Bachelor Thesis Finance

Can one profit from analysts' stock recommendations?

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1. Introduction

This chapter will introduce the research topic and briefly describe the research method. Afterwards a short layout of this thesis will be given.

In 1970 Fama developed the Efficient Market Theory, which argues that all public information (semi-strong form) or all public and private information (strong form) is already reflected in the stock prices as soon as this information becomes available. Investment banks and brokerage houses do however spend a lot of money on stock analysis. Obviously stock analysts play a key role in these analyses'. They gather (fundamental) information about specific firms and industries, analyze it and provide recommendations to the public. If Fama's Efficient Market Hypotheses (Fama, 1970) holds, these analysts' recommendations do not make any sense as they are based on information that is publically (weak and semi-strong form) and privately (strong form) available. Therefore the actual stock prices should reflect all the news already, which means that analyst recommendation cannot yield any abnormal returns. In this thesis I will investigate whether these analyst recommendations can be used to create a profitable trading strategy.

Most of the research on this topic has been conducted before the financial crisis/credit crunch hit the capital markets from 2008 and onward. For this thesis I will investigate the value of the analyst recommendations before and during the crisis, to see if there are any significant differences in the time windows used. This will be done by placing all the stocks of the S&P 100 into 5 different portfolios, based on the recommendation median. Afterwards the Jensen's Alpha will be calculated in order to determine whether analyst recommendations do yield excess returns. This will be done for the timeframe 2006 – 2011. Additionally, this timeframe will be segregated into 2 different windows; 2006 – 2008 and 2009 – 2011. This is done to see if either of these timeframes yields better returns compared to each other and the total timeframe. Comparing the Alphas is done by calculating a confidence interval for the first time window and the total time window to eventually see whether the Alphas of the second timeframe fall into these intervals or not.

In chapter 2 I discussed the relevant theory and literature I found on this topic. Papers that performed similar studies as I did will be discussed, as well as Fama's (1970) Efficient Market Hypothesis. All 3 forms of Fama's hypothesis will thoroughly be discussed by using the literature that give empirical proof that either support or reject a particular form of market efficiency. The other part of this chapter discusses the relationship between analyst recommendations and stock returns. Research on this topic started ever since analysts started issuing stock recommendations. Cowles (1933) was the first one to research if analyst recommendations had investment value. He, however, did not find any statistical significant evidence that this was actually the case. Later on this conclusion was rejected by multiple papers. In 1984 Elton found significant excess returns that lasted up to 2 months after the issuance of

buy recommendations. In 1996 Womack found that sell recommendations yield large, significant (1% level) returns that lasted up to 6 months. Barber found in 2001 that trading fees cause most of the abnormal results to disappear. Without the transaction costs the returns were on average >4% annualized.

Chapter 3 contains my research question and the data used for my thesis, including an overview of the empirical research performed for this thesis. Chapter 4 contains the results of the empirical study that has been performed for this thesis. Eventually chapter 5 contains the conclusions of the findings and the recommendations for further studies on this topic.

2. Theory and literature

This chapter will discuss the relevant theory and literature regarding the topic of this thesis. First of all Fama's (1970) Efficient Market Hypothesis will be thoroughly discussed. Afterwards the literature involving stock recommendations will be discussed.

2.1 Efficient Market Hypothesis

In 1970 Fama formulated the Efficient Market Hypothesis, which argues that asset prices fully reflect all available information. This implicates that no (risk-adjusted) returns can be gain by investors, which means they cannot outperform the market. Malkiel (2003) defines efficient markets as markets "[….]that do not allow investors to earn above-average returns without accepting above-average risks." There is a well-known story within Finance that explains the efficient markets in a rather easy way: A finance professor and student come across a $100 bill lying on the ground. When the student is about to pick it up, the professor says "Don't bother – if it were really a $100 bill, it wouldn't be there." The fact that financial markets do not allow investors to earn excess returns without taking excess risks, makes us believe the markets are efficient (Malkiel, 2003). Or, more formally as Jensen (1978) described it: "A market is efficient with respect to information set θ_t if it is impossible to make economic profits by trading on the basis of information set θ_t." (Jensen, 1978) The Hypothesis has been divided into 3 different forms, namely: The Strong Form, Semi-Strong Form and the Weak Form. All 3 forms will be discussed in the next paragraphs.

2.1.1 Strong Form

Basically, the strong form claims that both public and private information are already reflected in the current stock prices of publically traded assets. Needless to say this means that no excess returns can be gained (in the long term) when the Efficient Market Hypothesis holds.

