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Value versus growth during the financial crisis of 2008: Evidence from Finland

Bachelor's Thesis
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1. INTRODUCTION

Many of studies have been conducted concerning value premium in the field of economic research. The debate between returns of value and growth stocks has been a long-lasting topic and has resulted in many studies confirming or criticizing the existence of the value premium. Value premium is defined as the excess return on value stocks over growth stocks. Value stocks, in general, are defined as the low price-to-earnings, price-to-book, price-to-cash flow, and other equivalent financial ratios, while growth stocks are the opposite, with high ratios. In various research papers persistent value premium has been discovered in both different time periods and equity markets. Also, a huge amount of theoretical and empirical studies have been published in an attempt to understand the causes of value premium. On the other hand, the effects of the financial crisis of 2008 on value premiums is an engrossing topic, but has not yet resulted in many publications because the crisis is so recent. However, there have been various economic crises and recessions in the past, which are included in the time scale of many studies. The effects of the crises on the value premium have not been scrutinized in many of the published papers, however.

Value premium has been studied on many different markets on many different time periods and its existence has been sighted. Despite the amount studies that use data from international markets, the Finnish stock markets continue to go unrepresented in the prior studies about value premium. This could be, because the Finnish stock market (OMX Helsinki or OMXH) is relatively small with only around hundred companies trading. This comes partly from the fact that Finnish economy and market size is relatively small, but also that OMXH has been trading internationally only for two decades, which is somewhat short time span compared to the larger stock markets.

However, Pätäri & Leivo (2009) found strong value premium in Finnish stock market during 1993 – 2003. Their (Pätäri & Leivo 2009) study also indicated that value stocks tend to perform better particularly in bearish market. An extensive study by Fama & French (1998) found value premium existing in twelve major markets (i.e.

U.S, Japan, U.K, France, Germany, Netherlands, Belgium, Switzerland, Sweden, Australia, Hong Kong and Singapore) ratio during period 1975 – 1995. Like said, the spectrum of studies concerning value premium is ample and these examples are just a fraction of the literature.

1.1 Background and Effects of Financial Crisis

After the dot-com bubble in early 2000's U.S Federal Reserve continued the low interest rate policy, which is thought to be a significant element that helped to foster the housing and mortgage markets (Stiglitz, 2010). This combined with a political effort to provide mortgages for the underprivileged by easing the regulation on sub-prime mortgages this led to a boom in housing market. Also the long lasted deregulation of the capital markets led to situation where financial institutions and other key-players began to take excessive risks. (Taylor, 2008).

Financial innovation played a key role as well, with banks packaging mortgages into completely new financial instruments and selling them forward to investors. These new financial instrument attracted AAA ratings from rating agencies; the AAA rating implied very low risk, but it soon would become painfully obvious that one could not diversify all of the risk away, so AAA ratings were misleading at best. The real risk of these newly created financial innovations was difficult to determine due to their complexity. (Acharya & Richardson, 2009).

The housing bubble began to burst in early 2007, which was followed by the real equity market collapse that started to take place in the middle of September 2008 with the bankruptcy of Lehman Brothers and the bailout of AIG. The collapse of Lehman Brothers triggered a panic reaction in financial markets, and the political decision to let it collapse was justified by politicians with the idea of preventing future moral hazard taking place in other banks. The consequences of the financial crisis have been both severe and global: The extent of the crisis can be described with drop of more than 56 % in world equity markets measured from all-time high USD market capitalization from October 2007 by the end of February 2009. (Bartram & Bodnar, 2009).

The financial crisis can be said to have started in the U.S, but contagion to global markets would soon follow. The consequences in Finland's economy and Finnish stock market were major. The magnitude of the influences can be shown from the calculations by Statistics Finland where GDP decreased by 8.2 percents in 2009. Also Finnish exports, which are relatively substantial for an export-oriented country decreased by 21.5 % in 2009 (Statistics Finland, 2012). OMXH grew rapidly after hitting the bottom of dot-com bubble in March 2003 to 5 000 points and until it peaked to almost 12 500 points in November 2007. After the peak, the fall has been brutal and OMXH hit the bottom in March 2009 and where it remained at around 4000 points. Unfortunately, while the financial crisis is over, the larger problems that are haunting both American and European economy cannot be said to be over yet in 2012, as both America and Europe are still struggling with debt.

