Does the stock market misprices customer satisfaction?

Bachelor Thesis

Ruben Jakobs (382504)

Erasmus School of Economics

Erasmus University Rotterdam

Abstract:

In this thesis the pricing of customer satisfaction by the stock market is investigated. This is done by creating a portfolio based on the top 20% best performing companies according to the American Customer Satisfaction Index. This portfolio is compared with the performance of S&P 500. In this thesis we find that the strategy realized a higher return in almost every year between 2000 and 2015. This went together with a higher volatility in all of the years. Also the regression, which was used to calculate alpha and beta, showed this pattern. The average Sharpe ratio of the portfolio and the S&P 500 indicated that our strategy is more lucrative because our strategy gives a better reward in terms of return for the risk taken than the S&P 500.

18/07/2016

Introduction

2006, Fornell et al. shocked the finance world by composing an investment strategy that created a portfolio that realized a cumulative return of 75% while the market not even realized a positive return. During the examination period of their study Fornell et al. actually bought the stocks to prove that their results were not only based on theory. The most shocking was that this return could not be explained by the book-to-market ratio nor by the size-effect, which are two explanatory variables generally accepted throughout the finance world.

The strategy Fornell et al. created was based on customer satisfaction. Their theory was that the stock market mispriced customer satisfaction because of its intangibility. And that investing in companies with high customer satisfaction levels would realize an abnormal return relative to the S&P 500, which was used as the market index. This study holds a small paradox. We state that customer satisfaction is mispriced because of its intangibility but on the other hand we assign multiple companies a customer satisfaction score. This paradox is a fair objection against this research. But by using a consisted methodology to value the customer satisfaction levels of the companies, we try to estimate the relative differences between the customer satisfaction levels of the companies.

For their study Fornell et al. used the customer satisfaction scores provided by the American Customer Satisfaction Index. This company does a lot of research into customer satisfaction and holds an index with customer satisfaction scores for more than 450 companies. The specific calculation and methods used by the ACSI will be discussed later in this thesis.

Customer satisfaction can be achieved in various ways, such as charging low prices to exclusive treatment to satisfy the customer. For this study only the part of exclusive treatment and personal care will be taken into account as indicator of customer satisfaction. Mostly because this kind of customer satisfaction needs investments and time to get recognised and acknowledged.

One can see a clear example of customer satisfaction, as defined in this thesis, when looking at the difference between a high end clothing store and another random clothing store. At the high end one there is a shop assistant for every customer that enters the shop. When entering the shop they offer you something to drink or something to eat, if the customer wishes. In contradiction, walking into any other random clothing store almost no assistance is offered. This contradiction or difference is a pure example of how a company tries to create customer satisfaction.

Current literature only investigated the valuation of customer satisfaction by the stock market up to 2006 and could not come to a general accepted conclusion about the valuation. Therefore the research question of this thesis follows:

''Is it possible to outperform the S&P 500 with a portfolio based on customer satisfaction scores between 2000 and 2015?''

In this thesis we find that our portfolio strategy realized a higher return in fifteen of the sixteen investigated years. Only six of these years are significant. However, the volatility of our portfolio is also higher in all the investigated years, of which twelve years are significant.

The alpha and beta calculated in this thesis indicate the same as the return and volatility of our portfolio. With an alpha of 1.829, which we calculated in this thesis, one can conclude that our strategy realized a 1.829% higher return on average over the time period between 2000 and 2015 than the S&P 500. While our beta of 1.211, indicated that the riskiness of our portfolio is also significantly higher than the risk of the S&P 500.

To check if the extra volatility of our strategy is justified by the reward, in terms of return, for this extra risk we use the Sharpe ratio. The average Sharpe ratio indicates that over the time period 2000 till 2015 our strategy gives a better reward for the risk taken than the S&P 500.

In Section II of this thesis we will discuss the complementary literature, Section III the data and methodologies used, Section IV we will discuss the results and in Section V we will draw a conclusion.

Literature

The relationship between customer satisfaction and business performance was generally accepted decades ago. It is logical that satisfied customers return to the same store that satisfied them. The phenomenon was easily explained as rational behaviour.

This rational behavior affects business performance in many ways, for example through revenue. As customers return to the same store to do their grocery shopping, the revenue of this specific store will increase. Another effect of satisfied customers is that they are willing to pay more for the service they get. Therefore, a company with really satisfied customer can increase its prices, which also increases their revenue.

An often heard objection against customer satisfaction is that it costs a lot of money to deliver the service that satisfies customers. This is a valid objection, although a study by Reichheld and Sasser (1990) showed otherwise. Reichheld and Sasser discovered that, on average, the investments in customer satisfaction start to pay off after a period of five years. After that period the firms brand is well established and the customers are convinced of the quality of your service and will return more often.

Reichheld and Sasser discovered a lot of other effects of customer satisfaction on business performance. For example, that customer loyalty generates a steady future cash flow, because satisfied customers will show their loyalty and keep coming back to the same store. They also discovered that a high customer satisfaction lowers the transaction costs to acquire new customers for the company in the long run, because satisfied customers are more likely to come back. This implies that a company with high customer satisfaction, and therefore loyalty, does not need a lot of new customers and does not have to spend much on acquiring them.

