excess return over the market portfolio over the sample period 1963-2009, when controlling for the Carhart four-factor model.

# 6. Data and methodology

In this chapter, it is presented the research hypotheses more specifically. After that, the data used in this paper is introduced. The last subchapter goes through the methodology used in this paper to reach empirical results.

## 6.1 Research hypotheses

Previous studies (see for example Novy Marx 2014 and Tikkanen & Äijö 2018) prove that implementing quality strategy, it is possible to generate abnormal returns over the market. However, there are lack of studies made in the Finnish stock market that implement quality strategy by using Ebitda/TA or gross profitability as quality metrics when forming portfolios. Since the aim of this study is to examine dependence between quality metrics and stock returns and prove it statistically, the first hypotheses are:

H1: *Stock returns are dependent on the company's Ebitda/TA figure*

*H2: Stock returns are dependent on the company's Gross Profitability*

Moreover, the Fama French five-factor regressions are run against quality portfolio returns to find out if the returns can be explained by the risk factors, the second hypothesis is:

H3: Quality stock returns cannot be explained by the risk factors

## 6.2 Data

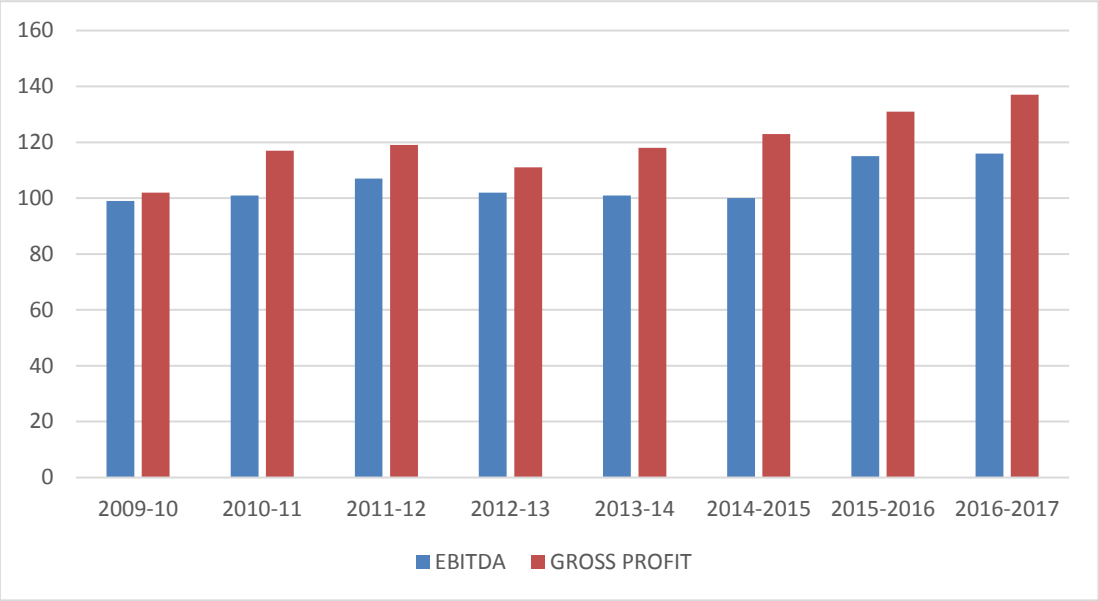
The most important source was the database provided by the University of Vaasa, Thomson Reuters DataStream. Fama French's European five-factor

values I have downloaded on their site. As market return, I use OMX Helsinki Gap GI index, whose data I have gathered from the Bloomberg database. Additionally, I use 12-month Euribor rate as a risk-free rate, whose data is also collected from Bloomberg database.

The data collected for this study covers the period from 30 June 2009 to 30 June 2017. I decided to focus on this period because I want to look at the post-financial crisis, which is the time when stock markets all over the world have been mostly bullish. The collection of the data was limited to companies quoted on the Helsinki Stock Exchange. However, financial companies are excluded from the study, because their financial statement reporting differs from ordinary companies. Also, companies whose data could not be obtained were excluded from the paper. The above-mentioned period is eight years and for each year it is formed four model portfolios. Therefore, together there are 32 model portfolios. These model portfolios are Ebitda/TA Long, Ebitda/TA Long-Short, Gross Profitability Long and Gross Profitability Long-Short. The total number of observation companies for the period is 1799, of which 841 companies were for Ebitda/TA and 958 companies for Gross Profitability.

The figure (2) shows the total number of annual observation companies used in this paper. As mentioned before, there were total 1799 observation companies during the review period, from which the model portfolios were formed annually end of each June. However, the portfolio formation is based on the year end accounting variables of the previous year. According to Davydov et al. (2016), by using this method, it is possible to lower the risk that research would be exposed to look-ahead bias. Related to the gross profitability observations, there is much less observation companies for Ebitda/TA. This is since Ebitda is relatively new indicator and not all companies publish it in their financial statements.