1.2 Objectives

The objective of this study is to examine the impact of the Global Financial Crisis of 2008 to both value and growth portfolios using the evidence from OMX Helsinki. The study covers time period from 2006 to 2010, starting well before the bankruptcy of Lehman Brothers in United States and ending to 2010 covering the two equal length two-year periods. Six portfolios per period are created using different financial ratios for value and growth stocks. The benchmark for total market return will be OMXH CAP, due to the fact that the average performance of OMXH is largely influenced by performance of Nokia Corporation. Thus, the research questions will be:

1. Can the existence of value premium be observed on the Finnish stock markets during the financial crisis?
2. Which portfolio managed to achieve the best returns and risk-adjusted returns?
3. How did the portfolios perform when benchmarked against the total return of the OMXH CAP?

1.3 Structure

The structure of this thesis is following: Section two introduces a literature review of previous studies and academic literature. Section three presents the theoretical framework. Section four covers the data and the research methods. In section five the empirical results are presented. Last and final, the sixth, section provides a summary for research findings.

2. LITERATURE REVIEW

This section will provide a compact review of previous studies in the light of value premium. The purpose is to cover different time periods and different equity markets, and also the findings to explain value premium and theories of causes underlying.

2.1 Explanations of Value Premium

The existence of the value premium can be said to pose a dilemma for the rational expectations model. Zhang (2005), asserts that according to conventional wisdom, growth options must be riskier than value stocks, yet historically value stocks have outperformed growth stocks. Originally, financial economists thought that this P/E anomaly was nothing but a statistical artifact, based on misspecification of the CAPM. DeBondt and Thaler (1985) argued though that this was not the case, but a better explanation for the anomaly is a behavioral one; economic agents are not purely rational actors as rational expectations hypothesis assumes, but instead they are irrational human beings who overvalue stocks consistently and have what behavioral economists have called bounded rationality. Their explanation, then, is that companies with very low P/E are currently undervalued, based on series of gloomy forecasts, but the prices slowly adjust as future earnings turn out to be better than expected and the initial expectations are turned out to be wrong. Similarly, very high P/E ratio would indicate that the stock is currently overvalued. Their empirical tests suggest that this could indeed be in the case.

Zhang (2005) provides a different solution for the value anomaly: He uses neoclassical framework and rational expectations mode to analyze the problem. To paraphrase, he explains that, “in bad times it is value firms that are burdened with unproductive capital, making it more difficult for value firms to reduce their capital stocks than growth firms. And in good times, growth firms invest more and face higher adjustments costs to take advantage of the favorable economic conditions.” This, he argues, explains the existence of value anomaly, but is also consistent with the irrational overreaction hypothesis as described by Debondt and Thaler (2005).

Other possible explanations provided and largely presented in the literature are risk premium and free lunch suggestion. Former view, as outlined by Liew & Vassalou (2000), asserts that value premium is a reward for investors who take more risk, but this risk is not reflected in the traditional risk assessment models such as CAPM. Another group is academics, who assume that value premium is nothing but a market inefficiency, meaning that markets assume that future earnings can be deduced from past earnings, erroneously. This is similar approach as taken by Debondt and Thaler (2005).

Arnott and Hsu (2008) provide an informational approach to the value anomaly. They argue that value premiums are easily explained by informational inefficiencies in stock prices. They also favor the behavioral approach, and argue that with the amount of empirical and behavioral support for irrational overreactions and price overshooting their explanations are more consistent with the existing evidence than explanations based on rational models.

Thus, many different explanations have been set forth as to why value premium exists, but the academic literature does not provide any degree of suggestion that consensus about the matter has been reached.

2.2 Finnish Markets

Finnish markets are underrepresented in the studies about value premium, though are not completely absent. By far the largest and most extensive work about Finnish markets with regards to value premium has been done by Pätäri & Leivo (2009, 2010, 2011). Their findings (2009) indicate strong evidence for the value premium during period 1993 – 2008. The research was performed using six valuation ratios (E/P, EBITDA/EV, CF/P, D/P, B/P and S/P) and also eight composite value measures. The data was on monthly basis and the portfolios were composed annually.