A logical question that follows out of all these findings is how customer satisfaction effects the accounting figures such as the retention rate, revenue growth, profit margins and return on sales. Ittner and Larcker (1998) found evidence that customer satisfaction is not completely reflected in these accounting figures, but customer satisfaction is relevant for stock pricing. The logical explanation for this incorrect valuation is that customer satisfaction is an intangible asset and is not easy to measure or to value.

Market pricing

Assuming that there is a positive relationship between customer satisfaction and business performance, and acknowledging that it is difficult to value this intangible asset, Fornell, Mithas, Morgeson III and Krishnan (2006) wanted to investigate whether the market misprices customer satisfaction.

Fornell et al. conducted a portfolio study to examine the effect of customer satisfaction on stock prices. They build a portfolio with the best performing companies according to the American Customer Satisfaction Index (ACSI). The ACSI is an index which ranks 500 companies based on customer satisfaction scores. Fornell et al. updated their portfolio every

month when the ACSI came with an update. After using this portfolio strategy for 6 years, between 1997 and 2003, their portfolio realized a cumulative return of 40% where the S&P 500 only realized a return of 13%.

Fornell et al. also did an actual real time portfolio study. They held a portfolio based on the same criteria as their earlier portfolio study. They held this portfolio between 2000 and 2004. During this period their portfolio realized a return of 75% while the S&P 500 only realized a return of -19%. Fornell et al. concluded from their results that the market mispriced customer satisfaction.

Besides the remarkable returns of the portfolios, they also discovered that the portfolios only had a beta risk of 0.78, which indicates that the risk of the portfolio is significantly less than the market risk. The actual real time portfolio was held between 2000 and 2004. In this period the world economy suffered from the burst of the ‘’Internet Bubble’’. This might create a biased result.

The findings of Fornell et al. motivated various other researchers to conduct studies into the potential mispricing of customer satisfaction in the market. Among them were Aksoy, Cooil, Groening, Keiningham and Yalçin (2008). They did a comparable study and they also concluded that the market misprices customer satisfaction. They found that between 1996 and 2006 the portfolio based on the same strategy that Fornell et al. used realized a cumulative return of 164% where the S&P 500 realized a result of only 104.7%.

However, Jacobsen and Mizik (2009) and O’Sullivan, Hutchinson and O’Connell (2009) found no significant mispricing of customer satisfaction. First of all, Jacobsen and Mizik found smaller and not significant returns for the portfolio based on the same criteria used by Fornell et al. In addition to Fornell et al’s work, Jacobsen and Mizik investigated the return on their portfolio for specific industries. They found that, if existing, the abnormal return of the portfolio was due to companies from the computer and internet sector. Their portfolio for that specific sector realized an abnormal return of 2.7% per month.

O’Sullivan et al. conducted two comparable portfolio studies, one with the same time period as Fornell et al., and one with the same time period as Jacobsen and Mizik. O’Sullivan et al’s portfolio with the same time period as Fornell et al. realized an annualized return of 8.42%, where the S&P 500 realized an annualized return of 4.15%. Although their results would implicate the same conclusion as Fornell et al. made, O’Sullivan concluded otherwise. This will be explained later on in this thesis. For the time period Jacobsen and Mizik used, O’Sullivan et al. found an annualized return of 11.09% for their ACSI based portfolio while the S&P 500 realized an annualized return of 9.05%. This led to the same conclusion as Jacobsen and Mizik made, namely that there is no widespread mispricing in the market of customer satisfaction.

The Effect of Different Methodologies

As one might notice, the results/returns of the portfolios based on the highest ACSI scores differ among time periods and studies. This paragraph is to compare the different methodologies used in the different studies.

Fornell et al. (2006) used a relatively easy methodology. They build two different portfolios. One portfolio with the top 20% of the ACSI and one with the remaining 80% of the companies. Fornell et al. noticed that according to other literature the book-to-market ratio and the ‘’size effect’’ are two potential explanations for their remarkable return (Fama & French, 1995). First, they compared the average book-to-market ratios of both portfolios with each other. This resulted in a 0.41 ratio for portfolio 1, which was the top 20%, and a 0.42 ratio for portfolio 2. These ratios are not significantly different, so they do not explain the differences in the results. Secondly, they compared the average revenue of both portfolios, which they used as an indicator for the average sizes of both portfolios. Portfolio 1 had an average revenue per company of 37.8 billion dollars and portfolio 2 an average revenue per company of 26.4 billion dollars. So the theory of ‘’size effect’’ could also not explain the abnormal returns Fornell et al. found.

Aksoy et al. (2008) found more or less the same results only using a more advanced methodology. Aksoy et al. tried to explain the abnormal return of their ACSI based portfolio with the CAPM, the three-factor and the four-factor model. Also with the advanced models the results indicated that the market mispriced customer satisfaction. With the CAPM they still found an abnormal return of 0.99% per month, the three-factor model an abnormal return of 1.17% per month and with the four-factor model an abnormal return of 0.88% per month.

