Does the values premium exist in international portfolios by combining CAPE ratio with Book-to-market in well-developed European markets?

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ABSTRACT

This paper examines if the value premium still exists when incorporating market-level and firm-level conditions together. To evaluate my research, I have presented several tested portfolio strategies. I used two different measures to build these portfolios. On the market-level perspective, I have used the CAPE ratio with some adjustments, and on the firm-level perspective, I have used book-to-market with a slight adjustment. The zero-cost portfolios hold a long position on the cheapest markets value stocks and short sell the expensive markets growth stocks. The strategy can achieve above-average results regularly and beat the market. On the other hand, in times of crisis, the strategy performs poorly, but can still beat the market under the global financial crisis.

Portuguese abstract here:

Esta Dissertação centra-se em investigar se existe um retorno positivo na estratégia de investimento que consiste na compra de ações *value* e venda a descoberto de ações de crescimento (*growth*), quando se incorpora na estratégia condições ao nível do mercado e da firma. Para avaliar minha pesquisa, apresento várias estratégias de investimento testadas. Foram utilizadas duas medidas diferentes para construir essas carteiras. Ao nível do mercado, utilizou-se o índice CAPE com alguns ajustes, e ao nível da firma utilizou-se o book-to-market com um pequeno ajuste. As carteiras de custo zero têm uma posição de compra nas ações de valor do mercado mais barato e uma posição de venda a descoberto de ações de crescimento do mercado mais caro. No entanto, a estratégia pode atingir resultados acima da média regularmente e superar o mercado. Além disso, em tempos de crise, a estratégia tem uma performance mais fraca mesmo com a posição de venda, mas ainda assim pode superar o mercado durante a crise financeira global.

Keywords: Book-to-market, CAPE ratio, Inflation, Long-Short strategy, Europe

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Introduction

The prediction of stock returns has been and is a primary challenge for economists and financial practitioners. However, there is some evidence of which ratios or measures are better predictors than others. For example, there is evidence of value premium, that stocks with higher fundamental values like the book-to-market have a higher average return than those with lower fundamental values (Fama and French, 1992). There has also been done a lot of research around the market timing and the predictability of the market returns with the help of different valuation methods. The first step in this paper is to focus on using a valuation tool for different countries and compare them, looking at macroeconomic conditions like inflation. In the second step of this paper, all the stocks are sorted on value to build three portfolios. These two stages are helping the strategy to go from market-level to firm-level.

Campbell and Shiller (1998) find one of the most potent measurements of value where they developed a Cyclically-Adjusted price to earnings ratio, or as they call it, CAPE ratio/Shiller pe ratio. The CAPE ratio uses the price of an index as S&P500 and divides their price on ten years average earnings, which are adjusted for inflation. Since the earnings are adjusted for inflation, the past earnings will not be understated due to inflation. According to Robert Shiller, the CAPE ratio is a powerful predictor of capital markets for the long-horizon in most of the world. They showed that by doing a simple regression, where they calculated the CAPE ratio since 1871 and regressed that with 10-years real stock returns. Their significant regression results show that the CAPE ratio predicts the long-turn markets return (Campbell and Shiller, 1998).

The research around the CAPE ratio shows that it is a less powerful predictor for short-term returns, just like other valuation metrics (Leibowitz and Bova 2007). However, predicting the market returns implies that long-term equity returns are mean-reverting. This means that CAPE is working when the ratio is above or under the long-term average of that specific index. This dissertation examines if this ratio can help with short-term returns. In my case, I only look at the CAPE ratio as a comparison and validation tool. This measure implies that I treat the countries with high CAPE ratios as "growth" countries and those with low CAPE ratios as "value" countries. The way this paper treats the CAPE ratio has been used with other similar ratios to the CAPE ratio, but not for the particular countries.

The other measure that this dissertation is looking into is the famous book-to-market. Fama and French (1992, 1993, 1996, 1998), among others, show strong evidence that the book-to-market significantly explains the cross-sectional variation in the average returns, anyway there is also evidence that this effect is much weaker among the more prominent firms. There are several possible explanations in the literature for the value premium, but I investigate two of them closely. The first is explained by Fama and French (1992, 1993, 1996, 1998) who argue that high book-to-market based portfolios represent compensation for risk where value companies have a higher distress risk. The second explanation is that book-to-market-based portfolios are result from extreme mispricing of securities (Griffin and Lemmon, 2002). There are also other explanations, like DeBondt and Thaler (1985) and LaPorta (1996), who both argue that value strategies capture regression to the mean while investors tend to extrapolate too much. This dissertation does not answer which one of the possible explanations are correct but whether if there is a value premium when market-level conditions are included. So the research question of this dissertation is:

"Does the values premium exist in international portfolios by combining CAPE ratio with Book-to-market in well-developed European markets?"

The period used for analyzing this strategy is from 01/01/1993 till 01/01/2020. The data for the dissertation is from DataStream, Kenneth French website and the AQR website. In the first part of this thesis I look into the CAPE ratio for Sweden, Norway, Germany, Italy and France, where they are compared to find overvalued and undervalued countries. In this stage, all the stocks are included, and no screening process are completed. In the next step I create three portfolios in every country where they are sorted on value. For this part, some screening has been done where the companies considered as small-cap and micro-cap are excluded. The particular reason for this is to have only liquid assets. Finally, the obtained results are compared with AQR website data to test if I can obtain similar results for validation.

To be able to tell the main factor of the results, a long-short portfolio with MSCI indexes of these countries are also completed, where the most undervalued country have a long position and a short position on the most overvalued country according to the CAPE ratio. This gives an overview of

the driver of the result, whether it is the market-level conditions, firm-level conditions, or the combination of these two strategies. The descriptive statistics of the portfolio are shown to determine how good the portfolio performs.

The following central part that this dissertation looks at is the combination of the cheap markets and their cheap stocks minus expensive markets and their expensive stocks. The transaction costs are also included at this stage, looking into the portfolio turnover. The descriptive stats of the long, short and long-short portfolios are shown at this stage. The Capital Asset Pricing Model and the Carhart four-factor model regression is applied to these three portfolios to see if they capture any alphas and how these three portfolios capture different betas. The particular reason for using the Carhart four-factor model (FFC4) is to see the most critical betas, including market, size, value and momentum.

I also include a robustness test of the descriptive stats. The robustness test considers the same period with the same data but with more extreme values, which means stocks with lower/higher book-to-market than the ones used in the initial portfolio. Instead of dividing each countries stocks into three portfolios sorted on value, I divided them into five portfolios sorted on value. This result gives more extreme points and test if higher means and more solid betas can be achieved. The regression tests are also followed by an crisis test to examine how the portfolio performs during the crisis. This shows if the strategy is solid under every condition or not.

The dissertation is presented as follows. The first part is the literature review, where I dig into earlier research about these two strategies to see if this literature review can support my finding. The second part is presenting the data and methodology where the methods and the data that has been used is presented. The third part present the descriptive stats and the robustness test of the descriptive stats. The fourth part introduce the CAPM and FFC4 regression for the initial strategy and the robustness test among the crisis test. Finally, the last part is the conclusion and the limitation of the dissertation.

2.0 LITERATURE REVIEW

This chapter analyze some of the existing literature for Cape ratio and the book-to-market ratio.