Using the six basic ratios mentioned above, Pätäri & Leivo (2009) found out that the best valuation multiple over the 15-year period was D/P value portfolio measured by all performance metrics. In general, value portfolios outperformed both market and

growth portfolio by employed performance metrics with EBITDA/EV, E/P, CF/P and D/P multiples. B/P and S/P were the only ratios that did not achieve statistically significant differences with any performance metric.

In addition, Pätäri & Leivo (2009) examined the influence of bull and bear markets. According to their findings, the outperformance of value strategies is mostly attributed to the fact that the value portfolios suffer much less from bear markets than do stocks on average. During bull markets the value and growth portfolio differences are much smaller. However, the same value strategies that outperform the market the most behave quite similarly for the full sample period as in bull market conditions.

Their research (Pätäri & Leivo, 2009) also covered the relationship between value and size anomalies, which indicated that the value premium is not explained by size anomaly in the Finnish stock market. The study itself does not explain the causes underlying the value premium, but they suggested “periphery syndrome” as one possible reason causing pricing errors and opportunities to earn abnormal profits by employing active investing strategies. The intermittent periphery syndrome is said to be caused by the herding behavior of international institutional investors cashing their equity positions first from the furthest stock market during turbulent times. This is said to cause steeper drops in Finnish stock market because of the relative low liquidity compared to larger and more developed stock markets. And on the other hand, during bullish period the thin trading tends to raise the stock prices more than they do in the major stock markets. As combined, these factors increase the volatility of the Finnish stock market.

2.3 International Markets

A groundbreaking study by Basu (1977) implied that the low P/E portfolios (value) seemed to have higher absolute and risk-adjusted rates of return on average than the high P/E portfolios (growth) during period 1957 - 1971 in the U.S market. Chan et. al (1991) conducted research about the existence of value premium on Japanese stock markets from 1971 to 1988 and found evidence of the existence of value premium, especially related to B/P and CF/P multiples. The existence of value premium was found also from six major markets (France, Germany, Switzerland,

U.K, Japan, and U.S) sorted by price-to-book value over the period 1981 - 1992 (Capaul et. al 1993), however they had relatively small time span of 10 years. So far the largest number of studies has been done by Fama & French (1992, 1998, 2006) about the value premium. Fama & French (1992) found that especially E/P and book-to-market equity provides value premium between 1963 and 1990 in the U.S market.[1] Their (Fama & French, 1998) international findings supported positive value premiums formed on B/M, E/P and C/P, with twelve of the thirteen mentioned countries.

A more recent study by Fama & French (2006) still found strong value premium both for time period 1963 - 2004 in the U.S market and for 1975 - 2004 in 14 major markets outside the U.S. Their (Fama & French 2006) findings support also that CAPM can explain the strong value premiums of 1926 – 1963 in the U.S market but not in the period 1963 – 2004. During the later period growth stocks had larger betas than value stocks, which is the reverse of the suggestion of the CAPM. Also their testing covered value premium among large cap stocks versus small cap stocks, where the 14 markets outside U.S produced similar value premium whether the firm size was big or small. In the U.S post-1963 period B/M the large cap stocks did not have value premium, but using E/P as screening ratio the value premium was identical for small and big stocks.

As seen, the evidence on existence of value premium is quite broad as well as the criticism. It has received the attention of financial economists now more than three decades and still there is no consensus of the explanation of the persistence and the source of value premium.

[1] Notice the inverse ratios which are widely used in context of value premium. See Chapter 4 for details.

3. THEORETICAL FRAMEWORK

3.1 Value Investing

Value investing is a stock-picking method that bases on finding stocks trading below their inherent worth. Framework for value investing is considered to be Graham & Dodd's (1934) book "Security Analysis", which suggests investing into securities trading less than their intrinsic value. Hence value stocks are considered to be low priced compared to fundamentals (i.e. dividends, earnings, sales, cash flows) and growth stocks are the opposite. Generally used indicators of fundamentals are inter alia ratios P/E, P/B, P/CF, P/S, EV/EBITDA. More specific descriptions of ratios used in this study presented in part 3.3 Ratios.

Screening undervalued stocks when employing financial ratios does not always provide bona fide value stocks or growth stocks. Ratios are not unambiguous to interpret, but are used as approximates and of course involve a degree of uncertainty. In addition, there are various different composite value measures attempting to reduce the spurious undervaluation stemming from price-based earnings multiples.