Figure (2.) Number of observation companies year by year




## 6.3 Methodology

Model portfolios are formed so that the shares were ranked according to both financial figures, Ebitda and gross profits (both scaled by total assets) from highest to lowest. Top 30 percent of the companies were selected to the Long portfolio and bottom 30 percent of the companies were selected to the Short portfolio. In this study, it is used one year holding period, so the portfolio formation is repeated each year during the eight-year period. Similar portfolio breakdown is commonly used by several previous papers of this kind. All the shares that were selected to the portfolio has the same weight. However, the weight of the one share in the portfolio varied annually, depending on the number of the shares in the model portfolio.

In this paper, it assumed that the shares selected for the portfolio were held to the end of holding period. At the end of the holding period, all the shares were sold off and thus returns or losses were realized. The aim was to get the most realistic image about the portfolio performance, so the companies that left the exchange during holding period were also taken into the account. Trading costs and taxes have not been taken into the account in this study. The data gathered for the research was analyzed by determining the total return per annum of each

portfolio. The calculation of the total return on portfolios took account the change of the price of each stock selected in the portfolio and any possible dividends.

### 6.3.1 The simple regression models

Each year, 2009-2017, a regression analysis is carried out, in which Ebitda/TA and gross profitability are the explanatory variables for the return of the shares. Subsequently, the averages of these regression coefficients are calculated, and the t-values are calculated by dividing the coefficient mean by the mean error average. The same method is used by Lakonishok et al. (1994) and Davis (1994) in their studies. These models are used to find out if Ebitda/TA and gross profitability can explain stock returns.

Hence, I start with the simple regression models using the following regression equations:

(4) $$r_1 = \alpha + \beta_1 * EBITDA + \varepsilon$$

(5) $$r_1 = \alpha + \beta_1 * GP + \varepsilon$$

Where:

$r_1$ = return of a stock

$\alpha$ =intercept

$\beta_1$ = coefficient for variable

EBITDA = company's Ebitda scaled by total assets

GP = company's gross profitability

$\varepsilon$ = error term

### 6.3.2 Fama-French five-factor model

I also use Fama-French five-factor model to examine if Ebitda/TA and gross profitability portfolio returns can be explained by risk factors:

(6) $$EBITDA_{rf} = \alpha + \beta_i MARKET + \beta_2 SMB + \beta_3 HML + \beta_4 RMW + \beta_5 CMA + \varepsilon$$

(7) $$GP_{rf} = \alpha + \beta_i MARKET + \beta_2 SMB + \beta_3 HML + \beta_4 RMW + \beta_5 CMA + \varepsilon$$

Where:

$EBITDA_{rf}$ = Ebitda/TA portfolio monthly returns over the risk-free rate

$GP_{rf}$ = Gross Profitability portfolio monthly returns over the risk-free rate

$MARKET$ = is the market return over the risk-free rate

SMB = the size factor

HML= the value factor

RMW = the profitability factor

CMA = investment factor

After regressing five-factor model against Ebitda/TA and gross profitability portfolio returns, I drop factors one by one to examine if there are factors, which don't give any additional value to explaining returns.

# 7. Results

In this chapter, it is introduced empirical results of the study. First, the observed average return and risk levels on profitability portfolios are examined during investment period. Additionally, performance of portfolios is presented, and is compared with each other and with benchmark index. Secondly, statistical test results are introduced. At the end of the empirical part, there is summary of the results.

## 7.1 Summary Statistics

Table (1.) shows summary statistics of quality portfolios and market index during the sample period 2009-2017. Panel A presents yearly mean return, mean standard deviation and Sharpe ratios of Ebitda/TA (Long) and Gross Profitability (Long) portfolios and OMX Helsinki GAP GI index. Panel B shows the same information for Long-Short portfolios. As can be seen in Panel A, Ebitda/TA-portfolio yearly mean return is 21,11%, when Gross Profitability-portfolio generate 19,23% return per year on average. The market mean return during the period is 16,12%. According to the results, both quality strategies produced clearly better than the market index. In addition, the standard deviation of the Ebitda-portfolio (GP) is 17,72% (17,96%), when standard deviation of the market index is almost the same, 17,93%. Sharpe-ratio, which measures the risk adjusted performance of a portfolio, is 1,147 (1,027) for the Ebitda-portfolio (GP) and 0,855 for the market index.

When considering quality investing as alternative strategy to value investing, it can be noted that these results are in the same direction as previous literature of value investing. For example, Davydov et al. (2016) comprehensive study find traditional value strategies generate about 20% mean returns per year on average, and Magic Formula-strategy reaches 19,26% mean return in the Finnish Stock Market during 1991-2013. Value strategies seem to have consistently higher standard deviations than quality strategies investigated in this paper, since the observation period is totally different.