2.1 CAPE Ratio

Modigliani and Cohn (1979), Ritter and Warr (2002), Asness (2003), and Campbell and Vuolteenaho (2004) argue that investors look at past trends in nominal cash flow growth when they want to look at expectations about future nominal growth, but they fail because they do not adjust for the inflation. This implies that in times of low inflation, their expectations of future cash flows are too high, which gives an inflated price-to-earnings ratio of the market, and in times with high inflation, their expectations of future cash flows are too low, resulting in depressed price-to-earnings ratio. This inflation, or in other words "money illusion", would drive wrong future expectations, while if the values were correctly adjusted for the inflation, the investors should be able to have a more correct expectations of the future cash flows.

Klement (2012) tested if the CAPE ratio could be used as a forecasting and valuation tool for 35 countries. In his research, he includes even emerging markets. Klemenets findings shows that the CAPE ratio is reliable as a long-term valuation indicator for most of the countries he used. He also used the CAPE ratio to predict real returns on local equity markets over the next five to ten years. The results show that the model performs poorly in the short-term investment horizon, but the CAPE ratio and real market returns has an average correlation of 0.7 for an investment of five years and more. His results provide insight into how this measurement can perform when used for countries as a valuation measure. Kenourgios, Papathanasiou, and Bampili (2021) examine different valuations models like CAPE, price-to-earnings and price-to-book value to predict future returns. They examine for 1,3,5 and 10 years for all the models. Their results show that P/E and P/BV ratios are not correlated for future returns. On the other hand, their CAPE5 model where they use five years average earnings adjusted for the inflation, is able to give an efficient estimator of future returns. Unfortunately, their research was only done for the Greek stock market.

CAPE ratio is mainly used for equity markets to predict future returns, however Bunn and Shiller (2014) tested how predictive the CAPE ratio is in industries where they use a data range of 143 years from 1870 to 2013. They were able to find that CAPE is a powerful tool for predicting sectors performance as well. There are some literatures on CAPE research for the predictability of country's total returns. Kiemling (2016) did significant research where he researched 17 MSCI country indexes since 1979. In addition, Kiemling (2016) used price-to-earnings, price-to-cash

flow and price-to-book ratios to see which ratios give a more significant result to predict the returns. His results indicate that only price-to-book and CAPE ratio enable reliable forecasts on MSCI returns and market risks. In his findings, the CAPE ratio shows one of the highest expected returns in the European equity market.

The CAPE ratio has been criticized for being overly pessimistic about the prospects for equity market returns, lacking robustness to distortions in corporate earnings and overstating the long-term predictability of returns due to overlapping returns observations and endogeneity. Philips and Ural (2016) looked at these critics and had some interesting findings. First, they looked at new construction techniques that makes it robust to a range of accounting and index construction biases and changes equity market fundamentals in the CAPE ratio. Secondly, they look at CAPE ratios forecast capability over different periods where they use different econometric methods that account for endogeneity, overlapping observations and the presence of outliers. They were able to find that these enhancements have a minimal impact on the CAPE ratio in the U.S equity market forecast, but they found evidence that these enhancements are helpful in smaller markets and in different markets where they experienced significant dislocations. They also show accounting-flow variables like cash flow and revenues instead of earnings in the CAPE ratio that can effectively supplement and enhance the CAPE ratios market return forecast.

Jivraj and Shiller (2017) looked closer into the CAPE ratio and different ratios to compare them. When they found out that the CAPE ratio is the best predictor of the market, they decided to look at how the CAPE ratio could be used. In their paper, they discussed two possible methods to use the CAPE ratio. The first method is to use it as a market timing method. However, they argue that using the CAPE ratio as a market-timing tool will be wrong since their results show that equity markets have risen and fallen over time for extended and non-symmetric periods, where they cannot have any steady-state level. This makes it challenging to use CAPE ratio as a market-timing tool unless expected returns are mean reversion to some level. However, there is no reason to expect CAPE ratio to have a steady-state.

Their second method is to use CAPE ratio as a relative valuation tool where investors can use this tool to compare different market indexes and countries. However, there are also four main concerns

about using the CAPE ratio to compare different countries. One of the main concerns is that national equity markets can have very different sectoral compositions, where some national equity markets can be service or agriculture dominant like Sweden while others are oil dominant like Norway. Secondly, the inconsistency in sectoral relative valuation between the countries can be driven by the nature of the companies within a respective sector being very different across countries. The third concern is different accounting rules where earnings can be different across the countries. The last concern is the FX considerations where different countries use different currencies. One possible solution here is to convert all currencies to the same currency. However, the authors show that the CAPE ratio across countries can still be informative within an asset allocation exercise even with these challenges. They show that the CAPE ratio can be combined with different ratios to build an investment strategy and use this in the asset allocation section.

The literature of CAPE ratio is well studied and understood. I notice that many researchers have tried to compare the CAPE ratio with other ratios. The main goal of most of the researches has been to see how good the CAPE ratio and other ratios are to predict future returns. Based on the studied literature, I am able to conclude that the CAPE ratio is one of the most powerful tools to predict market returns on different countries, index markets and even industries. According to Jivraj and Shiller (2017), the CAPE ratio can be an excellent predictor to value different countries and make a comparison. However, to use the CAPE ratio as a valuation tool between different countries, there are some challenges that Jivraj and Siller (2017) write about in their paper. Thus, an asset allocation strategy can be built with the CAPE ratio and another valuation ratio.

2.2 - Book-to-market

The book-to-market ratio is a well-known tool used in different strategies and has been well studied by many researchers. For example, it is well known that firms with a high book-to-market ratios which are also known as value stocks, have a higher average return than firms with a low book-to-market ratio, which are also known as growth stocks around the world. Leaning on the research that has been done until now, there are several potential explanations for this. Two popular explanation for the positive correlation between the book-to-market and subsequent stock returns can be explained by risk or mispricing in the market.

First, the risk-based explanation about this is researched by Fama and French (1992), who argue that the value premium compensates for distress risk. They argue that value firms have higher average returns than growth stocks because they are fundamentally riskier. In addition to this argument, they also find that high book-to-market ratio generally give lower future earnings, while low book-to-market ratio generally give better future earnings. Chui et al. (2012) argue that if the different returns between value firms and growth firms represents a systematic risk premium, then one would expect association with other risk factors. In their research, they are able to find significant positive results for their size-adjusted value premium in 22 countries out of 40 countries. Hanh and lee (2006) use the change in the term spread as a risk measure for the credit market condition, they find that value companies have higher factor loadings on the change in the spread than growth companies. They also find that the HML factor constructed by Fama and French (1993) is positively associated with GDP growth which was also showed by Liew and Vassalou (2000), supporting the risk-based explanation.

Lakonishok (1994) introduced the mispricing-based explanation, where the author argues that stocks are assumed to be overpriced or underpriced from time to time. The particular reason for this is that investors tend to underreact to the changes in the fundamental strength. However, he shows evidence that the value-growth returns are positive because these strategies exploit the suboptimal behavior of the investors and not because value strategies are more fundamentally riskier. This means that the positive value-growth returns are a product of corrections arising from investors who expect firms fundamental performance to be positive. In addition, LaPorta (1997) showed that value stocks generally experience positive future earnings surprises while the growth stocks experience negative future earnings surprises.