3.2 Efficient Market Hypothesis

Akintoye (2008) defines efficient capital markets as, "where the joint distribution of security prices at a period, given the set of information that market uses to determine security prices, is identical to the joint distribution of prices that reflect all available information," which essentially means that there is no difference between the information that market uses and the relevant information, meaning that nobody would be willing to pay for the information.

The Efficient Market Hypothesis (EMH) is largely used theory of financial economics. Fama (1970) arranged EMH to three sub-categories: Weak, semi-weak and strong forms of efficient markets. Firstly, the *weak form* of efficient markets exists when all the prices of traded assets already reflect all the historical information. Second form is the *semi-weak* form, where the prices include all historical information and also

adjust instantly to reflect the new publicly available information. Finally, the *strong form* is where the stock prices reflect all relevant and available information, whether public or private (insider information). Therefore, the strong form incorporates both the semi-weak and weak forms to itself, and semi-weak naturally encompasses the weak form.

Thus, EMH seems to suggest that arbitrage opportunities are random and cannot be achieved consistently. In efficient markets return and risk go hand in hand, which means more return can be achieved with more risk. Market inefficiencies are defined in academic research as anomalies. These are plenty of different anomalies specified and researched, but one concerning this study the focus is on the value effect. By Schwert (2003) the value effect is the value premium found amongst various studies.

Efficient market hypothesis has also attained criticism from behavioral finance. The criticism is mainly directed towards the assumptions of investors as rational actors. Stiglitz and Grossman (1980) have also argued that informationally efficient markets are actually impossibility: prices can never reflect all the available information, because acquiring information is costly, since if information was free, as informationally efficient markets assume, those who spent time and resources to acquire the information would not receive any compensation.

3.3 Ratios

3.3.1 Price-Earnings Ratio

The P/E ratio is one most commonly applied earnings based stock valuation multiple, where current stock price (P) is divided by earnings per share (EPS). Simply it defines how much investors are prepared to pay from one unit of earnings at the current moment. P/E can also be seen as duration of a stock, which implies how many years with current earnings it takes to pay back the value of the stock. High P/E ratio may indicate that the firm has good growth opportunities or that its earnings are relatively safe and therefore more valuable. Further it can plainly point out that the stock is just over priced. Whereas low P/E ratio may indicate low growth

opportunities, high risk of a company and its earnings, or just undervaluation of a stock. All these imply the challenging nature of interpreting the ratio.

Bodie & al. (2005) divides price into two components; no-growth value per share (EPS/r) and present value of growth opportunities (PVGO). Applying this method the P/E equation can be written as follows:

$$\frac{P_0}{EPS} = \frac{\frac{EPS}{r} + PVGO}{EPS}$$

(Eq. 1)

Where:
P_0 = the price of the stock at the moment
r = expected rate of return
EPS = expected or trailing 12 months Earnings per Share
PVGO = Present Value of Growth opportunities.

Other known approach presenting the price is the Gordon's (1959) constant growth dividend discount model. Where the equation for P/E can be written as follows:

$$\frac{P}{E} = \frac{DIV_1}{EPS_1} \; x \; \frac{1}{r - g}$$

(Eq. 2)

Where:
DIV_1 = expected dividend for the next year
EPS_1 = expected return per share for the next year
r = required rate of return
g = expected stable growth rate of dividends

The two models above (Eq. 1 & 2) show where the value of the ratio is derived. The factors impacting the ratio the most, as general, are the earnings, the growth and the required rate of return. Simply, when expected earnings and their expected growth increase it increases the price and simultaneously the value of the ratio and when decreasing the impact is opposite. The rate of return indicates the risk of a stock,

where higher risk raises the rate of return which decreases the P/E ratio and with lower risk the impacts are vice versa.

3.3.2 Price-To-Book Ratio

P/B ratio compares a stock's market value to its book value. The higher the ratio the more investors are expecting company to generate earnings in future with the assets company is holding. Respectively, when the ratio is lower and stock of the company is trading close to its book value (or even under), investors are not expecting firm to deliver the economic value added that would cover their required return on equity (e.g. ROE). Though, some investors think that low P/B investments are safe because of the regression to the mean, meaning when returns tend to move towards the average. Book value is often seen as a margin of safety as well, which is thought to be the value of liquidating the assets. However, book value can not been seen straightly as a liquidation value, which renders the margin of safety notion unreliable. P/B varies greatly among industries and the comparison of the ratio is valid between stocks carrying similar fundamental attributes.