Jacobsen and Mizik (2009), who found contradicting results in comparison with Fornell et al. and Aksoy et al., used a four-factor model with a calendar-time portfolio approach and a firm-specific risk model. Next to those models they used a model with time-varying risk factor loadings. They chose for this time-varying risk factor model, because they updated their portfolio monthly for multiple years. Therefore, they assumed that their portfolio is sensitive to time-varying risk factors.

The calendar-time portfolio approach Jacobsen and Mizik used is the same one as Aksoy et al. (2008) used. Calendar-time approach means that Jacobsen and Mizik chose a specific set of risk variables at the beginning of their time period and did not change these factors over time. Jacobsen and Mizik found that, according to their model, there is no significant abnormal return realized by the portfolio based on the highest ACSI scores. Only when they divided their portfolio in sub-portfolios based on industry, they found that the portfolio consisting of firms from the computer and internet sector realized an abnormal return of 2.7% per month, as said earlier.

Remarkable is that according to their firm-specific risk model the portfolio realizes a 0.7% abnormal return per month and the portfolio consisting of only the companies from the computer and internet sector realizes a 3.2% abnormal return per month. Although, which will be discussed later, Jacobsen and Mizik do not recognize the 0.7% abnormal return because they use a 1% significance level. The firm-specific risk model means that they first obtained an estimate of all abnormal returns per firm and then aggregated the abnormal returns into a

portfolio per time period. When the mean abnormal return of this portfolio is significantly different from zero they concluded that the market mispriced customer satisfaction.

Their model which accountings for time-varying risk factors did not give any significant abnormal return. For their conclusion, Jacobsen and Mizik held on to their model which accounts for time-varying risk factors, because of the earlier discussed motivation.

O'Sullivan et al. used three different models to explain the abnormal return of their portfolio based on the highest ACSI scores. Namely, a market model, a three-factor model and a four factor model. With these three models they investigated, as said, the same time-frames as Fornell et al. and Jacobsen and Mizik used. O'Sullivan et al. found no positive significant effects in both periods. Their findings are consistent with those of Jacobsen and Mizik, but differ strongly with those of Fornell et al. O'Sullivan et al. write these differences off to their different methodology and make the same conclusion as Jacobsen and Mizik.

Significance and Time Period

After the publications of Fornell et al. (2006), Aksoy et al. (2008), Jacobsen and Mizik (2009) and O'Sullivan et al. (2009) all authors responded to each other with new studies and criticised each other's work. Most of the criticism was on the different significance levels, methodologies and the potential biases in the different time periods.

As noted by Fama (1998):*''no one methodology will be superior under all conditions, and a variety of issues can impact performance of alternative approaches used to generate estimates of abnormal returns. Each approach relies on certain assumptions and has advantages and disadvantages.''* Therefore, the discussion about the best methodology will be left out of this section.

Another point of criticism from Fornell et al. addressed to Jacobsen and Mizik was about their choice to use a 1% significance level instead of a 5% level, which is more common accordingly to earlier research. Fornell et al. (2009) even stated that: *''If the odds are even 10 to 1 that a portfolio would provide excess returns over a 10-year period versus the market return, there is little doubt what a rational investor would do.''* This means that when we speak about portfolio returns, it is even doubtful if significance is relevant at all.

Other critics from Jacobsen and Mizik (2009) addressed to Fornell et al. was that their time-frame might be biased by the ''Internet bubble'' that bursted during their research. Which is also the case with the time period Aksoy et al.(2008) used.

In conclusion, we can say that there is no general consensus made in earlier literature about market mispricing of customer satisfaction. Depending on the methodology, the time period and the level of significance one can realize an abnormal return with a portfolio based on the best performing companies according to the ACSI, or not. In section three there will be a further discussion about the methodology, and a justification of the methodology used in this paper.

Data & Methodology

The American Customer Satisfaction Index

To build a portfolio based on the best performing companies according to the ACSI it is necessary to have the ACSI scores of all the companies. This data is available at http://www.theacsi.org. The ACSI assembles customer satisfaction data of almost 500 companies. All these companies get a score between 0 and 100. These scores are based on six variables which are put together in an econometric model. The ACSI uses customer interviews as input for their multi-equation model. This model was developed at the University of Michigan's Ross School of Business. The input for the model is based on interviews with customers. These interviews provide information about six variables which are used in the model.

According to the ACSI the variables are defined as follows:
- Customer Satisfaction:*' The customer satisfaction (ACSI) index score is calculated as a weighted average of three survey questions that measure different facets of satisfaction with a product or service. ACSI researchers use proprietary software technology to estimate the weighting for each question.'*

- Customer Expectations: *'Customer expectations is a measure of the customer's anticipation of the quality of a company's products or services. Expectations represent both prior consumption experience, which includes some non-experiential information like advertising and word-of-mouth, and a forecast of the company's ability to deliver quality in the future.'*

- Perceived Quality:*' Perceived quality is a measure of the customer's evaluation via recent consumption experience of the quality of a company's products or services. Quality is measured in terms of both customization, which is the degree to which a product or service meets the customer's individual needs, and reliability, which is the frequency with which things go wrong with the product or service.'*