A major argument against this theory is insider trading. Most countries do have laws against insider trading which means it is not possible that private information has already been reflected in the actual stock price. Excess returns can only exist when these laws are ignored, which would mean the profits were gain illegally. Insider trading has happened and still does happen nowadays. Several recent articles in (financial) newspapers prove this[1] [2]. A rather recent article in a Dutch financial newspaper shows that a former board director of the exchange listed company Qurius used inside information to place a total of 6 orders to buy almost 300.000 stocks[3]. However, according to Laffont & Maskin (1990) large traders that can generate enough volume to affect the actual price of an exchange listed

[1] The Wall Street Journal published the article "They Were Best of Friends, Until the Feds Showed Up" (Eder, et al., 2012). A Hedge Fund trader was pleaded guilty to security fraud and conspiracy.

[2] Another article tells about an insider trading case from a former Lehman Brothers broker. He was sentenced to three years probation after he helped out the FBI to gather evidence from his co-conspirators (Bray, 2012).

[3] This was all done 20 minutes after the extraordinary shareholders meeting was finished, during which a decision was made regarding an investment bank taking a 21% ownership in Qurius. This information would be made public later, after the stock orders were placed. Dutch court sentenced the director to 200 hours of community service. (van der Boon, 2012).

asset, would not trade on private information. Once private information is obtained by a big trader, the information efficiency of prices breaks down and a "pooling" equilibrium arises. Such an equilibrium has the advantage that incentive constraints with regards to information-inferred prices is avoidable. This, because the big trader would have the incentive to keep the private information private. Trading on it in a "normal" equilibrium would cause the price of the asset involved to reflect the private information, which means it would no longer be private (Laffont & Maskin, 1990). Thus, it would no longer be possible to gain (additional) profits based on this information. Laffont & Maskin (1990) created a model around this behavior and gave proof of their proposition in their paper. This is however questionable, because one could wonder why a large trader that possesses private information simply does not make a lot of small trades to prevent a reaction in the stock price.

Another argument against a strong form of market efficiency was given by Grossman and Stiglitz (1980). They concluded that the market cannot be perfectly efficient. This is because there would no longer be an incentive for traders and analysts to gather new information. Obtaining this information is costly and once it is obtained, it would basically be reflected in the actual stock price immediately. Therefore it is not possible to gain excess returns based on private information. The only way traders could outperform the market is if they could take positions in the market based on their insider knowledge without revealing this information in the stockprice. This however contradicts the strong form efficient market hypothesis, which argues that all information is already reflected in the stock price. Thus, it is not possible to take better positions compared to other traders. (Stiglitz & Grossman, 1980).

2.1.2 Semi-strong form

The semi-strong form claims that all public information is reflected in the stock price almost directly after the release of new information. This means that investors can only profit from the release of new information if they trade directly on it. Thus, the possibility to gain profits is almost non-existent. Besides that, it excludes the possibility to gain profits based on either fundamental or technical analysis. Ever since Fama published the EMH, researchers have been testing the 3 different forms. Mishra (2005) tested the semi-strong form on the Indian stock market. Mishra performed an event study (using an 180 day event window) from June 1998 to August 2004 around the information release of bonus issues (sample of 46 bonus issues). The paper concluded that 9 to 8 days prior to the announcements there were significant (5% level) positive abnormal returns, possibly caused by leaking information. The announcement day yielded an excess return of – 0.10% (not significant). The days after the announcement showed negative returns, yet only significant on the fourth day. According to Mishra this behavior was expected and therefore the findings of Mishra do indeed support the idea that the Indian stock market is semi-strong efficient (Mishra, 2005).

Ali & Mustafa (2001) tested the semi-strong efficiency hypothesis on the Pakistan stock exchange. They basically tested the pattern of information arrival and the pattern of market activity variables. In other words, they tested the relationship between the arrival of public information and excess stock returns. For this study they took 15772 news headlines (from about 1.5 years) and measured the market activity in 2 different ways: the returns on the market and the (abnormal) trading volumes. Besides the stock returns, the trading volumes are also related to the efficient market hypothesis. Once (important) news regarding a stock is published, investors will decide to trade on it. This would result in an increase in trading volumes. The relationship between news and trading volumes were significant negative. Ali & Mustafa explained this by referring to French-Roll (1986) opinion, which states that no significant trading volumes are required in order to incorporate new information into stock prices. The relationship between news and stock returns was however insignificant negative. (Ali & Mustafa, 2001) This means that the release of news does impact the trading volumes, yet it does not influence the stock prices. Therefore they did not find significant evidence that the stock exchange involved is indeed semi-strong efficient, as Ali & Mustafa (2001) did not find any significant evidence that the stock prices were affected by the release of (important) news.