3.3.3 Price-Cash Flow Ratio

P/E ratio's earnings factor can easily be affected by accounting practices and is commonly viewed as subject to some imprecision and even manipulation. P/CF is usually used as an alternative to P/E ratio, because of the nature of the cash flow, that tracks cash actually flowing into or out the firm and this way is less affected by accounting decisions. It is also said to be a measure of the market's expectations of a firm's future financial health.

4. DATA AND METHODOLOGY

This section covers the details of data gathering and portfolio formation. Also the performance metrics and statistical tests applied are covered.

4.1 Sample

Data is obtained from Datastream and it consists of Finnish stocks listed in OMX Helsinki. Observations are on monthly basis from 31.8.2006 to 31.8.2010 and the sample period is survivorship bias free. All the financial ratios are composed basing on third quarter financial information. Returns are calculated from Datastream's Return Index, which shows the theoretical growth in value of a share holding over a specified period, assuming that dividends are re-invested to purchase additional units of equity at the closing price applicable on ex-dividend date.

4.2 Portfolio Formation

Portfolios are composed in value and growth portfolios by the inverse ratios of P/E, P/B and P/CF. Inverse values are used to avoid the possible problem with negative values and values which are close to zero in the denominator of the normal ratios. Hence, the interpretation of the inverse ratios changes opposite so that the ratios of the value stocks are high and the ratios of the growth stocks are low. Value portfolios are considered to be the top 30% and growth portfolios are the bottom 30%.

The ratios are calculated from Datastream's data for individual ratios. For E/P the earnings figure used is the annual EPS figure from Datastream which is derived from an aggregation of interim period earnings for the portfolio composition dates, while the price is the closing price of the month as in all other ratios used. Book-value per share used in the B/P ratio and the Cash Flow per share in the CF/P ratio is the value of the end of the last fiscal year.

Portfolios will be composed twice and both for two-year holding period. There will be six portfolios per holding period; value portfolios by high E/P, B/P, CF/P and growth

portfolios by low E/P, PB/P and CF/P. First portfolio formation is in 31.8.2006 and re-formation in 29.8.2008, which is held up to 31.8.2010.

Table 1. Descriptive Statistics for Portfolio Formation (2006 – 2010)

	Maximum	Mean	Minimum	Median
E/P				
All	2.984	0.079	0.000	0.060
Top	2.984	0.168	0.066	0.111
Bottom	0.041	0.011	0.000	0.000
B/P				
All	2.189	0.102	-0.281	0.088
Top	2.189	0.251	0.116	0.159
Bottom	0.066	-0.029	-0.281	0.013
CF/P				
All	3.266	0.582	-0.560	0.543
Top	3.266	1.054	0.640	0.949
Bottom	0.377	0.181	-0.560	0.206

The Table shows maximum, mean, minimum and median values for every valuation multiple employed as a basis of portfolio formation for the formation dates (31st August 2006 and 29th August 2008). The comparable figures for value portfolio (Top) and the growth portfolio (Bottom) are also reported separately.

4.3 Performance Evaluation

4.3.1 Jensen's Alpha

Jensen's Alpha measures the ex-post average return on the portfolio over and above that predicted by the CAPM, given the portfolio's beta and the average market return. Positive alpha indicates excess return over the expected return predicted by the CAPM and respectively negative alpha indicates underperformance above the predicted return. Therefore, Jensen's Alpha measures the risk adjusted returns and is calculated as follows:

$$\alpha_p = \overline{r}_p - \left[\overline{r}_f + \beta_p\left(\overline{r}_m - \overline{r}_f\right)\right]$$

(Eq. 3)

where,

$\overline{r}_p$ = the return of portfolio *p*

α_p = the Jensen's alpha of portfolio *p*

β_p = the beta of the portfolio *p*

$\overline{r}_m$ = the stock market return

$\overline{r}_f$ = the risk-free return

Statistical significance of Jensen's Alpha is measured by Student's T-test. The significance levels are 1 %, 5 % and 10 %; where 1 % is highly statistically significant, 5 % is statistically significant and 10 % almost statistically significant.