Bali et al.(2010) shows in their research that the U.S value premium is very strongly dependent on the companies valuation signals contained in their equity financing activities. They also find in their research that the high returns of value companies are because they purchase their equity. On the other side, the low returns of growth companies are because of issuing new equity. The paper also shows that amongst value issuers and growth purchases, there is no value premium. Their opportunistic financing hypothesis says that companies issue equity when their stock price are high, and the companies purchase their stocks when the stock price are low, which gives a solid argument

for a temporary mispricing explanation. The author argues that considering the companies activities financed with the equity should help investors identify mispriced value- and growth companies. However, the purchases (issues) should signal potential undervaluation (overvaluation) based on the board's private assessment of the company's intrinsic value relative to the market. Thus, Bali et al. (2010) provide evidence that value-growth returns in the U.S stock market are due to mispricing since value issuers and growth purchasers do not give any significant return differences.

Explaining why value stocks give a higher average return and growth stocks a lower is a discussion that many researchers have tried to answer. However, the fact that value stocks capture higher average returns than growth stocks is proven by several researchers. Moreover, Fama and French (1998) certify that the portfolios built to minimize risk factors related to size and book-to-market add substantially to the variation in the stock returns, which is explained by a market portfolio. The portfolios that the authors build are sorted in size and value, but I want to build my portfolios that is only sorted on value and found how that can capture the CAPM and CCF4 asset pricing models.

The four-factor model includes the market factor, size factor, value factor and momentum factor. Fama and French (1992, 1993, 1996, 1998) argue that the four-factor model can explain the value premium and other anomalies. Therefore, these four factors helps me in my research to explain if any significant betas are captured in the well developed markets in Europe. Most of the research that has been done in this area has been completed for big markets and indices, where they have been able to capture significant results. In this research, I treat the CAPE ratio as a valuation method between well-developed countries in Europe where the literature in that field is weak, and this is combined with the book-to-market ratio, a well-developed measurement and valuation tool. Most of the literature is sorted on size and book-to-market, while I only look into book-to-market ratio. Instead of the traditional book-to-market calculation that has been used for the research papers, I am using another version of that calculation. The tradition that has been done for academic work calculates lagged book equity because of the availability of data, but they also use the same lag for the market value of the companies. The approach I use in this paper, looks at the current market value of companies. This helps me being more precise with my calculations and test if this improves the value premium. Asness and Frazzini (2013) show that they can capture significant

positive alphas with this approach where they update their value portfolio every month with the current market value.

3 DATA AND METHODOLOGY

In this chapter of this paper, I looked into sample selection, data description, and variable definition. This part investigate where and why the specific data is used.

3.0 Data

The samples consist of country-level and firm-level data that are primarily obtained from DataStream. The stock returns, CPI, and other variables are from DataStream International, which Thomson Financial provides. The sample period is January 1993 to January 2020. The particular reason for the short period is the availability of the data. Although some data is available for bigger companies or more valuable companies but not for the smaller stocks. Furthermore, all returns, book values, market values and earnings are in Euros to avoid any exchange risk because of the currencies. Finally, since this paper only examines countries from Europe, I use monthly risk-free rates for Germany, which was obtained from AQR database. Since the factor returns are in U.S dollars, I convert them into Euros. The exchange rates are obtained from DataStream International.

The short sample period reduces the power of the test, which I take into consideration. All domestic common stocks available on DataStream for the specific countries are included. However, the countries used in this test are Germany, France, Italy, Sweden, and Norway. There are two main reasons for using these particular countries: to look at developed countries in Europe and that their accounting is under the IFRS since I am looking at earnings per share of the companies. The companies must report their earnings under the same accounting rules otherwise differences could affect the earnings. I did not do any winsorization for the returns, which generates some extreme values. However, to avoid too many extreme values, I screened out companies with prices less than 5 euros, this is also considered as penny stocks, I also screened out the small caps. The small cap of every country is different, so the stocks in every country were sorted by market cap from smallest to largest, and the stocks below the 15 percentiles of the distribution are excluded, which is the same method used for MSCI indices.

The firm-level variables are measured as follows. First, the book-to-market ratio (BM_t) is the book equity to market equity ratio at the beginning of the fiscal month t. Second, the company's earnings per share (EPS_t) are the company's earnings divided by outstanding shares at the beginning of the fiscal month t. The change in EPS is every quarter. There are some minor differences in the timing for different companies. The price (P_t) for the companies are obtained and adjusted for dividends and splits, which is at the beginning of the fiscal month t. The market cap (Mkt_t) of the companies are also obtained, which is at the beginning of the fiscal month t. The returns series started in January 1993 and ended in January 2020 for all the countries, while the earnings started in January 1990 and ends in January 2020. When it comes to market-level variables, the consumer price index (CPI_t) is used at the beginning of the fiscal month t. FFC4 is also achieved for the same period.

Most of the data I use in this paper are primary data, but some secondary data is also used. All the firm-level data is primary, while some market-level data is secondary. The consumer price index and the FFC4 is the secondary data. "By primary data, I refer to the data treated by me, while the secondary data is collected and treated by others".

3.1 CAPE ratio

This paper aims to find the perfect market timing by implementing the CAPE ratio and find the most over-valued and under-valued markets to build a portfolio based on the specific criteria. First, I compute the index price and earnings for each country which is value-weighted on the market cap of all the stocks in the particular country (Figures 1 and 2). All the data that I obtained is monthly, and the earnings are lagged with 12 months.

$$\sum_{t=1}^{n} \frac{mkt_t * P_t}{\sum_{j=1}^{n} mkt_j} \qquad (1)$$

$$\sum_{t=1}^{n} \frac{mkt_t * EARN_t}{\sum_{j=1}^{n} mkt_j} \qquad (2)$$

When these two elements are calculated with the CPI prices of that country, I then have all the elements to find their CAPE ratios (Figure 3). Finally, I calculate the CAPE ratio based on the Robert Shiller calculation with a minor adjustment. The original calculation of the CAPE ratio is

based on ten years average of EPS which is adjusted for inflation, while mine is a variant based on four years earnings adjusted for the inflation, respectively.

$$Cape_t = \frac{P_t}{[(EARN_t + EARN_{t-1}..EARN_{t-4})/\,4]} \qquad (3)$$

3.2 Book-to-market and returns

After the calculations for the CAPE ratio, I compute the ratio of book equity to market equity (B/M). With this, I go from the market-level to firm-level. The stocks are sorted from the lowest B/M to the highest B/M in every country. In other words, from growth to value stocks. Since the size of the nations are different, there are different numbers of stocks in the bins. This implies the more prominent countries like Germany, Italy, and France had 230, 124 and 232 companies on average in each bin while smaller economies like Norway and Sweden have 59 and 87 on average in each bin.

The book value is obtained from DataStream at the beginning of the month from 01.01.1992 until 01.01.2020. The main reason for downloading the book value data one year earlier before all the other information is because the book value is 12 months lagged in my calculations. However, the market value of each company is obtained from 01.01.1993 until 01.01.2020, where the market value of the current month is used to calculate the book-to-market. Second, the monthly value-weighted returns for every portfolio in different countries are computed. I build two different portfolios, terciles for my preliminary test and percentile for the robustness test in every country with a holding period of one month. All of the portfolios are value-weighted with the companies market cap. I screen out my portfolios small caps and stocks under 5 euros to avoid illiquid stocks. This decreased the number of stocks from 3899 to 2205 in total. When the screening and cleaning of the data are finished, the calculations for the book-to-market are made. In this paper, I also complete a crises test where I look into how this strategy works in the global financial crises for the time spent from mid 2007 until late 2009. I do the same precise procedures for this period, just like the whole sample.