It can however be argued that the above mentioned markets are not as developed as the westerns markets. Givoly and Lakonishok (1979) however found evidence of semi-strong market inefficiency for NYSE stocks. They selected companies from 3 different industries and obtained for all selected companies the forecasted EPS, actual earnings and monthly stock returns for the window from 1967 – 1974. For each revision on the recommendation median the abnormal returns were calculated by using a market model (CAPM). The results of this research showed that significant abnormal results start to form 2 months prior to the release of a revision. Also, they found that significant abnormal results last up to 2 months after the revision is issued. One would expect in a semi-strong market that the revision is priced (almost) instantly after the issuance. (Givoly & Lakonishok, 1979) Therefore it can be concluded that Givoly and gave proof against the semi-strong efficient market.

2.1.3 Weak Form

The weak form claims that investors could profit from fundamental analysis (which is also used by stock analysts) but not from technical analysis, as future prices cannot be predicted by using historical data according to the weak form Efficient Market Hypothesis. Basically it states that stock prices are simply random. Laurence, et al. (1997) tested the weak-form efficient market hypothesis for the 4 Chinese stock exchanges by observing 1000 daily returns for the period 1993 – 1996, by testing the correlation and causality. They concluded that there is a significant serial correlation for all the time series involved. According to Laurence, et al. (1997) this contradicts the weak form efficiency hypothesis as it would be possible for investors to exploit serial correlation to generate profits. Yet, for 3 of the 4 exchanges the correlation decreases during the second period of their research, making these

markets more efficient. Besides that, all 4 Chinese markets showed a significant a strong relation with the US markets, meaning the Chinese markets are being integrated into the global economy. (Laurence, et al., 1997) Although there are signs of weak-form inefficiency, the results show that the Chinese markets are becoming more efficient. Al-Loughani & Chappel (1997) tested the weak-form efficient market hypothesis on the London Stock Exchange for a time window (1983 – 1989) where the government's monetary policy towards the capital markets remained relatively unchanged, therefore the potential changes on the tested stocks were already accounted for. According to Al-Loughani and Chappel older studies did not take serial independence and the Identical and independent distribution (IID) into account. The IID is a major assumption within the weak-form hypothesis considering the fact that it implies that stock prices simply follow a random walk, thus cannot be predicted by using stockdata from the past. Their study did however took this assumptions into account. "The notion that the current price of a share fully reflects available information was taken to imply that successive price changes (or returns) are independent. Consequently, there must be no serial correlation between the returns at different times. Furthermore, it was also assumed that successive price changes (returns) are identically distributed." The empirical results of their study yields that their data series shows a significant (5% level) heteroscedasticity. A random walk behavior (which implies that past stock movements cannot predict future movements) was however expected. The conclusion that can be drawn from the results of their empirical research is that the weak-form hypothesis cannot be supported the London Stock Exchange (Al-Loughani & Chappel, 1997).

As can be seen in the former paragraphs, a lot of research has been done on the Efficient Market Hypothesis. The hypothesis has been tested on a lot of different capital markets all around the world. Yet, by considering all these papers the Efficient Market Hypothesis cannot be proven, nor denied. Most of the papers do support some form of efficiency, but there is a lot of evidence that the markets are not as as efficient as Fama (1970) claims.

2.2 Analyst recommendations

Academics have been doing research on stock recommendations ever since analysts started issuing these recommendations. Cowles was most likely the first researcher to publish a paper on this topic. and concluded that the forecasters did not exhibited skills, but that the profitable recommendations were a result of pure chance (Cowles, 1933). Due to the lack of data, it is possible that Cowles came to this conclusion (Kerremans, 2010). Researchers back then did not have access to databases that are used these days. Cowles' conclusion has been rejected in papers written years later.

Elton (1986) researched the investment value of recommendations by placing stocks into different portfolios, based on the average recommendation for every stock. He did however create those

portfolios in a way they all had the same beta, so all the returns would be risk-adjusted. For this research he collected stock data for 33 months (1981-1984) and recommendations from 34 brokerage firms. When Elton compared a portfolio of upgrades with a portfolio of downgrades, the largest and most significant (5% level) result was found. This comparison yielded 2.43% in the month of issuance, 1.86% after 1 month and 0.37% after 2 months. After these 2 months the returns disappeared. Transactions costs were not taken into account in this study (Elton, et al., 1986). Womack (1996) found that especially sell recommendations yield large, significant post-mean drifts up to -9.1% (annualized) and extended up to 6 months (Womack, 1996). Womack mainly focused on the price reactions to individual analysts' recommendations. (Until this moment, researchers did not take transaction fees into account). Barber, Lehavy, McNichols and Trueman (2001) constructed portfolios based on the average analyst consensus for the period of 1985-1996 and did take the trading fees into account. This resulted in a sample of 361.620 recommendations. They concluded that portfolios which are rebalanced daily and are timely adapted to recommendation changes yield gross annual abnormal returns >4% or 75 basis points per month. Most of these results were statistically significant. The trading fee caused most of the the abnormal results to disappear, which means a profitable strategy would not be possible. (Barber, et al., 2001)