4.3.2 Sharpe Ratio

Sharpe ratio measures portfolio return over risk-free return divided by the standard deviation of the excess returns over that period. It measures the reward to volatility trade-off, in other words how volatile has one unit of profit been. Sharpe Ratio is calculated as follows:

$$Sharpe\ Ratio = \frac{R_i - R_f}{\sigma_i^{ER_i/|ER_i|}} \quad \text{(Eq. 4)}$$

where,

R_i = the average monthly return of a portfolio *i*

R_f = the monthly risk free rate of return (i.e 1-month Euribor)

ER_i = the excess return of a portfolio *i*

σ_i = the volatility of the excess return of portfolio *i*

In this study the modified version by Israelsen (2003) is used to avoid validity problems deriving from the negative excess returns.[2] The Sharpe Ratio measures risk-adjusted performance of a risky asset or a trading strategy. It indicates how well the return of an asset compensates the taken risk, the higher the Sharpe Ratio the better.

[2] Notice the index $ER_i/|ER_i|$ in the denominator of Equation 4.

Among criticism of using standard deviation as a risk-measure Pätäri & Leivo (2009) introduces adjustment to Sharpe Ratio, where the standard deviation is skewness and kurtosis adjusted (SKAD, henceforth). Basic standard deviation is said to oversimplify the concept of risk because of all the variation from the mean, including the positive, directly have influence to the value of standard deviation. When return distributions are negative skewed the use of standard deviation as a risk surrogate penalizes also from the upside potential that is sought-after from the investor's point of view. Therefore, the adjusted Sharpe Ratio is applied to capture the skewness and kurtosis of return distributions being analyzed. Using the framework of Favre and Galeano (2002) of the adjusted Z-value (Z_{CF}) which is derived employing the Cornish-Fisher expansion as follows:

$$Z_{CF} = Z_C + \frac{1}{6}(Z_C{}^2 - 1)S + \frac{1}{24}(Z_C{}^3 - 3Z_C)K - \frac{1}{36}(2Z_C{}^3 - 5Z_C)S^2$$

(Eq. 5)

where,

Z_C = Critical value for the probability based on normal distribution

S = Skewness of the return distribution

K = Kurtosis of the return distribution

Sample skewness and kurtosis are determined as follows:

$$S = \frac{1}{T}\sum_{T=1}^{T}\left(\frac{r_t - \bar{r}}{\sigma}\right)^3$$

(Eq. 6)

$$K = \frac{1}{T}\sum_{T=1}^{T}\left(\frac{r_t - \bar{r}}{\sigma}\right)^4 - 3$$

(Eq. 7)

Applying method described above SKAD is calculated by multiplying the standard deviation by the Z_{CF} / Z_C ratio. In this study the 95% confidence level is used determining the Z_C equal to -1.96 as Favre & Galeano (2002) suggests. Hence, the adjusted Sharpe Ratio can be written:

$$Adjusted\ Sharpe\ Ratio = \frac{R_i - R_f}{SKAD_i^{ER_i/|ER_i|}}$$

(Eq. 8)

where,

$SKAD_i$ = Skewness and kurtosis adjusted deviation of the monthly excess returns of a portfolio *i*

4.4 Statistical Tests

4.4.1 Welch's T-test

Statistical significance between portfolio alphas is tested by Welch's T-test. Welch's T-test can be written as follows:

$$t = \frac{\alpha_i - \alpha_j}{\sqrt{SE_{\alpha i}^2 + SE_{\alpha j}^2}}$$

(Eq. 9)

where,

α_p = the alpha of a portfolio *p*

SE_p = the standard error of a portfolio *p*

The degrees of freedom for the t-statistic are calculated as follows:

$$v = \frac{\left(SE_{\alpha i}^2 + SE_{\alpha j}^2\right)^2}{\frac{SE_{\alpha i}^4}{v_i} + \frac{SE_{\alpha j}^4}{v_j}}$$

(Eq. 10)

where,

V_i, V_j = the degrees of freedom defined on the basis of number of time series returns in samples *i* and *j* (v = *n – 1)*