- Perceived Value:*' Perceived value is a measure of quality relative to price paid. Although price (value for money) is often very important to the customer's first purchase, it usually has a somewhat smaller impact on satisfaction for repeat purchases.'*

- Customer Complaints:*' Customer complaints are measured as a percentage of respondents who indicate they have complained to a company directly about a product or service within a specified time frame. Satisfaction has a negative relationship with customer complaints, as the more satisfied the customers, the less likely they are to complain.'*

- Customer Loyalty:*' Customer loyalty is a combination of the customer's professed likelihood to repurchase from the same supplier in the future, and the likelihood to purchase a company's products or services at various price points (price tolerance). Customer loyalty is the critical component of the model as it stands as a proxy for profitability.'*

With information about all six variables their model calculates a satisfaction score. The precise calculation of the score is not published, otherwise they would lose their unique business model.

The ACSI only measures domestic and foreign firms with a substantial U.S. market share. Also the firms must deliver goods or services to American customers.

Selection

Based on this data we select the top 20% according to the ranking. Unfortunately, it was not possible to get the monthly updates of the ACSI which it normally publishes. This problem was caused by the website of the ACSI which had some trouble redirecting us to the correct page from which the data could be downloaded. Therefore, in contradiction to earlier literature, in this study the portfolio is rebalanced yearly instead of monthly.

Originally the top 20% of the ACSI consisted of an average of 97 companies. Logically, not all these firms were publicly traded. Therefore, only the publicly traded companies were used, which resulted in a portfolio with an average of 60 stocks per year.

Time Period

In this paper we use data from the period 2000 till 2015. The choice to start our analysis at 2000 is based on the following: the ACSI has a dataset of customer satisfaction scores between 1995 till now. However, between 1995 and 2000 there are multiple firms which went bankrupt or merged with another firm. This results in a lot of noise and room for miscalculations during that period. Therefore, in this paper only the years between 2000 and 2015 are examined.

This time-series gives us an interesting overview, because earlier literature only used time-series up to 2006. Therefore, this study provides us interesting new results, but also results we can compare with the earlier literature.

Cumulative Return

To compare the portfolio with the S&P 500 we need the cumulative returns of both. This data was provided by Bloomberg. With the tickers, which were collected manually for all the firms registered on the ACSI, we obtained the cumulative returns gross dividend of all firms. Gross dividend means that the dividend was reinvested in the specific stock.

With the cumulative returns of all the companies we calculated the cumulative returns of the portfolio for every year. This was done by cumulating the total cumulative returns of all stocks on the last trading day of each year. For our portfolio study we took the equally weighted average of the portfolio by dividing the total cumulative return by the total amount of stocks that were in the portfolio. This was on average 60.

Volatility

Of course, the cumulative returns alone are not enough to make conclusions about the performance of the portfolio. Therefore, we need at least the volatility as well. The volatility is an indicator of how risky your portfolio is. It indicates the fluctuations of your returns over a certain time period. To calculate the volatility of the portfolio we took the daily closing prices of all stocks. With these closing prices we calculated the standard deviation per year. By dividing the standard deviation of all stocks by the average closing price of that stock, we get the percentage standard deviation, also known as the volatility. The same was done for the S&P 500.

With all the volatilities of all the stocks we calculated the portfolios volatility by taking the unweighted average of all volatilities. This gives us the volatility of the portfolio for every year.

Comparing Returns

Having the percentage cumulative returns of the S&P 500 and the portfolio, we conducted t-tests for every year to test if the return of the portfolio was significantly different form the return of the S&P 500. For the t-test we subtract the return of the S&P 500 from the portfolios return and divide this by the standard deviation of the S&P 500. This gives us a t-value which results in a p-value.

Comparing Volatilities

To compare the volatilities of both the S&P 500 and the portfolio we conduct an F-test. Dividing the largest volatility by the smallest gave us a F-value. As degrees of freedom we took the number of trading days minus one. With these F-values the p-value was calculated. The null-hypothesis for this test is that both volatilities are equal and do not significantly differ.

Alpha (α) & Beta (β)

Alpha is often considered the performance of a portfolio against the market index, which in this case is the S&P 500. The excess returns of the portfolio relative to the S&P 500 is the portfolios alpha.

Alpha is calculated by a univariate regression, which looks as follows:

$$R_p = \alpha + \beta * R_{s\&p}$$

For this regression we used the monthly data of the returns, because of the unnecessary adjustments that had to be done to the consisting dataset. This means that we have 180 data points of the portfolios returns and the returns of the S&P 500. This regression was ran in Eviews.

The beta is used as a risk indicator. Beta shows the relationship between the returns of the portfolio relative to the returns of the S&P 500. For example, if the beta of a portfolio is 0.75 and the S&P 500 increases with 10% than the value of the portfolio would increase 7.5%. The beta was calculated in Eviews as well with the same regression as was used for calculating alpha. The coefficient β indicates beta, the relationship between the S&P 500 and the portfolio.