To build the initial portfolio, I investigated the CAPE ratio of the countries to see which country is the most undervalued and which one is most overvalued. This implies that the country with the highest CAPE ratio have a short position on the growth stocks while the country with the lowest

CAPE ratio has a long position on the value stocks. This are done for all portfolios, and all of the portfolios are tested with CAPM and FFC4 variables.

3.3 Empirical methodology: regression analysis

My first step is to examine the descriptive statistics for the portfolios and then run two regressions. The first regression is how the portfolio captures only the market beta (CAPM) and then how it captures the FFC4. Next, exploring the value premium across the countries for my leading portfolio, following the FFC4 model where:

CAPM:

$$R_{it} - R_{ft} = a_i + \beta_i(R_{mt} - R_{ft}) + \epsilon_{it} \qquad (4)$$

Carhart four-factor model:

$$R_{it} - R_{ft} = a_i + \beta_{1i}(R_{mt} - R_{ft}) + \beta_{2i}SMB_t + \beta_{3i}HML_t + \beta_{4i}WML_t + \varepsilon_{it} \qquad (5)$$

R_{it} is the monthly raw return for portfolio i month t, R_{ft} is the risk-free rate of the corresponding month, which is the one-month t-bill of Germany. R_{mt} is the market return of the European market, which is value-weighted minus the R_{ft}, SMB_t is the difference between small stocks and big stocks returns on diversified portfolios and HML_t is the difference between high book-to-market (value) and low book-to-market (growth) stock returns. To be able to capture the momentum returns, I use Carhart's (1997) WML_t, which is the difference between winners and losers stock returns. That is the difference between stocks with the highest returns in the previous 12 months and the stocks with the lowest returns in the previous 12 months. The HML factor is the equal-weighted average of the returns for the two high book-to-market portfolios for the European market minus the average of the returns for the two low book-to-market portfolios. The HML factor is double-sorted on the size and value of the European market. The SMB factor is the equal-weighted average returns on the three small stock portfolios for Europe minus the average returns of three big stock portfolios. These variables are updated monthly and captured in U.S dollars, converted to euros using the DataStream exchange rate for dollar/euro. This regression is commonly used in asset pricing to evaluate portfolio performance. The firm size, asset growth, value and momentum are

included in this regression. The previous studies in this field show that these firm characteristics influence future returns.

3.4 Transaction costs

The literature in this field mentions three different transaction costs: direct transaction cost, indirect transaction costs and costs that accrue with short selling. In this part of the paper, I made an assumption.

The direct transaction cost has two elements included in Bhardwaj and Brooks (1992) that include the bid-ask spreads and the broker commission. Since this strategy includes short selling, I had to bear in mind the problems that come with it. Short selling means that sellers borrow the shorted stocks and repay the securities on demand. This process can be problematic from time to time since the short-sellers have the risk of a short squeeze, in which borrowed securities must be repurchased often with loss unless the borrowers can find an alternative lender for the securities. However, the information about transaction cost is unavailable, so I made an assumption for the transaction costs. I calculated the turnover of the portfolio times 50 basis points and call this my transaction cost for my portfolio (Barroso et al., 2019). However, it does not take into account the size of the different stocks. This implies that I assume the transaction cost of a small stock and big stock is the same. See Figure 6.

$$Turnover(\%) = 0.5 * (Dropouts(\%) + New(\%)) \qquad (6)$$

Where the Droupouts(%) represent the percentage stocks in the portfolio at time t-n that dropped out from the growth (value) criteria at time t and New (%) represent the percentage stocks in the portfolio at time t-n that moved into the growth (value) criteria at time t.

4.0 Results and findings

In this chapter, I am taking a closer look into the descriptive stats, regressions, validation tests and the robustness check that I calculate for this research paper.

4.1 Descriptive stats for each country & validation

Table 1 summarizes the descriptive stats of each country and use these as a validation tool to see how the values I calculated match with professional analysts from AQR capital management. The values from the AQR website are the high minus low (HML) I used to validate my results to see if I could capture values close to their calculations. In table 1, I also investigate the MSCI index of the countries to see how they are correlated with the stocks that I use from the same country.

Table I

	Norway			
	Mean	**Standard deviation**	**Sharp Ratio**	**Correlation**
RMRF_MSCI	*0.096*	*0.232*	*0.41*	
RMRF_F	*0.093*	*0.189*	*0.49*	
HML_F	*0.001*	*0.199*	*0.01*	
HML_AQR	*-0.008*	*0.175*	*-0.04*	
RMRF_F & RMRF_MCSI				*0.964*
HML_F & HML_AQR				*0.725*
	Sweden			
RMRF_MSCI	*0.117*	*0.233*	*0.50*	
RMRF_F	*0.123*	*0.214*	*0.57*	
HML_F	*0.057*	*0.217*	*0.26*	
HML_AQR	*0.007*	*0.166*	*0.04*	
RMRF_F & RMRF_MCSI				*0.959*
HML_F & HML_AQR				*0.762*
	Germany			
RMRF_MSCI	*0.078*	*0.203*	*0.38*	
RMRF_F	*0.076*	*0.183*	*0.41*	
HML_F	*0.048*	*0.206*	*0.23*	
HML_AQR	*0.044*	*0.151*	*0.29*	
RMRF_F & RMRF_MCSI				*0.963*
HML_F & HML_AQR				*0.750*
	France			
RMRF_MSCI	*0.071*	*0.178*	*0.39*	

RMRF_F	*0.082*	*0.172*	*0.47*	
HML_F	*0.021*	*0.138*	*0.14*	
HML_AQR	*0.026*	*0.134*	*0.19*	
RMRF_F & RMRF_MCSI				*0.972*
HML_F & HML_AQR				*0.789*
		Italy		
RMRF_MSCI	*0.062*	*0.213*	*0.29*	
RMRF_F	*0.088*	*0.212*	*0.41*	
HML_F	*-0.025*	*0.211*	*-0.11*	
HML_AQR	*0.002*	*0.154*	*0.01*	
RMRF_F & RMRF_MCSI				*0.916*
HML_F & HML_AQR				*0.757*

Table I shows some of the disruptive stats and correlation of different portfolios used to validate the data and method used. For example, the RMRF shows market return minus the risk-free, and the second part shows which portfolio it belongs to. The RMRF_MSCI, RMRF_AQR and HML_AQR (high minus low) portfolios are secondary data which mean I have not constructed them. Otherwise, I build all the other portfolios. The results are divided into five countries, and the descriptive stats are presented annually.

The results show that the correlation between MSCI and the stocks I use have a high correlation for all the countries. However, the lowest correlation is for the Italian market with 91%, and the highest is at 97% for the Swedish market. All the correlations for the HML portfolios constructed by AQR analysts and mine is 70% and above, respectively. The correlation between the portfolios is an important measure to validate the data I use, but it is essential to look at descriptive stats of the AQRs portfolio for comparison. Most countries have very similar descriptive stats with the AQRs HML portfolio, which can validate the data and the method. As shown, there is almost no value premium in most countries. However, there is one exception for the Swedish market where I find a value premium of 5.7%, respectively, for the period used. There can be several reasons why my results and AQR results don't fully match. First, the AQR analysts double sort their portfolio with size and value while my portfolio is only sorted on value. Secondly, I obtain all of my data in Euros while the AQR analysts obtain their data in dollars, which I convert into euros. This implies that there might also be a forex difference. However, the main argument is because of the sorting methods. When it comes to the MSCI correlation with my portfolio, the forex could be the main reason for not achieving 100% correlation.