4.4.2 Jobson-Korkie Z-test

The original Jobson-Korkie Z-test is employed to measure the statistical significances of differences between comparable pairs of Sharpe Ratios. In this study the corrected version of Memmel (2003) is applied for both unadjusted and adjusted Sharpe Ratios. It can be written as follows:

$$Z_{JK} = \frac{Sh_i - Sh_j}{\sqrt{V}}$$

(Eq. 11)

where,

V = asymptotic variance of the Sharpe Ratio difference

$$V = \frac{1}{n}\left[2 - 2\rho_{ij} + \frac{1}{2}\left(Sh_i^2 + Sh_j^2 - 2Sh_iSh_j\rho_{ij}^2\right)\right]$$

(Eq. 12)

where,

Sh_p = the Sharpe Ratio of a portfolio *p*

ρ_{ij} = correlation between returns of portfolios *i* and *j*

n = number of observations

5. RESULTS

This section provides the results of the empirical findings. The Financial Crisis offers a challenging basis for the study because of the highly turbulent markets where stock returns are decreasing and volatile, while interest rates are high. As well the negative market premium sets an interesting foundation for the empirical testing.

Table 2. Return, Risk and Performance Metrics of Portfolios (2006 - 2010)

	Annual Return	Annual Volatility	SKAD	Jensen's Alpha (sign.)	Sharpe Ratio	Sharpe Z_{JK} (Pf. Vs market) (sign.)	Adjusted Sharpe	Adjusted Sharpe Z_{JK} (Pf. Vs Market) (Sign.)	Beta
E/P									
Top	1.33 %	22.91 %	25.92 %	-3.09 % (0.519)	-0.00026	0.0039 (0.997)	-0.0003	0.0031 (0.9975)	0.88
Bottom	0.42 %	23.25 %	24.95 %	-7.49 % (0.237)	-0.00051	0.0051 (0.996)	-0.0005	0.0055 (0.9956)	0.83
B/P									
Top	3.92 %	24.29 %	27.28 %	-0.93 % (0.857)	-0.00015	0.00082 (0.999)	-0.0002	0.0010 (0.9992)	0.93
Bottom	-2.91 %	23.15 %	26.50 %	-9.91 % (0.128)	-0.00064	0.00665 (0.995)	-0.0007	0.0077 (0.9939)	0.82
CF/P									
Top	2.89 %	22.28 %	21.03 %	-1.90 % (0.607)	-0.00019	0.00181 (0.999)	-0.0002	0.0015 (0.9988)	0.89
Bottom	-1.39%	21.85 %	25.25 %	-6.69 % (0.214)	-0.00043	0.00466 (0.996)	-0.0005	0.0055 (0.9956)	0.81
Market	0.80 %	23.84 %	24.71 %		-0.00010		-0.0001		
Rf	2.71 %	0.49 %							

The Table presents average annual return (percentual), three risk measures (i.e volatility, SKAD, Beta) and corresponding performance metrics (the Jensen's Alpha, the Sharpe ratio, and the adjusted Sharpe ratio) are presented for formed portfolio. The columns after Sharpe ratio and adjusted Sharpe ratio indicate the performance differences between each portfolio and market portfolio employing the corrected Jobson-Korkie Z-test. The significance levels are presented in parenthesis.

5.1 E/P Portfolios

The top portfolio by E/P ratio produced 1.33 % p.a. percent return for the observation period 2006 - 2010, while the bottom portfolio managed to perform 0.42 % p.a return. Top portfolio's annual volatility was slightly lower than bottom portfolios but employing SKAD as risk metric it was vice versa. Though, beta of bottom portfolio was 0.06 units lower than tops. Both portfolios carried negative alphas and they were not statistically significant. Also measured by Sharpe Ratio and adjusted Sharpe Ratio neither portfolio could not defeat the market portfolio as both portfolio's ratios were small negative figures near zero, nor they were statistically significant. (Table 1)

Top vs. Bottom performances are shown in Table 3. The alpha spread was 4.40 % for top portfolio, but the results were not statistically significant. Both Sharpe Ratio and adjusted Sharpe Ratio had the same microscopic difference 0.004, nor were they statistically significant. According to these results there were no discerning value premium between the E/P top and bottom portfolio.