Other researchers focused their studies more on the impact on the market of recommendations issued by specific analysts. E.g. Stickel (1992); he found that analysts from the "All-American" team yielded better results/are more accurate and had significant more impact on the market than recommendations from analyst who are not part of this team. The "All-American" is a team which is formed on basis of the annual ranking of top sell-side research analysts (based on surveys among thousands of financial managers, investors etc.). Sell-side firms are financial corporations that offer investment services, such as brokerage/dealing/investment research etc. to other companies. Therefore this team contains the top stock analysts of the USA. However, the abnormal results only yielded after upward recommendations. Major downgrades did not yield other results compared to non-All-American team members (Stickel, 1992). Mikhail, et al. (1997) studied the relationship between the experience of the analysts and the abnormal returns that yielded after the issuance of a new recommendation. For this study they took a "Learning by Doing" assumption into account, which implicitly states that analysts eventually will start issuing more accurate recommendations because of the experience they gain for certain firms/sectors. For this study they used the analyst recommendations by the same analyst for the same firm for (a minimum of) 32 quarters from 1980 -1995. Their final sample represented 236 analysts and 435 firms. Milkhail concluded that analysts do issue more accurate recommendations once they gain more firm specific knowledge/experience. He also found that the market recognized the improved accuracy of recommendations. (Mikhail, et al., 1997)

Based on the mentioned papers it concluded that years of research has shown that analyst recommendations do yield abnormal returns on the stock market. This does however contradicts Fama's Efficient Market hypothesis (1970), which has been researched thoroughly through the years too. By considering all three hypotheses and the former discussed papers this would mean that only the weak form holds. Barber (2001), Womack (1996) and Elton (1986) all found excess returns after the issuance of a new recommendation by either going long (buy recommendation) or shorting the stock (sell recommendation). In the case of either a strong or semi-strong market investors would not respond to these recommendations as the information would already have been reflected in the actual stock price. This is because the information that is used by the analysts is available to the public as well. On top of that, a lot of arguments against certain forms of market efficiency can be found.

3. Data & Methodology

This chapter will describe the actual research question, the data sample and the research method. Eventually it will show several descriptive statistics of the dataset used.

3.1 Research question

Following the paper of Barber, et al. (2001) I will investigate whether it is possible to create a profitable trading strategy based on analyst recommendations. Besides that, the timeframe used in this thesis will be split in order to research whether the value of the stock recommendations changed during the crisis, by comparing the computed alphas. I will create portfolios based on the median recommendation, to test the following hypotheses.

Hypothesis:

1. *Stocks with a favorable analyst consensus will yield larger returns than stocks with a negative analyst consensus.*

2. *The value of stock analysts' recommendations did not change during the crisis. Therefore the excess returns (Jensen's Alphas) for the time window of 2006-2008 and 2006-2011 should not be statistically significant different compared to the time window of 2009-2011.*

3.2 Data

The data used for this thesis has been obtained from different resources. First of all, the I/B/E/S database has been used to obtain the analyst recommendations. Thomson Reuter, owner of I/B/E/S, claims that it has close to 1200 contributors worldwide (Thomson Reuters, 2012). I/B/E/S has standardized all the analyst recommendations into 5 different types of recommendations. This has been done due to the fact that analysts use different type of wording/description for their issued recommendations. E.g. underperform can be considered equal to a sell recommendation. An overview of the scoring system can be found in table 1.

Table 1 – Numerical score per recommendation

Recommendation	Numerical score
Strong buy	1
Buy	2
Hold	3
Sell	4
Strong sell	5

Secondly, the CRSP database has been used to obtain the daily stock data. For this thesis the S&P 100 index is used. This index contains the top 100 stocks of the S&P 500, one of the wide-used indices on the world. The S&P 100 is capitalization weighted and represents about 45% of the US equity market capitalization. Therefore the companies listed in this index can be considered one of the largest in the

US and covers a large part of the market capitalization. It contains firms from all types of sectors, e.g. Apple, Amazon.com, Bank of America, Boeing, FedEx, Google, Sara Lee, Time Warner, Wal-Mart etc. Due to the fact that this index represents a large part of the US equity market, stocks listed on this index are well-covered by analysts, as analysts frequently issue new/updated recommendations for these stocks.