Table (1.) Summary statistics of quality strategies and market index

| Panel A | | | |
|---|---|---|---|
| LONG | Ebitda/TA | Gross Profitability | Market |
| Mean return | 21,11 % | 19,23 % | 16,12 % |
| Mean Std. Dev. | 17,72 % | 17,96 % | 17,93 % |
| Mean Sharpe | 1,147 | 1,027 | 0,855 |

| Panel B | | |
|---|---|---|
| LONG-SHORT | Ebitda/TA | Gross Profitability |
| Mean return | 11,99 % | 11,69 % |
| Mean Std.Dev. | 12,24 % | 7,64 % |
| Mean Sharpe L-S | 0,915 | 1,427 |

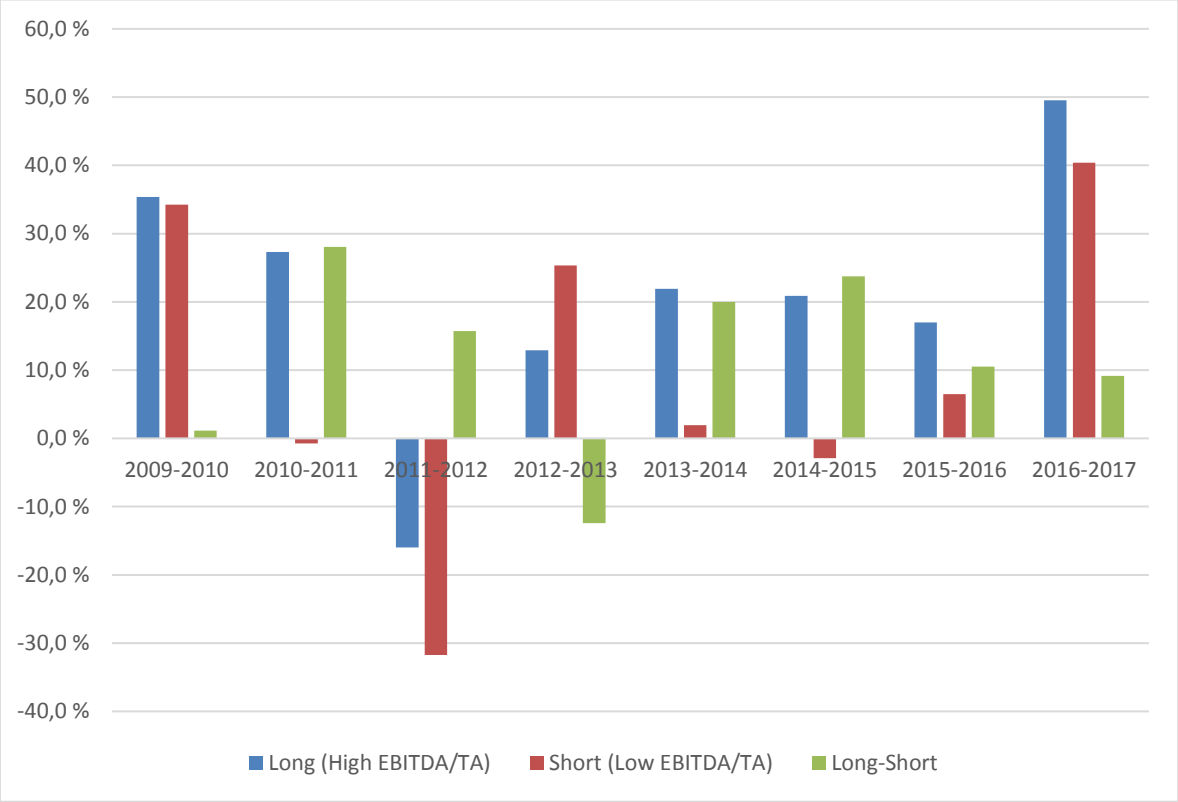
Panel B of table (1.) reports the same figures as Panel A, but for L-S portfolios. Returns look much weaker than the same numbers for Long-portfolios. Mean returns of L-S portfolios are 11,99% (Ebitda/TA) and 11,69% (GP). Unexpectedly, mean standard deviations of LS-portfolios are remarkably low, 12,24% for Ebitda/TA and 7,64% for GP-strategy. Sharpe-ratios are on at high level, 0,915 for Ebitda/TA and 1,427 for GP respectively. The results imply that despite the relatively low average annual returns, it possible to produce stable returns with low risk by implementing L-S quality strategies.

## 7.2 EBITDA-portfolio returns

As it can be seen in Figure (3.), high Ebitda/TA companies have generated clearly better returns than low Ebitda/TA companies in the Finnish Stock Exchange during the sample period 2009-2017. In seven years out of eight, Long-portfolio outperformed Short-portfolio. Only in one review year, 2012-2013, Short-portfolio performed better than Long-portfolio. This might be explained by the fact that

during 2012-2013 stocks bounced back from the market crash caused by distressed European states and banks. However, it seems that during decline year unprofitable firms suffer clearly more than firms in healthy condition. This is quite expected result, as high-quality companies can maintain their success through unfavorable economic times.