In conclusion, we have calculated the cumulative return and the volatility of the portfolio and the S&P 500 for every year. To check if the portfolio realizes a systematic positive return relative to the S&P 500 we calculated alpha. At last to see if the portfolio is more or less risky than the S&P 500 we calculated the beta. Which indicates the relation between the portfolio and the S&P 500.

Sharpe Ratio

The Sharpe ratio is a ratio that indicates the reward, in terms of return, for the risk one takes on an investment. Risk is defined in terms of the volatility of an investment. To calculate the Sharpe ratio for our portfolio strategy the following formula is used:

$$S = E(R_p - R_f) / \sigma$$

S is the Sharpe ratio, R_p is the return of the portfolio, R_f is the risk free rate and σ is the volatility of our portfolio. For the risk free rate we use the yield curve rates on a 10 year US treasury bond. This is in line with earlier research. These rates were obtained from the website of the U.S. Department of Treasury.

To make an conclusion we have to calculate the Sharpe ratio for our portfolio as well as for the S&P 500. After calculating all the Sharpe ratio's we take the average Sharpe ratio over the sixteen years this study was conducted. With this results we can conclude if it is lucrative to use our portfolio strategy relative to the risk taken.

Results

Returns

Figure 1 shows that most of the years the returns of our portfolio and the S&P 500 are pretty close and do not differ. Six of the fourteen years the return of our portfolio is significantly higher[1] than the S&P 500. In 2000 and 2001 the portfolio outperforms the S&P 500 significantly. Respectively with a 7.38% return versus a -8.23% return and a 12.60% return versus a -9.35% return. These returns result in two p-values of both 0.000% (*t=4.01 & t=3.02*).

Also in 2004 and 2005 the portfolio outperforms the S&P 500 significantly. This time with returns of 26.12% and 11.97% versus 11.21% and 5.77% returns of the S&P. Which again results in two p-values of 0.000% (*t=5.39 & t=2.54*).

2009 and 2010 where the last two years where the portfolio significantly outperformed the S&P 500. With the highest return between 2000 and 2015 the portfolio outperformed the S&P 500 by 29.22% (51.77 versus 22.55) in 2009. In 2010 the portfolio realized a return of 23.04% where the S&P 500 realized a return of 13.24%. These returns resulted in a p-value of 0.027% in 2009 (*t=2.41*) and 0.037% in 2010 (*t=2.01*).

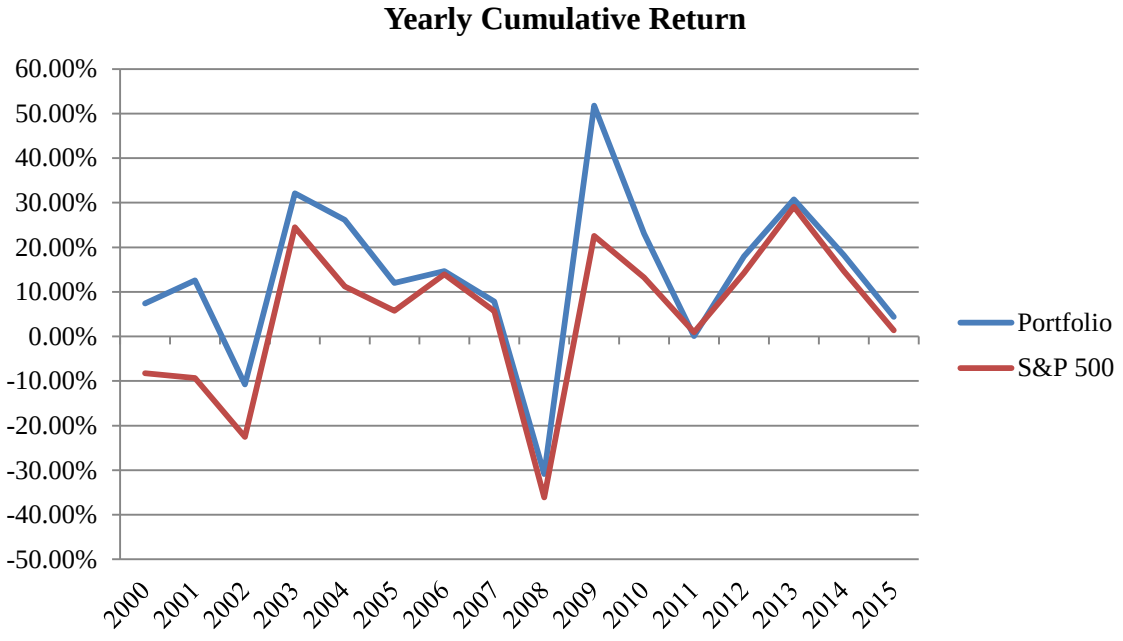

Figure 1

Volatility

With a maximum return of 51.77% and a minimum return of -30.86% the achievements of the portfolio are much better than those of the S&P 500 with a maximum of 29.07% and a minimum of -36.09%. These descriptive statistics could implicate that the volatility of the

[1] See Table 3

portfolio is higher than the volatility of the S&P 500. This implication is correct[2]. Figure 2 shows that the volatility of the portfolio is higher every year.