3.2.1 Recommendation Median

The median is also obtained from the I/B/E/S database. The database updates the median as soon as it is changed by new/updated recommendations. Therefore it can be easily noted when a stock should move from one portfolio to another. The median is used instead of the mean consensus to prevent extreme forecasts influence the consensus. Some analysts could have the incentive to issue a "extreme" recommendation for a particular stock. Some of the incentives are described by Eames, et al. (2002). In their paper they researched the influence of several factors on the issued recommendation by analysts. 2 incentives were discussed in this paper, namely: Trade Boosting and Objectivity Illusion. Trade Boosting could be described as analysts that issue an extreme forecast in order to stimulate others to trade. This, to profit from the additional trading fees for example. Another factor is the "Objectivity Illusion". This means that analyst could unintentionally adapt their forecasts to achieve more consistency in their recommendations (Eames, et al., 2002). Lamont (2002) also did research to principal-agent problems. In his paper he focused on macro- and micro economic forecasters whom might not live up to the expectations of the 'users' of their forecasts. For example, analysts that start their own firm apparently issue more extreme forecasts which turn out to be less accurate (Lamont, 2002). This is most likely due to the fact that they want to boost their career. Another finding by Lamont is that analysts start issuing more accurate forecasts once they grow older. The younger the analyst is, the more extreme forecasts are issued. To prevent these extreme forecasts influencing the analyst consensus the median will be used for my testing.

Based on the consensus the stock is placed in one of a total of 5 portfolios. This distribution was also used by Barber, et al. (2001). I do however use the median instead of the mean consensus that was used. The table below shows this particular distribution (Barber, et al., 2001). The created portfolios will be rebalanced daily. This frequency is chosen to take Fama's (1970) Efficient Market Hypothesis in mind. A larger frequency could lead to missing possible abnormal returns that occur around the issuance of a new recommendation, as stock returns usually fluctuate more around the issuance of a new recommendation. The created portfolios will be equally weighted.

Table 2 – Portfolio allocation

Portfolio	Median
Portfolio 1	$1 \leq 1{,}5$
Portfolio 2	$1.5 \leq 2$
Portfolio 3	$2 \leq 2{,}5$
Portfolio 4	$2{,}5 \leq 3$
Portfolio 5	$3 \leq 5$

3.3 Method

As mentioned in a former paragraph, for this thesis all the stocks listed on the S&P 100 will be used for the time window of January 1, 2006 – December 31, 2011. For these 5 years the returns will be computed by using the CAPM:

$$R_{pt} - R_{ft-1} = \alpha_p + \beta_p \left(R_{mt} - R_{ft-1}\right) + \epsilon_{pt}$$

Where:

$R_{pt} = \frac{P_t - P_{t-1}}{P_{t-1}}$ This is the daily return (including dividends).

R_{ft-1} = The monthly return on treasury bills on $t-1$

α_p = Jensen's Alpha

β_p = The Market Beta

R_{mt} = Return on a Market Portfolio (S&P 500)

ϵ_{pt} = The error term

This regression is used to find the Jensen's Alpha, which is basically the difference between the security market line (SML), as obtained by using the CAPM: ($\beta_p \left(R_{mt} - R_{ft-1}\right)$) (this is the expected return) and the actual return ($R_{pt} - R_{ft-1}$). The difference between these 2 positions can be considered excess returns, Jensen's Alpha. If Jensen's Alpha is significantly different from 0, it can be concluded that the recommendations do in fact yield excess returns. To test this, a T-test will be used to test Jensen's Alpha with $H_0 = 0$.

3.4 Descriptive statistics

Below I will further enlighten some specifics regarding the dataset that was used for this thesis. The median recommendations were matched with the 100 stocks of the S&P 100 for the time window from 2006 – 2011, which have been put into the table below. The average recommendation during this period remained almost unchanged, a small decline starting in 2009 is visible though. On the right side of the table the amount of recommendations per stock is shown. This shows the amount of analysts that issued a recommendation for a particular stock. One interesting fact is that for the years 2007, 2008 and 2011 the maximum median recommendation was 3, indicating that the stock analyst (on "average") only issued favorable recommendations in these years for stocks listed on the S&P100. Another interesting fact is that there never has been a median of 5 during the entire time window. This is all possibly caused by the small sample that was used.

Table 3 – Descriptive statistics of median and recommendations per year.