Figure (3.) Ebitda/TA portfolio returns during 2009-2017

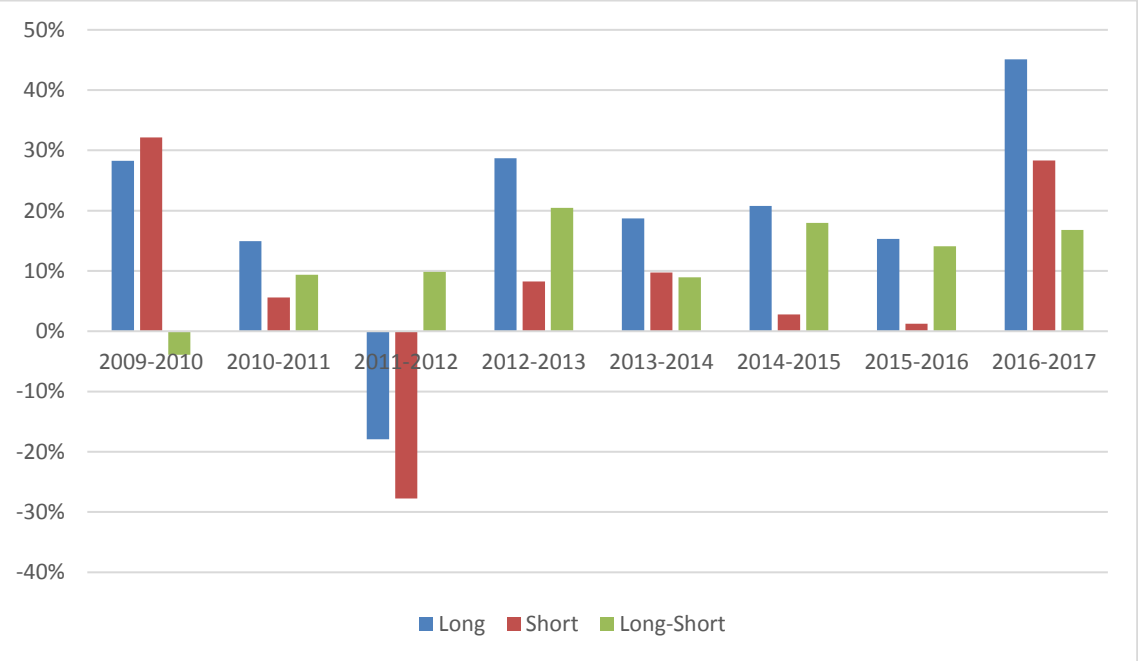



## 7.3 Gross Profitability-portfolio returns

Figure (4.) shows returns for portfolios formed by Gross Profitability. As expected, results seem to be quite similar compared to Ebitda/TA-portfolio returns. Companies with high Gross Profitability beats unprofitable firms in seven years out of eight. Period 2011-2012 is the only year when Long-portfolio returns are negative. Additionally, it can be detected from the chart that especially in the steep decline market, Long-Short portfolio can achieve positive returns. However, there was only one bearish year during the sample period, so it is not possible to draw

significant conclusions. The difference of returns between high profitability and low profitability firms is large enough that the Long-Short portfolio generates good returns also in the bullish market.

Figure (4.) Gross Profitability portfolio returns during 2009-2017




The results are in the same direction as Novy-Marx (2013) finds in his research, profitable firms consistently outperform unprofitable firms, which applies also in the Finnish Stock Exchange.

## 7.4 Profitability-portfolios Compared to Market Index

To investigate whether profitable firms can generate excess returns, i.e. higher returns related to the Finnish stock market, model portfolio returns should be compared with market index. In this paper, OMX Helsinki CAP GI Index is used to describe market returns, because it is weight capped and takes dividends into the account.

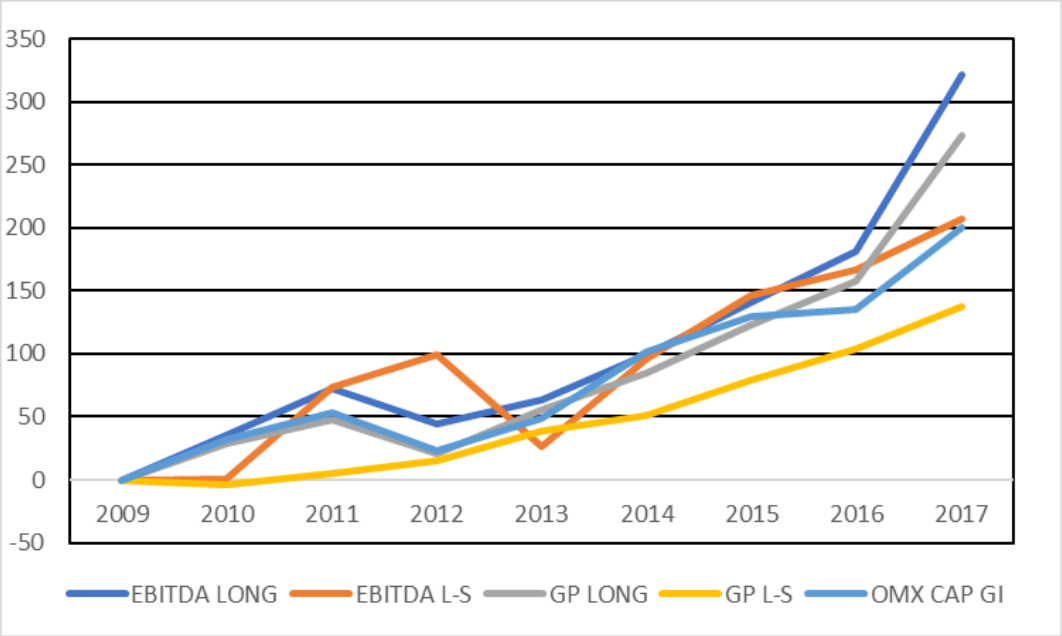
Table (2.) Profitability portfolios vs. OMX Helsinki GAP GI 2009-2017