Almost every year the volatility of the portfolio is significantly higher than the volatility of the S&P 500. Only in 2002, 2008 and 2013 the volatility of the portfolio is not significantly higher. In 2002 the volatility of the portfolio is 13.17% and the volatility of the S&P 500 is 11.44%, which results in a p-value of 0.13 (*F=1.15*).

In 2008 the volatilities of the portfolio and the S&P 500 where respectively 17.98% and 15.60%. These volatilities resulted in a p-value of 0.13 (*F=1.15*), which is coincidently the same as in 2002.

In 2013 the volatilities of the portfolio and the S&P 500 where the closest to each other. With volatilities of 8.16% for the portfolio and 6.04% for the S&P 500 the F-test gave us a p-value of 0.008 (*F=1.35*) which is not significant at a 5% level.

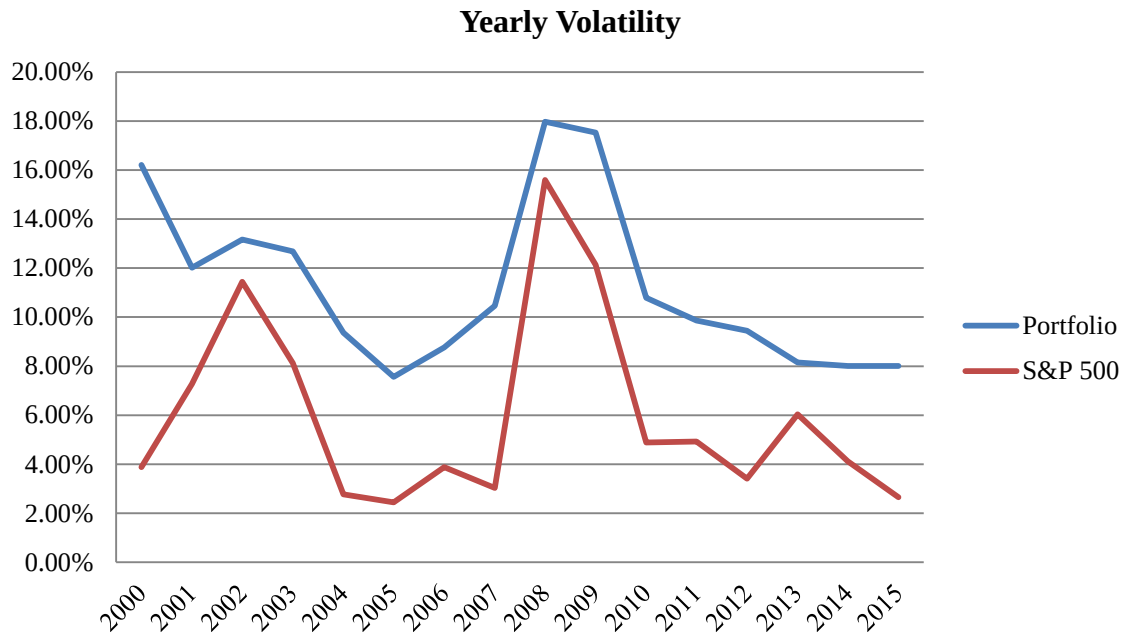

Figure 2

Alpha & Bèta

So far we have seen that both the return and the volatility of our portfolio strategy is in most cases significantly higher than that of the S&P 500. The higher returns and volatilities could induce each other. To check whether the higher return is not due to the higher risk of our strategy we calculate alpha and beta.

Alpha is used as a measure for the performance compared to the market index, in this case the S&P 500. An alpha of 1 means that the return on our portfolio was 1% better than the market index over the same period. According to table 1, the alpha of our portfolio is 1.829 with a p-

[2] See Table 4

value of 0.000% (*t=3.90*). Which means that our portfolio strategy realized a 1.829% better return on investment than the S&P 500 between 2000 and 2015.

Beta is used as a measure for the volatility relative to the market. A Beta of 1.5 means that, if the return of the market index increases with 1%, then the return of our portfolio increases with 1.5%. This can be interpreted as a higher risk because, relative to the market index, our portfolio fluctuates more than the market. Our returns relative to the returns of the S&P 500 realized a beta of 1.211 with a p-value of 0.000% (*t=6.49*). This means that our portfolio is more risky than the market.

Effect of the S&P returns on the portfolio returns

(Bèta)	Coefficient	Std. Error	t-Statistic	Prob.
α	1.829	0.469	3.90	0.000
β	1.211	0.186	6.49	0.000

Table 1

Sharpe Ratio

After calculating alpha and beta we are still not able to make a decision about investing or not. The strategy proved to generate a higher return than the S&P 500 but at the cost of a higher risk.

To make a decision we can use the Sharpe ratio. As stated earlier, the Sharpe ratio indicates the reward, in terms of return, for the risk taken. Unless the Sharpe ratio is negative. When the ratio is negative it indicates the punishment for taking extra risk.

For example a Sharpe ratio of -1.5 means that for every percent point volatility an investment bears, the return of this investment will decrease with 1.5%. Vice versa, a Sharpe ratio of 1.5 means that for every percent point volatility an investment bears, you will be rewarded with a 1.5% higher return.