		Median			# of Recommendations per Stock		
Year	Total rec.	Average Median recommendation	Min	Max	Average	min	max
2006	999	2,3193	1	4	21,6756	5	47
2007	1068	2,3675	1	3	21,1	5	44
2008	1113	2,40835	1	3	18,4555	6	41
2009	1299	2,4534	1	4	20,167	4	44
2010	1324	2,2953	1	3,5	23,22	2	54
2011	1349	2,261	1	3	25,35	6	56

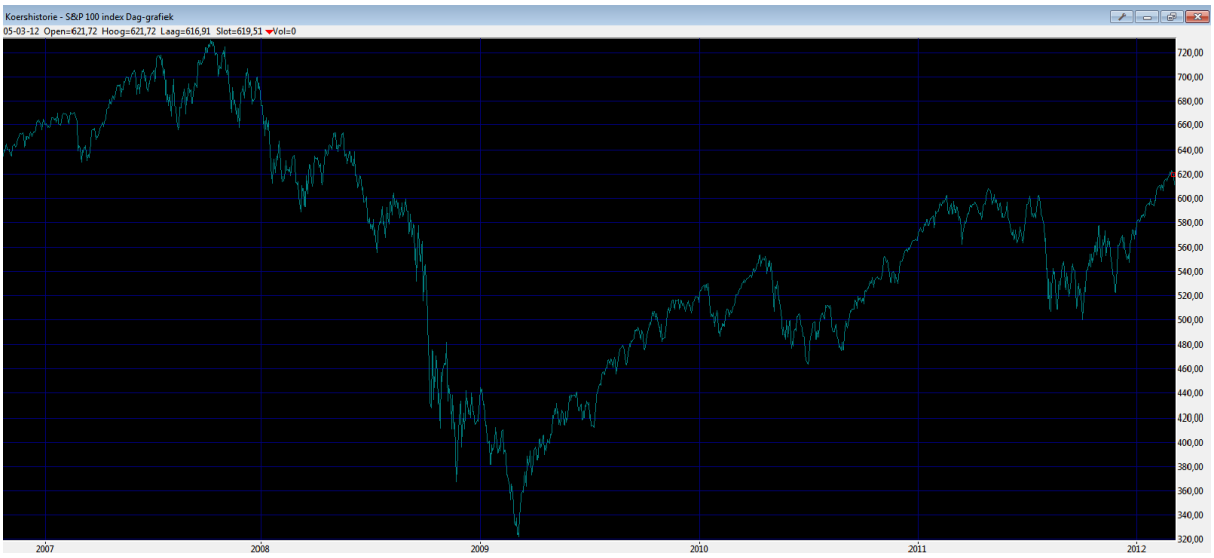
4. Empirical results

The following table shows the information regarding the performances of the stocks with a specific median of the issued recommendations. These results are shown per year, for the whole sample. The returns are annualized average daily returns. Below the returns the average amount of stocks per median are shown.

Table 4 – Returns per median per year

	Median	1	1,5	2	2,5	3	3,5	4
2006	Return	11,53%	0,00%	14,50%	15,46%	16,03%	-15,90%	14,77%
	Avg. # of Stocks	1,19	0,00	56,00	3,61	25,43	1,00	1,00
2007	Return	3,67%	0,00%	8,28%	6,58%	7,88%	0,00%	0,00%
	Avg. # of Stocks	1,00	0,00	56,51	4,47	31,78	0,00	0,00
2008	Return	-58,02%	-113,34%	-37,88%	-34,40%	-37,22%	0,00%	0,00%
	Avg. # of Stocks	1,08	1,57	51,95	5,76	38,11	0,00	0,00
2009	Return	9,16%	17,41%	30,02%	20,79%	30,36%	0,00%	28,56%
	Avg. # of Stocks	1,00	1,77	56,22	3,97	48,17	0,00	1,00
2010	Return	17,60%	29,65%	33,76%	5,98%	32,69%	-11,11%	0,00%
	Avg. # of Stocks	2,04	1,84	72,59	4,39	32,57	1,00	0,00
2011	Return	11,79%	-4,23%	1,79%	-15,96%	3,73%	0,00%	0,00%
	Avg. # of Stocks	1,24	1,63	78,16	4,64	28,61	0,00	0,00
	Avg. (2006-2011)	-0,71%	-11,75%	8,41%	-0,26%	8,91%	-4,50%	7,22%

A rather large drop appears in 2008, caused by the financial crisis that hit the markets. This is consistent with the actual graph of the S&P100 below. This is the daily graph for the full window used in this thesis, which clearly shows the drop starting in the beginning of 2008, lasting through the entire year. It should also be noted that there are no stocks with a median of 5 and only very few stocks with a median >3,5 throughout the entire time window. This could possibly be caused by the fact that only 100 stocks were used, which together represent the largest companies of the USA (S&P 100).