| Portfolio | LONG (HIGH EBITDA/TA) | LONG (HIGH GP/TA) | LONG-SHORT (HIGH-LOW EBITDA) | LONG-SHORT (HIGH-LOW GP/TA) | OMX Helsinki GAP GI |
|---|---|---|---|---|---|
| 2009-2010 | 35,38 % | 28,25 % | 1,14 % | -3,92 % | 31,81 % |
| 2010-2011 | 27,30 % | 14,96 % | 28,04 % | 9,35 % | 16,07 % |
| 2011-2012 | -15,99 % | -17,93 % | 15,74 % | 9,82 % | -19,87 % |
| 2012-2013 | 12,90 % | 28,69 % | -12,42 % | 20,46 % | 21,75 % |
| 2013-2014 | 21,92 % | 18,71 % | 20,01 % | 8,97 % | 35,01 % |
| 2014-2015 | 20,86 % | 20,78 % | 23,76 % | 17,97 % | 14,17 % |
| 2015-2016 | 16,98 % | 15,30 % | 10,50 % | 14,07 % | 2,49 % |
| 2016-2017 | 49,53 % | 45,09 % | 9,14 % | 16,78 % | 27,51 % |

As Table (2.) illustrates, both LONG-portfolio returns goes roughly to the same direction with market index year by year. A closer look, however, indicates that only one of the eight periods, the market has produced better returns than both portfolios formed by profitability ratios. When comparing Long-Ebitda/TA and Long-Gross Profitability portfolios to each other, it can be noticed that portfolio formed by Ebitda/TA produced clearly better than portfolio formed by Gross Profitability. As exception period 2012-2013, when Gross Profitability portfolio returns were approximately two times higher than Ebitda/TA portfolio returns, which can be considered a reasonably large surprise. The best investment periods for Long-portfolios were 2009-2010 and 2016-2017, when Ebitda/TA-portfolio achieved 35,38% and 49,53% returns and Gross Profitability-portfolio generated 28,25% and 45,09% returns. Respectively, market returns were 31,81% and 27,51% in the same period, indicating that both profitability portfolios (especially Ebitda/TA) won the market clearly.

To get better insight on the performance of quality strategies over time, the figure (5.) provides cumulative yearly returns of Ebitda Long (Long-Short), GP Long (Long-Short) and OMX CAP GI portfolios. Both long strategies outperformed market index during the sample period and Long Ebitda/TA strategy seems to continually yield highest returns, while Ebitda L-S performed as well as market index and GP L-S has clearly weakest returns. The curve for GP L-S portfolio retunr

Figure (5). Cumulative yearly returns of Ebitda Long, Ebitda L-S, GP Long, GP L-S and the market index



# 8. Regression analysis

To ensure that selected profitability strategies are able to beat the market, a regression analysis is performed. The first part of the regression analysis examines how the selected profitability indicators can explain the stock returns on the Finnish stock market. The second part of the regression analysis chapter presents the results of Fama French 5-factor model and other factor models as well.

## 8.1 Linear regression analysis results

Each year, 2009-2017, a simple regression analysis was carried out, in which Ebitda/TA and Gross Profitability were the explanatory variables for the return of the shares. Subsequently, the averages of these regression coefficients were calculated, and the t-values were calculated by dividing the coefficient mean by the mean error average. The same method is used by Lakonishok et al. (1994) and Davis (1994) in their own studies. Moreover, it is noteworthy that in some years, the residuals of the model are heteroskedastic. Heteroskedasticity is taken into the account by eliminating the top and bottom 5% from the data.

Table (3.) shows the main results of the simple regression analysis. As table presents, there is strong relationship between Ebitda/TA ratio and returns of the shares during 2009-2017. The Ebitda coefficient is 2,152 with p-value 0,049, indicating that the result is statistically significant at 5% level. However, the intercept of the regression model is relatively high 7,1%. Based on the high level of intercept, it can be stated that there are more variables that impacts on the returns of the shares. Leivo & Pätäri (2009) and Tikkanen & Äijö (2018) find related results, as they show that Ebitda/EV portfolios can yield high returns in the Finnish and European stock markets. The Gross Profitability intercept is slightly below zero, but it is not even close statistically significant result as the p-value is 0,854. Gross Profitability coefficient remains approximately one quarter of Ebitda's coefficient, being 0,565, with p-value 0,086. Hence, the result is statistically significant for Gross Profitability at 10% level. These results can be interpreted so that the company's high Ebitda and Gross Profits scaled by total assets are positively correlated with the company's stock returns. Conversely, low profitability is more likely to lead weak returns in the Finnish stock market.

Table (3.) Summary of regression analysis results.

| | Coefficient | T-value | P-value |
|---|---|---|---|
| Intercept | 0,071 | 1,929 | 0,057 |
| Ebitda/TA | 2,152 | 2,813 | 0,049 |
| | | | |
| | Coefficient | T-value | P-value |
| Intercept | -0,007 | -0,185 | 0,854 |
| Gross Profitability | 0,565 | 1,823 | 0,086 |

When interpreting the results, it is also worth noting that adjusted R squares of annual regressions varies between 0,3% and 11,9%, which are comparatively small percentages. R square is the most important meter that describes explanatory power of a regression. These obtained adjusted R squares implicate that in the best year, the model reflects 11,9% of the Finnish stock market returns and in the worst year only 0,3% of the returns are explained by the model. Consequently, it can be concluded that there are more factors on the Finnish Stock Exchange that affect stock returns. For example, in the small stock exchange like OMX Helsinki, market return strongly affects individual stock returns. Next, it is investigated if Ebitda/TA and Gross Profitability portfolio returns can be explained by risk-adjusted methods such as Fama French Five-Factor model (Fama & French (2014).