4.2 Descriptive stats for MSCI portfolios

To consider if the positive means is a result of market-level, firm-level or the combination of these conditions, I also have to make a portfolio with MSCI returns of these countries. The portfolios are based on the CAPE ratios. Table II shows an overview of the descriptive stats of the three portfolios that I build with MSCI returns. Where the "Long-portfolio" represents the undervalued markets according to the Cape ratio, the "Short-portfolio" represent the overvalued markets according to the Cape ratio, and the "Long-Short" is the returns of the undervalued market minus the overvalued market.

Table II

	Long-portfolio	**Short-portfolio**	**Long-Short**
Mean	*0.101***	*0.066*	*0.035*
T-stat	*2.29*	*1.43*	*1.07*
P-value	*0.022*	*0.153*	*0.281*
Std. Dev.	*0.229*	*0.240*	*0.170*
Min.	*-0.260*	*-0.321*	*-0.159*
Max.	*0.195*	*0.229*	*0.182*
Skew.	*-0.292*	*-0.796*	*0.048*
Exc. Kurt.	*1.242*	*2.900*	*0.906*
Sharpe ratio	*0.44***	*0.27*	*0.20*
T-stat	*2.28*	*1.42*	*1.07*
P-value	*0.022*	*0.153*	*0.281*
JB test statistic	*0.535*	*2.326*	*0,245*

Table II shows the descriptive stats of the portfolios built with the MSCI indexes. There is demonstrated three portfolios long, short and long-short, where all the values are annualized. One star represents 10% significant level, two stars represent 5% significant level, and three stars represent 1% significant level.

None of the portfolios gives any extreme skewness. The long, short and long-short portfolios have a skewness of -0.29, -0.79 and 0.048, respectively. The long-short portfolio is the one that is closest to a normal distribution and with excess kurtosis of 0.90, respectively. The long and short portfolios have sharper tails with excess kurtosis of 1.24 and 2.89, respectively. The skewness and excess kurtosis of these three portfolios show that there had not been many extreme returns and are more likely to see results close to the mean for the long and short portfolios.

There are some gaps between the means in these three portfolios. The long portfolio is able to capture an average annual return of 10.14% with a significant level of 5%, respectively. The short portfolio gives a positive average annual return of 6.62%, respectively, which is considered as a loss since this is my short position. The long-short portfolio captures an average annual return of

3.52%, respectively. Neither the short nor long-short portfolio can give significant mean or sharpe ratio results. However, the long portfolio is able to give a sharpe ratio of 0.44 with a significant level of 5%, respectively. There are slight differences between the volatilities of the portfolios. The long and short portfolios have a volatility of 0.22 and 0.24, respectively, explaining the high average mean. However, the volatility of the long-short position is 0.17, which also explain the low mean that the portfolio has.

4.3 Descriptive stats for cross-sectional portfolios.

The variables and stats summarized in table III show the descriptive stats of the cross-sectional portfolios after the transaction costs. Among the three portfolios, I notice that only the long portfolio has a moderately skewed distribution, the closest value for normal distribution. However, the long portfolio with 1.62 respectively in excess kurtosis shows that it is not a normal distribution, and there are expectations of getting positive returns but not any extreme values. The high negative skewness of the short portfolio with a high excess kurtosis underlies that with this strategy I can expect many small losses but some huge gains. This implies that the short portfolio on growth stocks face many gains where stock prices decrease, but there are also some significant losses where the stock prices rise. The strategy shows a positive skewness and excess kurtosis of 0.71 and 2.59, respectively, when it comes to the long-short portfolio.

Table III

	Long-portfolio	Short-portfolio	Long-Short
Mean	*0.139****	*0.048*	*0.091**
T-stat	*2.66*	*1.01*	*1.60*
P-value	*0.007*	*0.311*	*0.099*
Std. Dev.	*0.272*	*0.248*	*0.294*
Min.	*-0.281*	*-0.327*	*-0.265*
Max.	*0.303*	*0.201*	*0.377*
Skew.	*0.094*	*-1.013*	*0.715*
Exc. Kurt.	*1.621*	*3.705*	*2.591*
Sharpe ratio	*0.51****	*0.19*	*0.30**
T-stat	*2.60*	*0.97*	*1.59*
P-value	*0.001*	*0.327*	*0.099*
JB test statistic	*0.344*	*3.559*	*1.939*

Table III shows the descriptive stats of the portfolios built using the CAPE ratio and the book-to-market. There is demonstrated three portfolios long, short and long-short, where all the values are annualized. The long portfolio includes the cheap markets value stocks. The short portfolio consists of expensive markets growth stocks. Finally, the long-short portfolio is the long portfolio minus the short portfolio. I built the portfolios on the stocks of the five countries that I use for this strategy. The Short-portfolio is the combination of the undervalued countries' value stocks, while the Long-portfolio is the growth stocks

of the overvalued countries. Finally, the Long-Short portfolio is the difference between the long and short portfolios returns. One star represents 10% significant level, two stars represent 5% significant level, and three stars represent 1% significant level.

There are some differences when it comes to the mean of these three portfolios. The long portfolio gives an annual average return of 13.97%, respectively, with a significant level of 1%. This is followed by a sharpe ratio of 0.51, respectively, with the same significance level. Unfortunately, the short portfolio gives a positive annual return of 4.85%, which is considered as a loss for this strategy. The sharpe ratio for the short portfolio is 0.19, respectively. Neither the mean nor the sharpe ratio is significant for the short portfolio. The long-short portfolio is able to capture an annually average mean of 9.11%, followed by a sharpe ratio of 0.30, respectively. The average mean and the sharpe ratio have a significant level of 10% for the long-short portfolio. The volatility of the long, short and long-short portfolios are close to each other where they have a volatility of 0.27, 0.24, and 0.29, respectively. Overall, the strategy is able to perform quite well and give positive returns for the time span that is used.

4.4 Robustness Check

In order to see if the results of the descriptive stats are robust, I divide the portfolios into percentiles, which implies that instead of building three portfolios, I built five portfolios sorted on value. The descriptive stats are shown in table IV

Table IV

	Long-portfolio	Short-portfolio	Long-Short
Mean	0.149***	0.042	0.107**
T-stat	*2.72*	*0.78*	*1.96*
P-value	*0.006*	*0.435*	*0.049*
Std. Dev.	0.284	0.283	0.282
Min.	-0.298	-0.523	-0.218
Max.	0.308	0.233	0.582
Skew.	-0.178	-1.529	1.228
Exc. Kurt.	2.061	7.893	7.683
Sharpe ratio	0.52***	0.15	0.37**
T-stat	2.67	0.75	1.96
P-value	0.007	0.450	0.049
JB test statistic	0.454	7.723	5.217

Table IV shows the descriptive stats of the robustness check portfolios built using the CAPE ratio and the book-to-market. There is demonstrated three portfolios long, short and long-short, where all the values are annualized. The long portfolio includes the cheap markets value stocks. The short portfolio consists of expensive markets growth stocks. The long-short portfolio is the long portfolio minus the short portfolio. One star represents 10% significant level, two stars represent 5% significant level, and three stars represent 1% significant level.