When we look at table 2 we can see that our portfolio and the S&P 500 show no remarkable patterns. Both investments alternate each other in terms of the best Sharpe ratio pretty often. Over the time period used in this study our portfolio has the best Sharp ratio in eight of the sixteen years. Based on these findings we cannot make a decision about investing.

When we look at the bottom of table 5 and 6 we see the average Sharpe ratios of the S&P 500 and our portfolio. With an average Sharpe ratio of 1.043 our portfolio rewards ones investment better for the risk taken than the S&P 500 with an average Sharpe ratio of 0.783.

Yearly Sharpe Ratio's

Years	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	'12	'13	'14	'15
Portfolio	0.14	0.63	-1.11	2.23	2.37	1.00	1.13	0.36	-1.84	2.74	1.83	-0.18	1.72	3.39	2.01	0.27
S&P 500	-3.43	-1.98	-2.31	2.55	2.62	0.57	2.37	0.54	-2.46	1.54	2.04	-0.19	3.65	4.31	3.04	-0.33

Table 2

Discussion

Trying to interpret the results of our portfolio strategy is difficult because the results give mixed information. Solely looking at the normal return realized by the portfolio strategy, one would invest in our portfolio. On the other hand, the volatility of our portfolio is significantly higher than the volatility of the S&P 500. Therefore, a more risk averse investor would invest in the market index. This finding is in line with one of the main principles in finance, higher returns are a reward for higher risk in terms of volatility. This principle was discovered and proven by Fama & French (1987).

When looking at the regression we see the same contradiction. Alpha indicates that our portfolio realizes a 1.829% higher return, on average, over the time period 2000 till 2015 than the S&P 500. While beta indicates that our portfolio bears significantly more risk than the market index ($\beta=1.211$).

Also the Sharpe ratio leaves us in the middle at first. But when we look at the average ratio over the studied time period one can say that our portfolio outperforms the S&P 500, because our portfolio realizes a better reward for the risk one takes.

An objection against our result is the discrepancy between the interpretation of positive and negative Sharpe ratios. For example a portfolio with a slightly higher return than the risk free rate and a huge volatility is, according to the Sharpe ratio, better than a portfolio with a slightly lower return than the risk free rate and a very low volatility. While in real life an investor would probably prefer the second portfolio.

Therefore a suggestion for further research is the use of different measurements or explanatory models. This models or measurements can give more information about the valuation of customer satisfaction and can be less vulnerable for potential biases.

Another suggestion is to put more effort in getting the monthly updates of the ACSI scores. With the monthly updates there is more comparable literature.

Conclusion

The main findings of this study are that our portfolio strategy, realizes a significantly higher return than the S&P 500 in six of the sixteen years that were investigated. The volatility (risk) of our strategy was also significantly higher than the S&P 500, in twelve of the sixteen years. Our findings regarding the returns of our strategy are in line with the earlier research. However, the findings of our volatility of our strategy are not in line with Fornell et al. and O'Sullivan et al. They found that the strategy holds a lower risk than the S&P 500, where our findings prove otherwise. On the other hand are our finding regarding the volatility in line with the finding from Jacobsen and Mizik and Aksoy et al.

The regression analysis which gave us the alpha and the beta of the portfolio could also not give a decisive answer to the question if our portfolio strategy is more lucrative than investing in the market index.

For a general conclusion we have to look at the average Sharpe ratio of both our portfolio and the S&P 500. This shows us that on average our strategy generates a better reward for the risk an investor takes than the S&P 500. But one should not the criticism given on the Sharpe ratio in section IV.

To further support the conclusion of this thesis we want to refer to an earlier citation of Fornell et al. (2009) needed: *''If the odds are even 10 to 1 that a portfolio would provide excess returns over a 10-year period versus the market return, there is little doubt what a rational investor would do.''* Based on this statement from Fornell et al. we can conclude that, not only due to the Sharpe ratio but also because of our returns a rational investor would prefer to invest in our portfolio strategy instead of the S&P 500.

Of course this statement assumes a certain indifference curve for risk which is not applicable to all investors. Further research, as suggested in section five, is needed to draw a more sufficient conclusion from the data and the results used and obtained in this thesis.

Bibliografie

Aksoy, L., Cooil, B., Groening, C., Keiningham, T., & Yalçin, A. (2008). The Long-Term Stock Market Valuation of Customer Satisfaction. *American Marketing Association*, 105-122.

Carhat, M. (1997). On persistence in mutual fund performance. *Journal of Finance*, 57-82.

Fama, E., & French, K. (1993). Common risk factors in the returns on stocks and bonds. *Journal of Financial Economics*, 3-56.

Fama, E., & French, K. (1995). Size and Book-to-Market Factors in Earnings and Returns. *The Journal of Finance*, 131-155.

Fornell, C., Mithas, S., & Morgeson, F. (2009). The statistical significance of portfolio returns. *International Journal of Research in Marketing*, 162-163.

Fornell, C., Mithas, S., Morgeson III, F., & Krishnan, M. (2006). Customer Satisfaction and Stock Prices: High Returns, Low Risk. *Amercan Marketing Association*, 3-14.