## 8.2 Fama French Five-Factor Model Regression

As mentioned previously, there are several other variables than profitability that affects firm's stock performance. Fama & French (2014) presented five-factor model that takes market return, size, value, profitability and investment factors into the account. Model 5 of table (4.) shows the time series regression results of Fama French five-factor model for Ebitda/TA (long) portfolio. Models 1-4 describes the results, when factors are dropped one by one.

It can be clearly see from the table that portfolio formed by Ebitda/TA generates annualized abnormal return regardless of the model. However, only three of the models indicate that the portfolio's alpha is statistically significant. In model 5, which includes all factors of Fama French five-factor model, alpha is 4,64% and this is a statistically significant result at 10% significance level. Also, Model 3 provides statistically significant abnormal return (4,52%) at 10% significance level. Model 1, where only market return is an explanatory variable, abnormal return is 5,14% per year, which is statistically significant at 5% level. Since there are no remarkable differences between the results of regression models, it is focused on Model 5, which have the biggest number of factors. The results are largely in the same direction with other similar studies that focus on the Finnish stock market. For example, Davydov et al (2016) find that portfolio formed by Ebit/EV generates 7,58% annualized alpha in the Finnish Stock Exchange when regressing against Carhart four-factor model. This is almost two times higher when compared with Fama French five-factor model alpha obtained in this paper. The difference between these two model alphas may due to the regression model used or that the EBITDA is rawer figure than EBIT, as EBIT includes amortization and depreciation. Also, In Davydov et al. (2016) paper, it is used enterprise value as a divider, when I follow Novy Marx (2013), which uses total assets as a divider.

Additionally, Table (4.) reports Ebitda/TA-strategy's factor loadings on Fama French five-factor model and other models as well. As predicted, factor loadings for market are highly significant, and varies from 0,743 (Model 5) to 0,772 (Model 2). These under 1 factor loadings for market implicate that Ebitda/TA-strategy has relatively low expose to systematic risk. Davydov et al (2016) Ebit/EV corresponds to 0,729, which is extremely close to Ebitda/TA-strategy's beta. All models show that the Ebitda/TA-portfolio is tilted towards small cap stocks, while SMB loadings are ranging from 0,380 to 0,407. All these betas are significant at 1% level. Respectively, the Ebitda/TA-portfolio appears to be composed of growth stocks as its HML loading varies from 0,097 to 0,244. However, these HML loadings are not statistically significant, even if Model 5 gets close to significant level. Correlation between RMW factor and portfolio return is almost zero, which is clearly insignificant result. Model 5 also captures investment factor CMA, which loading is -0,406 at significance level 5%. According to result, Ebitda/TA-portfolio consist companies that invest a lot. Models' adjusted R squares are ranging between 75,5% and 78,8%, which are surprisingly high. As predicted, explanatory

power of the model improved considerably, when portfolio returns are regressed against factors.

Table (4.). Multiple regression results for Ebitda/TA-portfolio.
Model 5 describes Fama French five-factor model, and models 1-4 presents the regression results when factors are dropped one by one. Table reports portfolio's alpha and factor loadings (T-values in brackets). *, ** and *** indicate statistical significance at 10%, 5% and 1% levels.

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| Alpha | 5,14 % | 3,68 % | 4,52 % | 3,78 % | 4,64 % |
| | (2,002)** | (1,508) | (1,692)* | (1,412) | (1,733)* |
| Market | 0,772 | 0,793 | 0,772 | 0,773 | 0,743 |
| | (17,159)*** | (18,509)*** | (16,715)*** | (16,628)*** | (15,447)*** |
| SMB | | 0,407 | 0,399 | 0,406 | 0,380 |
| | | (3,555)*** | (3,488)*** | (3,404)*** | (3,222)*** |
| HML | | | 0,097 | 0,110 | 0,244 |
| | | | (1,145) | (0,846) | (1,615) |
| RMW | | | | 0,041 | 0,050 |
| | | | | (0,197) | (0,240) |
| CMA | | | | | -0,406 |
| | | | | | (-2,029)** |
| Sample Size | 96 | 96 | 96 | 96 | 96 |
| Adj. R squared | 0,755 | 0,782 | 0,783 | 0,781 | 0,788 |

The regression results for the Gross Profitability portfolio can be seen from the Table (5.). All models work well in explaining the returns of the Gross Profitability portfolio as adjusted R square is ranging from 58,0% to 62,9%. The results are highly associated with Ebitda/TA regression results, but they are not as much

statistically significant. As can be seen from the table, Gross Profitability strategy yields clearly positive alpha despite the model. The highest annualized alpha is captured by Fama French five-factor model, 6,23%. However, none of the alphas are statistically significant at any level, even if Model 5, 3 and 1 get relatively close to it.