The first thing to be noticed is that all three portfolios performances is substantially better than the previous. The long portfolio had an average annual return of 13.97%, increased to 14.96%. The mean of the long portfolio is unchanged at a significant level of 1%. The increase in the mean is also followed by higher volatility, where the new volatility is 0.28, representing an increase of 4.58%. The sharpe ratio improvement is also essential to point out, representing 0.52, also significant on a 1% confidence level. Finally, the skewness of the long portfolio is on -0.17, followed by excess kurtosis of 2.06. The short portfolios annual mean decreases from 4.85% to 4.26%, respectively. The short portfolio is still insignificant for the mean and the sharpe ratio. However, a decrease in the mean is positive for the short portfolio, but there is an increase in volatility of 3.70%, which goes up 0.28 respectively. Last but not least, the long-short portfolios mean increases by 17.49% and reaches 10.70%, with a significant level of 5%. Even with an increase in the mean, the volatility drops to 0.28 for the long-short portfolio, affecting the sharpe ratio where it increases to 0.37 with a significant level of 5%, respectively. There is also a solid increase in skewness and excess kurtosis, 1.22 and 7.68, respectively.

The results in the robustness test are mostly better, implying that when I am look into more extreme points, the strategy can capture a better mean. However, being aware that the higher mean is also followed by more extreme results is an important point. Interesting that the volatility of the long-short portfolio dropped but the mean increased which indicates that the strategy can actually capture higher returns with less volatility. Therefore, a robustness check of the descriptive stats was essential and can indicate that the strategy is robust.

4.5 Regression Results

In this section I look into how the long, short, and long-short portfolios performs. There is also an analysis of how these portfolios capture the explanatory power of factors on the returns. Furthermore, there will also be an analysis of the extreme points.

Table V

	CAPM			Carhart four-factor					
Portefolios	**Annualized α**	**Market β**	**R²**	**Annualized α**	**Market β**	**Size β**	**Value β**	**Momentum β**	**R²**
Long-portfolio	8,41%**	0,791***	0,235	9,750%**	0,710***	0,263*	0,340**	-0,242***	0,270
	2,11	*2,83*		*2,32*	*2,82*	*1,81*	*2,38*	*2,58*	
Short-portfolio	-3,12%	1,135***	0,579	-0,65%	1,136***	-0,243**	-0,371***	-0,062	0,599
	1,40	*2,80*		*0,51*	*2,81*	*2,27*	*3,35*	*1,31*	
Short-portfolio	11,53%**	-0,344***	0,076	10,40%**	-0,426***	0,506***	0,712***	-0,181*	0,108
	2,32	*3,41*		*2,10*	*3,29*	*2,59*	*3,29*	*1,79*	

Table V shows the CAPM and Carhart four-factor model for the portfolio returns from 1990 until 2020 on a yearly basis. Again, the regressions are calculated for the long, short and long-short portfolios. Under every Alpha and Beta, the corresponding t-stats is represented. One star represents 10% significant level, two stars represent 5% significant level, and three stars represent 1% significant level.

Table V gives an overview of the alphas for the long, short, and long-short portfolios. The highest alpha obtained is the long-short portfolio with an alpha of 11.53% and 10.40%, respectively. It has a statistically significant level of 5%. The second highest alphas are for the long portfolio with 8.40% and 9.75%, with a significant level of 5%. The short portfolio is able to capture an alpha of -3.12% and -0.64% but cannot capture any statistically significant level.

The regression analysis shows that the long and the short portfolios have positive and high statistically significant beta (market), regardless of the CAPM and the FFC4 model. The short portfolio beta (market) is over one, which shows me that the short portfolio is much more volatile than the market. The long-short portfolio captures a negative beta (market), which indicates that the return of the long-short portfolio decreases on average when the market goes up. Furthermore, all three portfolios are negatively correlated with beta (momentum). There is a 1% significant level for the long portfolio and a 10% significant level for the long-short portfolio, while the short portfolio can't capture any statistically significant level. There is a positive size beta for long-short and long portfolios, with a significant level of 1% and 10%. Short portfolio have a negative size beta with a significant level of 5%. Since this paper's primary strategy is based on value, it is important to look at the value betas. The long-short and long portfolios captures a positive

correlation with beta (value) that is significant on a 1% and 5% level. The short portfolio captures a negative beta (value) which is significant at the 1% level. Since the short portfolio is the growth stocks, it is understandable that there is a negative correlation between that portfolio and value.

The range for the R^2 for these three portfolios is from 7.69% to 59.92%, indicating the underlying models' low to moderate explanatory power. In addition, the long-short portfolio has the lowest R^2, meaning a subordinate explanatory variable, which indicates that the portfolio does not follow the market's movements. Anyway, it is noticeable that the FFC4 model describes the returns better than the CAPM for all three portfolios. The explanatory power is the highest for the short portfolio, followed by the long portfolio.

4.6 Robustness Check

This section shows the robustness check of the previous findings, where I run the same regression but for the percentile.

Alpha for the long portfolio decreases to 6.19% for CAPM, and there is also a drop for the FFC4 model where it reduces to 5.73%, respectively. The reduction in alphas for the long portfolio is not followed by the significant levels, where both alphas are still significant at the 5% level. Next, the long-short portfolio also decreases in the alphas but can keep the same significant level. However, the reduction in the long-short portfolio is not as dramatic as it was for the long portfolio. The short portfolio is able to capture a higher negative alpha, but they are not significant.

Table VI

	CAPM			**Carhart four-factor**					
Portefolios	**Annualized α**	**Market β**	**R²**	**Annualized α**	**Market β**	**Size β**	**Value β**	**Momentum β**	**R²**
Long-portfolio	6,198%**	1,248***	0,536	5,738%*	1,168***	0,272**	0,575***	-0,161**	0,580
	1,95	*3,19*		*1,84*	*2,88*	*2,19*	*2,98*	*2,23*	
Short-portfolio	-4,43%	1,237***	0,529	-3,18%	1,293***	-0,114	-0,506***	0,053	0,555
	1,55	*2,94*		*0,37*	*2,74*	*0,28*	*3,41*	*0,34*	
Long-Short	10,62%**	0,012***	0,083	8,92%**	-0,125	0,385**	1,081***	-0,213**	0,137
	0,33	*0,60*		*1,96*	*1,66*	*2,19*	*3,48*	*2,12*	

Table VI shows the CAPM and Carhart four-factor model for the portfolio returns from 1990 until 2020 on a yearly basis for the robustness check. The regressions are calculated for the long, short and long-short portfolios. Under every Alpha and Beta, the corresponding t-stats is represented. One star represents 10% significant level, two stars represent 5% significant level, and three stars represent 1% significant level.