Ittner, C., & Larcker, D. (1998). Are Nonfinancial Measures Leading Indicators of Financial Performance? An Analysis of Customer Satisfation. *Journal of Accounting Research*, 1-35.

Jacobsen, R., & Mizik, N. (2009). Customer Satisfaction-Based Mispricing: Issues and Misconseptions. *Marketing Science*, 836-845.

Jacobson, R., & Mizik, N. (2009). The Financial Markets and Customer Satisfaction: Reexamining Possible Financial Market Mispricing of Customer Satisfaction. *Marketing Science*, 810-819.

O'Sullivan, D., Hutchinson, M., & O'Connell, V. (2009). Empirical evidence of the stock market's (mis)pricing of customer satisfaction. *Intern. J. of Research in Marketing*, 154-161.

Reichheld, F., & Sasser, W. (1990). Zero defections: Quality comes to services. *Harvard Business Review*, 105-111.

Appendix

Cumulative Returns

Years	Portfolio	S&P 500	T-Statistic	P-Value
2000	7.38%	-8.23%	4.01	0.000%
2001	12.60%	-9.35%	3.02	0.000%
2002	-10.76%	-22.55%	1.03	0.268%
2003	32.09%	24.52%	0.93	0.466%
2004	26.12%	11.21%	5.39	0.000%
2005	11.97%	5.77%	2.54	0.000%
2006	14.65%	13.91%	0.19	0.897%
2007	7.83%	5.68%	0.71	0.239%
2008	-30.86%	-36.09%	0.34	0.589%
2009	51.77%	22.55%	2.41	0.027%
2010	23.04%	13.24%	2.01	0.037%
2011	0.07%	0.96%	-0.18	0.944%
2012	17.99%	14.22%	1.10	0.058%
2013	30.74%	29.07%	0.28	0.787%
2014	18.27%	14.68%	0.87	0.166%
2015	4.40%	1.40%	1.13	0.115%

Table 3

Volatility

Years	Portfolio	S&P 500	F-Statistic	P-Value
2000	16.21%	3.89%	4.17	0.000%
2001	12.02%	7.28%	1.65	0.000%
2002	13.17%	11.44%	1.15	13.186%
2003	12.68%	8.13%	1.56	0.000%
2004	9.37%	2.77%	3.39	0.000%
2005	7.56%	2.44%	3.10	0.000%
2006	8.76%	3.89%	2.26	0.000%
2007	10.47%	3.04%	3.44	0.000%
2008	17.98%	15.60%	1.15	13.186%
2009	17.52%	12.13%	1.44	0.234%
2010	10.78%	4.88%	2.21	0.000%
2011	9.86%	4.92%	2.00	0.000%
2012	9.44%	3.41%	2.77	0.000%
2013	8.16%	6.04%	1.35	0.833%
2014	8.01%	4.11%	1.95	0.000%
2015	8.01%	2.66%	3.01	0.000%

Table 4

Sharpe Ratio Portfolio

Years	R_p	σ	R_f	S
2000	7.38%	16.21%	5.12%	0.13942
2001	12.60%	12.02%	5.07%	0.626456
2002	-10.76%	13.17%	3.83%	-1.10782
2003	32.09%	12.68%	3.77%	2.233438
2004	26.12%	9.37%	3.94%	2.367129
2005	11.97%	7.56%	4.39%	1.002646
2006	14.65%	8.76%	4.71%	1.134703
2007	7.83%	10.47%	4.04%	0.361987
2008	-30.86%	17.98%	2.25%	-1.84149
2009	51.77%	17.52%	3.85%	2.73516
2010	23.04%	10.78%	3.30%	1.831169
2011	0.07%	9.86%	1.89%	-0.18458
2012	17.99%	9.44%	1.78%	1.717161
2013	30.74%	8.16%	3.04%	3.394608
2014	18.27%	8.01%	2.17%	2.009988
2015	4.40%	8.01%	2.27%	0.265918
Average	-	-	-	1.0428683

Table 5

Sharpe Ratio S&P 500

Year	R_p	σ	R_f	S
2000	-8.23%	3.89%	5.12%	-3.43188
2001	-9.35%	7.28%	5.07%	-1.98077
2002	-22.55%	11.44%	3.83%	-2.30594
2003	24.52%	8.13%	3.77%	2.552276
2004	11.21%	2.77%	3.94%	2.624549
2005	5.77%	2.44%	4.39%	0.565574
2006	13.91%	3.89%	4.71%	2.365039
2007	5.68%	3.04%	4.04%	0.539474
2008	-36.09%	15.60%	2.25%	-2.45769
2009	22.55%	12.13%	3.85%	1.541632
2010	13.24%	4.88%	3.30%	2.036885
2011	0.96%	4.92%	1.89%	-0.18902
2012	14.22%	3.41%	1.78%	3.648094
2013	29.07%	6.04%	3.04%	4.309603
2014	14.68%	4.11%	2.17%	3.043796
2015	1.40%	2.66%	2.27%	-0.32707
Average	-	-	-	0.7834095

Table 6