Table (5.). Multiple regression results for Gross Profitability portfolio.
Model 5 describes Fama French five-factor model, and models 1-4 presents the regression results when factors are dropped one by one. Table reports portfolio's alpha and factor loadings (T-values in brackets). *, ** and *** indicate statistical significance at 10%, 5% and 1% levels.

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 5 |
|---|---|---|---|---|---|
| Alpha | 5,88 % | 3,65 % | 4,27 % | 5,81 % | 6,23 % |
| | (1,481) | (969) | (1,129) | (1,402) | (1,478) |
| Market | 0,798 | 0,830 | 0,791 | 0,790 | 0,775 |
| | (11,496)*** | (12,536)*** | (11,116)*** | (11,086)*** | (10,310)*** |
| SMB | | 0,621 | 0,606 | 0,563 | 0,550 |
| | | (3,505)*** | (3,434)*** | (3,080)*** | (2,983)*** |
| HML | | | 0,180 | 0,028 | 0,089 |
| | | | (1,443) | (0,133) | (0,377) |
| RMW | | | | -0,299 | -0,295 |
| | | | | (-0,929) | (-0,914) |
| CMA | | | | | -0,196 |
| | | | | | (-0,628) |
| Sample Size | 96 | 96 | 96 | 96 | 96 |
| Adj. R squared | 0,580 | 0,625 | 0,629 | 0,629 | 0,626 |

As expected, betas for Market factor are highly significant at 1% level for all the models. Market factor loadings varies between 0,775-0,830, implying higher exposure to systematic risk than Ebitda-portfolio, but still under 1. The Gross

Profitability portfolio seems to include small cap shares like the Ebitda/TA portfolio, when loadings on SMB factor varies between 0.550 to 0.621. According to all models, these loadings are statistically significant at 1% level. The remaining factor betas, HML, RMW and CMA, looks almost like the Ebitda/TA-portfolio betas. Gross Profitability-portfolio is tilted towards growth stocks, and it is negatively associated with profitability and investment factors. However, none of these factors are statistically significant.

## 9. Summary and conclusions

The main purpose of this study is to investigate if the company's quality affects its yield and risk in the Finnish Stock Exchange. In other words, can portfolio formed by high quality companies, measured by profitability, gain excess returns in the Finnish stock market. I also compare the strategy's performance against other common investment strategies, such as traditional value strategies. Ebitda scaled by total assets and gross profitability are used as meters of profitability, and according to these meters portfolios are formed. Originally Novy Marx (2013) presented the power of gross profitability in the US stock market, which why I want to test it in the Finnish market as well. Ebitda describes more deeply company's ability to make actual profit after costs, so it is chosen as alternative profitability meter. The topic is interesting, because in the United States, studies focusing on profitability strategy have come up with surprising results that challenge traditional investing strategies. In the Finnish stock market, the topic has not been extensively studied, at least there are no remarkable scientific papers.

The methods used in this thesis are largely similar those of Novy Marx (2013) and Davydov et. al (2016) papers. Data covers all listed companies in the Helsinki stock exchange during 2009-2017. Portfolios were formed at the end of June each year but based on the previous year end figures. After one year holding period, profit or loss is realized by selling all the stocks and then portfolios were re-formed. The explanatory power of selected indicators is examined by regression analysis and the risk of the portfolios is measured by standard deviation of portfolio returns. Additionally, it is performed Fama French 5-factor model regression analysis to examine if quality portfolio returns can be explained by market, size, value, profitability and investment factors.

The results of this paper show that both quality strategies outperform the OMXH CAP GI between 2009 and 2017, as the Ebitda/TA (Gross Profitability) portfolios generated an average annual return of 21,11% (19,23%), while the average annual return for the OMXH GAP GI was 16,12%. This result is proven by a simple

regression analysis, and it can be stated that there is positive correlation between Ebitda/TA (Gross Profitability) and stock returns. Moreover, the results are statistically significant at 10% level. After controlling risk-adjustment method, Fama French five-factor model, it can be stated that the result is robust for Ebitda/TA strategy, as it generates annual 4,64% alpha at 10% significance level. The annual alpha for Gross Profitability strategy is also clearly positive, but not statistically significant. Based on the results, it is possible to challenge Novy Marx's (2013) argument about the excellence of gross profitability in explaining the earnings of the shares. At least in the Finnish stock market, gross profitability does not seem to be the most attractive choice for implementing quality strategy. Hence, based on the results and when considering all the empirical results, the hypotheses of this paper must be accepted.

According to the results, the quality strategies can be considered a worthy alternative to the value strategies, as the average annual returns of portfolios formed by Ebitda/TA and gross profitability are in the same direction that former value investing studies find in Finland. Further research could be done by comparing the returns of different quality strategies to the value strategies' returns over the same period on the Finnish stock market. It would be also interesting to find out the correlation between the yields of these strategies, ie whether a quality strategy can act as a hedge for value strategy, as Novy Marx (2013) claims in his research. Additionally, it would be interesting to form a hybrid portfolio based on Ebitda/TA and gross profitability.