5.2 B/P Portfolios

B/P top portfolio performed the best annual return of all portfolios composed, which was 3.92 %. The portfolio held the best risk adjusted performance metrics after the market portfolio, though with marginal differences compared to other portfolios. The top B/P portfolio was also the riskiest measured by all risk metrics. The bottom portfolio performed the supreme loss of all with -2.91 % p.a. Measuring the risk by beta the bottom portfolio carried out 0.11 units lower compared to the top portfolio. Both portfolios held negative alphas with top the smallest and bottom the largest of all portfolios, nor were they statistically significant. Neither portfolio could not beat the market portfolio employing Sharpe Ratio and adjusted Sharpe ratio, nor were the results statistically significant. (Table 1)

The alpha spread was largest with value 8.99 %, however it was not statistically significant. Sharpe Ratio difference was 0.008 and adjusted Sharpe Ratio difference 0.009, and neither was statistically significant. None of the performance metrics favors value premium with B/P portfolios during the Financial Crisis. (Table 3)

5.3 CF/P Portfolios

CF/P top portfolio achieved 2.89 % p.a. percent return, while the bottom portfolio - 1.39 % loss. CF/P portfolios carried the lowest volatilities and especially the top portfolio's SKAD was notably smaller than any other. In this case also, the bottom portfolio carried a smaller beta by 0.08 units. Both of the portfolios had performance weaker than the market portfolio measured by Alpha with negative values, and were statistically significant. Also Sharpe Ratio and adjusted Sharpe Ratio were both negative and both more poor then market portfolios. Neither was statistically significant against the market portfolio. (Table 1)

As the performance metrics between the top and bottom shows the alpha spread was 4.78 %, however it was not statistically significant. Also Sharpe Ratio and adjusted Sharpe Ratio differences were marginal and neither was statistically significant. Either these portfolios showed existence of value premium with statistical testing employed during the era of Financial Crisis. (Table 3)

Table 3. Performance Comparison of Top and Bottom Portfolios (2006-2010).

	Alpha Spread		Sharpe Ratio Difference		Adjusted SR Difference	
	Top vs. Bottom	(sign.)	Top vs. Bottom	(sign.)	Top vs. Bottom	(sign.)
E/P	4.40 %	(0.577)	0.004	(0.997)	0.004	(0.997)
BV/P	8.99 %	(0.276)	0.008	(0.994)	0.009	(0.993)
CF/P	4.78 &	(0.461)	0.007	(0.995)	0.005	(0.996)

The table exhibits the differences between value (Top) and growth (bottom) portfolios on the basis of several performance metrics (i.e the Jensen alpha, the Sharpe ratio, the adjusted Sharpe ratio). The difference of Alphas is evaluated with Welch's T-test and the difference of Sharpe ratios and adjusted Sharpe ratios with corrected Jobson-Korkie Z-test. Significance levels are presented in parentheses.

6. CONCLUSIONS

In this study we analyzed the performance of value and growth portfolios during the Financial Crisis which can be said to trigger in September 2008 when the Lehman Brothers filed bankruptcy and AIG was bailed out. The crisis is said to be one of worst financial crisis since the Great Depression of the 1930s. This study is effectuated by composing portfolios as value portfolios (top 30%) and growth portfolios (bottom 30%) by the ratios E/P, B/P and CF/P. First portfolios are composed by the individual ratios in 31.8.2006 and held to 29.8.2008, when they are re-composed and held to 31.8.2010. The purpose is to expound whether the value (top) portfolios perform better than the growth (bottom) portfolios and also how they perform against the market portfolio during the turbulent times of the Financial Crisis.

Compared to previous studies the results were rather surprising. Measured by pure percentual returns the value B/P portfolio produced the best annual return of 3.92 %. Also E/P and CF/P value portfolios performed slightly higher returns than the growth portfolios or the market portfolio. Hence, measured with risk adjusted performance metrics (i.e. Jensens Alpha, Sharpe Ratio and Adjusted Sharpe Ratio) none of the portfolios could not beat the market portfolio nor the results were statistically significant. Also differences between value and growth portfolios were marginal and none of the performance metrics were statistically significant. All in all these results indicate that there were no value premium discovered during the Financial Crisis period used in this study and almost in every value portfolio the slightly higher returns can be explained by the higher risk.

However, these results are not exhaustive and for further examination there are possibilities to extend the study. The Financial Crisis can not be said to be over, so wider time span would enable larger amount of observations and probably give more precise and extensive results. Also, applying more financial ratios and composite valuation measures as portfolio screening methods would give a wider basis for portfolio comparison.

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