4.1 Portfolios

Table 5 below shows the annualized returns of each portfolio. These portfolios are formed by combining the stocks per median according to table 2 stated on page 8. Remarkably portfolios 4 and 5, which are supposed to represent the stocks with a negative analyst consensus, both only had 1 year with a negative return. Portfolio 4 yielded a negative return in 2008, which could possibly be explained by the outbreak of the financial crisis. Portfolio 5 showed a negative return in 2010. This could however be explained by the fact that portfolio 5 only contained 1 stock at most, caused by using only 100 stocks for this research. The same goes for portfolio 1 and 3, as these portfolios contain a few stocks per year on average.

Table 5 – Annualized returns of the portfolios per year.

	Portfolio	1	2	3	4	5
2006	Return	11,53%	14,50%	15,46%	16,03%	5,22%
	Avg. # of Stocks	1,20	55,98	3,61	25,44	1,00
2007	Return	3,67%	8,28%	6,58%	7,88%	0,00%
	Avg. # of Stocks	1	56,504	4,472	31,776	0
2008	Return	-80,59%	-37,88%	-34,40%	-37,22%	0,00%
	Avg. # of Stocks	1,76	51,95	5,76	38,11	0,00
2009	Return	16,91%	30,02%	20,79%	30,36%	28,56%
	Avg. # of Stocks	1,68	56,23	3,97	48,18	1,00
2010	Return	16,85%	17,85%	5,15%	17,80%	-4,30%
	Avg. # of Stocks	3,30	72,60	4,39	32,57	1,00
2011	Return	4,25%	1,79%	-15,96%	3,73%	0,00%
	Avg. # of Stocks	2,17	78,17	4,64	28,61	0,00
	Avg. (2006-2011)	-4,56%	5,76%	-0,40%	6,43%	4,91%

4.2 Jensen's Alpha

As mentioned before, the following regression was used in order to compute Jensen's Alpha (α_p):

$$R_{pt} - R_{ft-1} = \alpha_p + \beta_p \left(R_{mt} - R_{ft-1}\right) + \epsilon_{pt}$$

The results are shown in Table 6 below.

Table 6 – Jensen's Alpha

	2006-2011		2006-2008		2009-2011	
	Jensen's Alpha	T-stat	Jensen's Alpha	T-stat	Jensen's Alpha	T-stat
Portfolio 1	0,0265%	0,618	-0,0074%	-0,79	0,0523%	1,185
Portfolio 2	0,0151%	2,934	0,0186%	2,299	0,0095%	1,441
Portfolio 3	0,0334%	1,444	0,0484%	1,576	0,0113%	0,326
Portfolio 4	0,0458%	4,032	0,0364%	2,048	0,0496%	3,401
Portfolio 5	-0,4028%	-0,941	-0,0346%	-0,163	-0,7393%	-0,928

This table shows Jensen's Alpha per portfolio for 3 different timeframes. The first column shows the Alphas for the entire timeframe used in this thesis. The last 2 columns show Jensen's Alpha for resp. the years before through the beginning of the crisis (2006-2008) and during the crisis (2009-2011). This is done to answer both hypotheses.

The Alpha is basically the difference between the expected return (obtained from the CAPM) and the actual return and therefore shows if excess returns of the portfolios (based on the stock recommendations) can be found. If so, the analyst recommendations do have investment value. The value next to each Alpha represents the T-statistic. Underlined values are statistically significant on a 5% level. 6 of the 15 Alphas were found to be significant. For the time window 2009-2011 only 1 Alpha turned out to be significant. All the Alphas for both portfolios 1 and 5 were not significant, possibly caused by the small amount of stocks that were placed in these portfolios throughout the full time window. The significant Alphas found are however very small. Portfolio 2 for 2006-2011 for example shows that the daily excess returns are 0,0151%. If one would decide to trade on this, the transaction costs would most likely be larger than the excess returns that could be earned. E.g. the fee Binck (a Dutch online broker) is €6,50 + 0,1% of the total order value, with a minimum fee of €10,- and maximum fee of €150,-[4]. This was however not researched in this paper. Barber, et al. (2001) found that the transaction costs caused none of their trading strategies to yield abnormal net returns greater than zero. By comparing all portfolios throughout the entire timeframe (see table 5) it can be concluded that hypothesis 1 does not hold. Stocks with a positive consensus do not structurally yield larger returns than stocks with less favorable consensus. This, combined with the very small Jensen's Alpha's and the trading fees it can be concluded that it is not possible to create a profitable trading strategy by going long (short) in stocks with a (less) favorable analyst consensus.
The second hypothesis suggested the Alphas are not statistically significant different from each other. In order to research this, a 95% confidence interval for both the time window 2006-2011 and 2006-2008 was calculated. The results are shown in table 7 and 8.