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## APPENDIX

Appendix 1. Ebitda/TA portfolio returns during 2009-2017

| Portfolio | LONG (HIGH EBITDA/TA) | SHORT (LOW EBITDA/TA) | LONG-SHORT (HIGH-LOW) | OMX Helsinki GAP GI |
|---|---|---|---|---|
| 2009-2010 | 35,38 % | 34,23 % | 1,14 % | 31,81 % |
| 2010-2011 | 27,30 % | -0,74 % | 28,04 % | 16,07 % |
| 2011-2012 | -15,99 % | -31,74 % | 15,74 % | -19,87 % |
| 2012-2013 | 12,90 % | 25,32 % | -12,42 % | 21,75 % |
| 2013-2014 | 21,92 % | 1,91 % | 20,01 % | 35,01 % |
| 2014-2015 | 20,86 % | -2,89 % | 23,76 % | 14,17 % |
| 2015-2016 | 16,98 % | 6,48 % | 10,50 % | 2,49 % |
| 2016-2017 | 49,53 % | 40,38 % | 9,14 % | 27,51 % |

Appendix 2. Gross Profitability portfolio returns during 2009-2017

| Portfolio | LONG (HIGH GP/TA) | SHORT (LOW GP/TA) | LONG-SHORT (HIGH-LOW) | OMX Helsinki GAP GI |
|---|---|---|---|---|
| 2009-2010 | 28,25 % | 32,17 % | -3,92 % | 31,81 % |
| 2010-2011 | 14,96 % | 5,62 % | 9,35 % | 16,07 % |
| 2011-2012 | -17,93 % | -27,75 % | 9,82 % | -19,87 % |
| 2012-2013 | 28,69 % | 8,23 % | 20,46 % | 21,75 % |
| 2013-2014 | 18,71 % | 9,74 % | 8,97 % | 35,01 % |
| 2014-2015 | 20,78 % | 2,81 % | 17,97 % | 14,17 % |
| 2015-2016 | 15,30 % | 1,23 % | 14,07 % | 2,49 % |
| 2016-2017 | 45,09 % | 28,31 % | 16,78 % | 27,51 % |

Appendix 3. Yearly linear regression results for Ebitda/TA portfolio

| | Investment period 2009-2010 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | 0,224 | 7,017 | 0,000 |
| EBITDA | 1,874 | 2,422 | 0,017 |

| | Investment period 2010-2011 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | 0,002 | 0,065 | 0,948 |
| EBITDA | 3,784 | 4,367 | 0,000 |

| | Investment period 2011-2012 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | -0,353 | -11,198 | 0,000 |
| EBITDA | 4,331 | 4,597 | 0,000 |

| | Investment period 2012-2013 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | -0,017 | -0,492 | 0,624 |
| EBITDA | 4,932 | 4,984 | 0,000 |

| | Investment period 2013-2014 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | 0,098 | 3,172 | 0,002 |
| EBITDA | 1,474 | 3,156 | 0,002 |

| | Investment period 2014-2015 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | -0,040 | -1,045 | 0,299 |
| EBITDA | 5,416 | 5,420 | 0,000 |

| | Investment period 2015-2016 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | -0,020 | -0,582 | 0,562 |
| EBITDA | 2,147 | 2,698 | 0,008 |

| | Investment period 2016-2017 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | 0,275 | 6,048 | 0,000 |
| EBITDA | 2,156 | 1,978 | 0,051 |

Appendix 4. Yearly linear regression results for Gross Profitability portfolio

| | Investment period 2009-2010 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | 0,152 | 3,411 | 0,001 |
| GP | 0,570 | 1,114 | 0,268 |

| | Investment period 2010-2011 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | -0,018 | -0,489 | 0,625 |
| GP | 0,780 | 2,110 | 0,037 |

| | Investment period 2011-2012 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | -0,267 | -7,889 | 0,000 |
| GP | 0,479 | 1,472 | 0,144 |

| | Investment period 2012-2013 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | -0,034 | -0,862 | 0,390 |
| GP | 1,337 | 3,291 | 0,001 |

| | Investment period 2013-2014 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | 0,139 | 3,268 | 0,001 |
| GP | 0,205 | 0,874 | 0,384 |

| | Investment period 2014-2015 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | 0,093 | 2,471 | 0,015 |
| GP | 0,411 | 1,926 | 0,057 |

| | Investment period 2015-2016 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | -0,055 | -1,516 | 0,132 |
| GP | 0,414 | 2,081 | 0,039 |

| | Investment period 2016-2017 | | |
|---|---|---|---|
| | Coefficient | T-value | P-value |
| Intercept | -0,069 | -1,508 | 0,134 |
| GP | 0,324 | 1,479 | 0,142 |

Appendix 6. Fama French five-factor model factor correlations

| | *Market-Rf* | *SMB* | *HML* | *RMW* | *CMA* |
|---|---|---|---|---|---|
| Market-Rf | 1 | | | | |
| SMB | -0,139468286 | 1 | | | |
| HML | 0,375962518 | 0,001357132 | 1 | | |
| RMW | -0,294293092 | -0,151015763 | -0,810311795 | 1 | |
| CMA | -0,040163877 | -0,055626441 | 0,517888352 | -0,399032527 | 1 |