When comparing the beta (market) for the long portfolio, there is a positive increase with the same significant level. However, the scenario for the short portfolio is different where there is a slight decrease in the beta (market), but still a 1% significant level. There is a positive increase for the long-short portfolio for the beta (market) in CAPM, but a higher positive beta (value) for the FFC4 model. Moving on to another explanatory factor, there is still a negative beta (momentum) for the long and long-short portfolio with a 5% significant level. In contrast, the short portfolio captures a positive beta (momentum) which is not significant. The beta (size) factor does not face any considerable changes for the long portfolio, but there are adverse changes for the short and long-short portfolios. Furthermore, the long-short portfolio holds on the same significant level, but the short portfolio is still not significant for beta (size). Finally, there is a positive increase in the beta (value) for the long and long-short portfolios where both are able to have a significant level of 1%, and a negative beta (value) for the short portfolio which is also significant at a 1% level.

As a result, there is also higher R^2 values for all three portfolios. This gives more confirmed results even with a reduction in the alphas. Overall, the FFC4 model describes the returns better than the CAPM for all the portfolios.

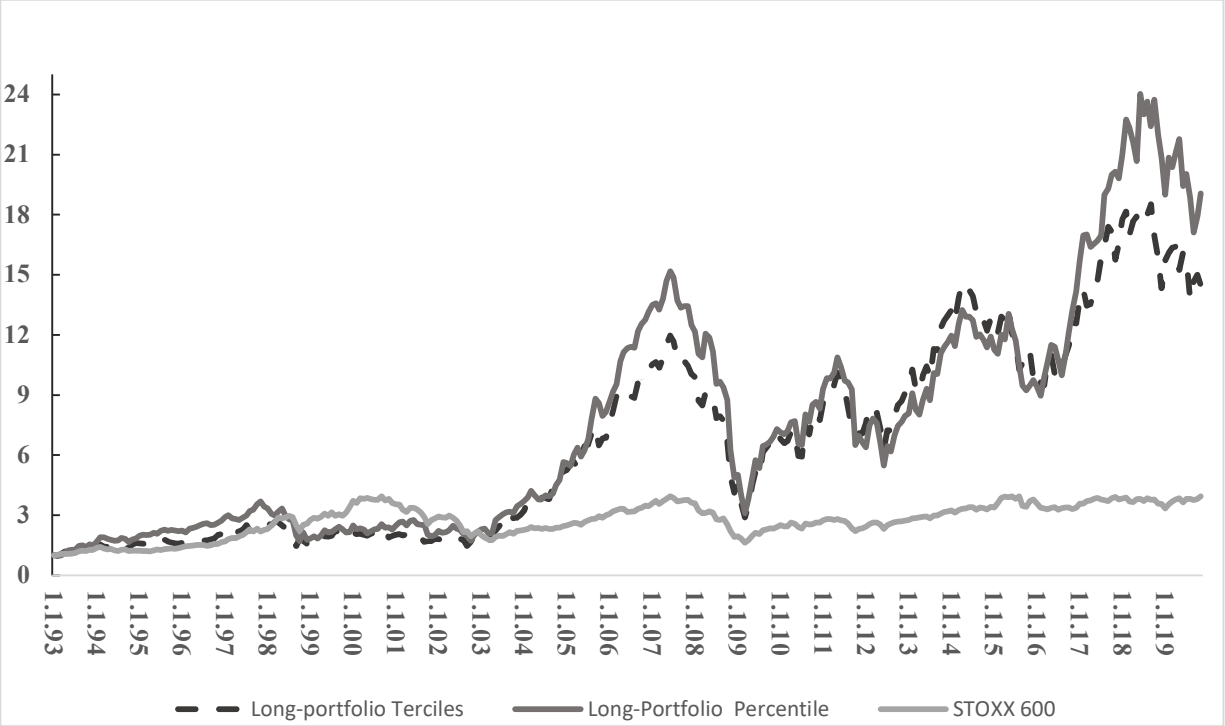

Figure 1 presents the long-portfolio of the initial and robustness test strategy's performance compared to the benchmark over a time frame of 27 years. The cumulative returns are plotted on the X-axis (starting by 1) and the time in years on the Y-axis.

Figure 1

Figure 1 shows the cumulative returns of the long portfolio of terciles and the long portfolio of the percentile which I use for the robustness test, and the cumulative returns of the STOXX 600 as a benchmark. Notice that both of the long portfolios perform much better than the benchmark. All three portfolios run parallel to each other throughout the years, but the volatility of the long portfolios is much higher than the benchmark. The long robustness tests portfolio mostly outperforming the long initial portfolio. There is also quite clear that the long portfolios outperform the benchmark most of the time but are beaten by the marked through the dotcom bubble crises.

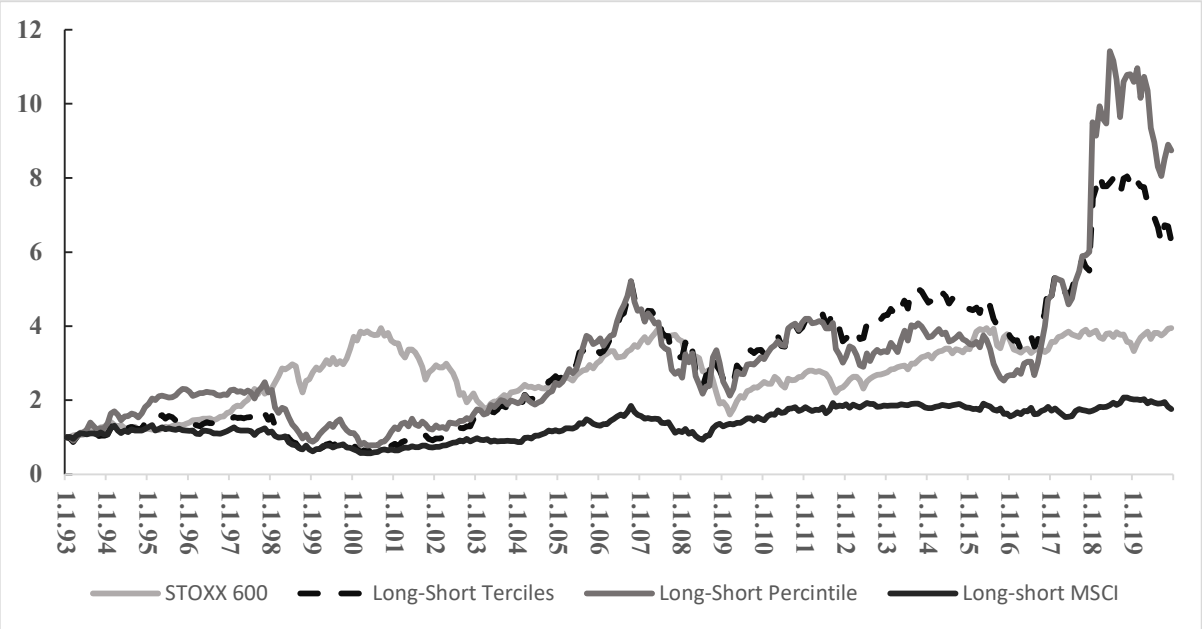

Figure 2 presents the long-Short portfolios of the initial, robustness test and MSCI strategy's performance compared to the benchmark over a time frame of 27 years. The cumulative returns are plotted on the X-axis (starting by 1) and the time in years on the Y-axis.

Figure 2

Figure 2 gives an overview of the long-short portfolios for the initial, robustness and MSCI portfolios combined with the same benchmark as figure 1. Again, the long-short portfolios for the initial and robustness test strategy together with the benchmark outperform the MSCI long-short portfolio most of the time. However, the initial and the robustness test portfolios moves are very close to each other, but a clear outperformance from the robustness test strategy cannot be seen. Regardless, these two strategies outperform the benchmark most of the time except under the dotcom bubble. The results shown in these two Figures show that when the strategy is looking into more extreme points, the strategy performs better in the long run. This also bears more volatility, higher downturns, and higher upturns, which is in line with the retrieved results.

4.7 Performance in Times of Crisis

After the robustness test, which confirmed the obtained results, I wanted to go further and perform a crisis test. In table IX the descriptive stats of the initial long-short strategy and STOXX 600 are presented. During the global financial crisis from mid of 2007 to the end of 2009, the strategy was able to outperform the market.

Table IX

	Long position	Short position	Long-Short	STOXX 600
Mean	-0.061	0.002	-0.063	-0.150
Std. Dev.	0.406	0.410	0.295	0.226
Min.	-0.282	-0.303	-0.165	-0.133
Max.	0.303	0.188	0.192	0.118
Skew.	0.260	-0.602	0.558	-0.223
Exc. Kurt.	1.191	0.110	0.253	-0.300
Sharpe ratio	-0.14	0.01	-0.21	-0.66

Table IX shows the disruptive stats of the initial long-short portfolio and the benchmark, which is the STOXX 600, in times of crisis. All the values are annualized.

The obtained results do not give positive results but can only capture a minor loss. However, the initial strategy that provides a mean of -6.3% is followed by a standard derivation of 0.29, while the market for the same period gives a mean of -15.00% with a volatility of 0.22, respectively. An important measure to look into is the sharpe ratio, where the initial strategy has a sharpe ratio of -0.21 while the benchmark has a sharpe ratio of -0.66.

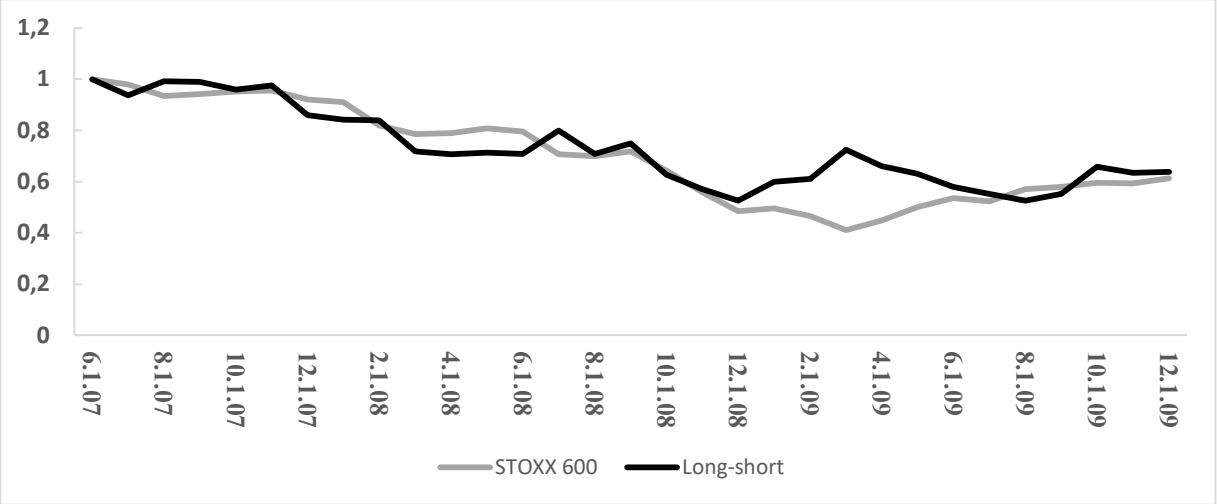

Figure 3 presents the long-Short portfolio of the initial performance compared to the benchmark over a time frame of 16 months, which is the global financial crisis time period. The cumulative returns are plotted on the X-axis (starting by 1) and the time in years on the Y-axis.

Figure 3

This measure shows the risk-adjusted return of these two portfolios. As shown in Figure 3 the initial portfolio can capture a better risk-adjusted return with a lower negative return but higher volatility. The higher volatility can also be seen at the maximum and minimum values that is less extreme for

the benchmark. The results confirm what can be seen in table IX, namely that the initial strategy have some influence by the market and has higher volatility.

It is considering that buying cheap stocks from cheap markets and short expensive stocks from the expensive markets work particularly well in regular times where the strategy is able to capture significant positive results. However, the strategy does not perform that well in times of crisis. As shown earlier, the market is able to beat the strategy under the dotcom bubble. On the other hand, the strategy beats the market under global financial crises but gives a negative return. However, it is not fear to compare the long-short strategy with the market since the strategy has a beta close to zero, while the market has beta of 1. The long portfolio would be a better comparison where the beta is close to the markets beta, and as shown the long portfolio performs better than the market in the long run. Overall, the strategy can be used for the long term, but after the poor performance of the short positions shown earlier, it would be more profitable to only buy cheap stocks from cheap markets. With only the long portfolio, this strategy captures higher returns with lower volatility.

5.0 Conclusion

This paper investigated a portfolio strategy to see if there is any value premium that can be obtained where the strategy goes from a market-level to a firm-level to build a portfolio. With a zero-investment strategy, which allocates half of the funds in cheap stocks from undervalued markets and short sells the expensive stocks from overvalued markets. To find overvalued and undervalued markets, the CAPE ratio was used with an adjustment where the average earnings adjusted for the inflation of four years are used instead of ten years. To find the cheap and expensive stocks, I use book-to-market ratio with a minor adjustment, where the current market value is used every month to decide if there would be any reallocation. I also use a portfolio for the robustness check where I move from dividing the dataset from terciles to percentile to see if more extreme points could have better results. However, all the portfolios shown in this paper are value-weighted (compositions based on market capitalization).

There was discovered that the initial strategy provides significant positive returns but that the robustness test strategy outperforms the initial strategy. Moreover, in the crises test where the strategy is compared with STOXX 600 under the global financial crises, there is some evidence

that the strategy outperforms the benchmark. However, the strategy does not get positive results under the global financial crises.

The short portfolios do not capture any significant or positive values for this strategy. The long portfolios were mainly the main driver of the obtained positive returns. Therefore, I conclude that the strategy is profitable, but it will capture higher returns with lower risk with only using the long portfolio. When that's said, this will not hold under crisis, thus I recommend using it in combination with other strategies within uncertain and high volatile market conditions. However, if the strategy is followed for the long term the effect of a crisis will not be dramatically but for the short term the effects will be more significant.

5.1 Limitations

There is some limitation on market-level and firm-level. First, since I'm looking into different countries with different amounts of companies, the bins do not have the same number of companies inside of the long-short portfolios. Second, the number of companies changes every month, which makes it difficult to see how many companies are used every month. That is why I operate with averages. In the end, short portfolio can be a limitation for this strategy since short selling brings some difficulties where they are not very liquid, and you might be in a short squeeze position. On the market-level more countries could be included to see if the same values could be achieved. When it comes to the firm-level limitations, many other valuation methods and ratios could be used, like price to cash flow ratio or forward PE ratios. Moreover, to use the same valuation metrics across the companies is not a fear valuation. For example, comparing a financial institution's firm's and manufacturing firms' value can be defined differently. A possible extension here is to control for the industry when defining value metrics.

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