Table 7 – Jensen's Alpha + 95% Confidence Interval (2006-2008)

	2006-2008		CI 95% 2006-2008		2009-2011		Falls in CI
	Jensen's Alpha	T-stat	Lower	Upper	Jensen's Alpha	T-stat	2006-2008
Portfolio 1	-0,0074%	-0,79	-0,1918%	0,1770%	0,0523%	1,185	Yes
Portfolio 2	0,0186%	2,299	0,0027%	0,0344%	0,0095%	1,441	Yes
Portfolio 3	0,0484%	1,576	-0,0118%	0,1086%	0,0113%	0,326	Yes
Portfolio 4	0,0364%	2,048	0,0016%	0,0712%	0,0496%	3,401	Yes
Portfolio 5	-0,0346%	-0,163	-0,4546%	0,3854%	-0,7393%	-0,928	No

[4] http://www.binck.nl/lage_tarieven/tarieven

Table 8 – Jensen's Alpha + 95% Confidence Interval (2006-2011)

	2006-2011		CI 95% 2006-2011		2009-2011		Falls in CI
	Jensen's Alpha	T-stat	Lower	Upper	Jensen's Alpha	T-stat	2006-2011
Portfolio 1	0,0265%	0,618	-0,0577%	0,1108%	0,0523%	1,185	Yes
Portfolio 2	0,0151%	2,934	0,0050%	0,0251%	0,0095%	1,441	Yes
Portfolio 3	0,0334%	1,444	-0,0120%	0,0788%	0,0113%	0,326	Yes
Portfolio 4	0,0458%	4,032	0,0235%	0,0681%	0,0496%	3,401	Yes
Portfolio 5	-0,4028%	-0,941	-1,2460%	0,4403%	-0,7393%	-0,928	Yes

For both time windows a 95% confidence interval was calculated and eventually compared to the Alphas for the 2009-2011 time window. If the Alphas for 2009-2011 fall into the calculated confidence interval, the Alphas are not statistically significant different from each other. The only Alpha that did not fall into the confidence interval was from portfolio 5 for the 2006-2008 time window. Yet, the Alpha used to calculate the confidence interval was not significant. All the other Alphas did fall into the confidence intervals calculated. Therefore hypothesis 2 should not be rejected.

All in all, hypothesis 1 is rejected and hypothesis 2 is not rejected. The significant Jensen's Alphas found are all very small. This means that it most likely is not possible to create a trading strategy that would yield positive net results, after accounting for transaction costs. When comparing the Alphas for the 2009-2011 timeframe with both other time windows it showed that they are not statistically significant different from each other.

5. Conclusion and recommendations

This chapter will give the conclusion of the findings in this thesis. It will end with giving several recommendations for further research on this topic.

In this thesis I researched whether a profitable trading strategy exists based on analyst recommendations. For this 100 stocks from the S&P 100 were used for the timeframe of 2006 – 2011 and placed in one of 5 portfolios, based on the analyst consensus. Besides that, it was investigated whether or not the Jensen's Alphas found are statistically significant different from each other. Therefore the above mentioned timeframe was segregated into 2 different timeframes in order to compare the excess returns that occurred in both frames, by using a confidence interval.

The results show that it would not be possible to create a profitable trading strategy based on going long (short) in stocks with a (least) favorable analyst consensus. The portfolios with the most favorable consensus yielded positive returns in most of the years, yet the portfolios with the least favorable consensus yielded positive returns in most of the years too. Portfolio 1 performed, on average, even the worst of all portfolios. Yet, this portfolio contained only a few stocks. On top of that the Jensen's Alpha's I found were most likely too small to leave a positive net return after accounting for transaction costs. The fact that portfolios with both the positive and negative consensus yielded positive returns does however contradict most literature on this topic, which has been thoroughly discussed in the beginning of this thesis. There could be a few explanations for this.

First of all, only the S&P 100 has been used for this research. This index contains 100 stocks which is a rather small amount compared to other papers on this subject. E.g. Barber, et al. (2001) for exmple used up to 9408 firms, which results in a much better portfolio allocation. In this thesis portfolios 1 and 5 only contained a few stocks at most due to the small sample size.

Secondly is the timeframe used for this thesis. I used the timeframe 2006 – 2011, which is shorter than most other papers on this topic. Yet, more interesting are the events that happened during this chosen timeframe. From 2008 and onwards more and more negative news was published. First about the financial crisis, even causing the bailout of financial institutes, followed by the bad macro-economic news as more and more countries ended up in a recession or even depression. Eventually there was the Euro crisis, in which some countries within the European Union almost defaulted. All this news caused major drops in stock prices. Existing papers researched timeframes that did not have these major fluctuations in stock prices and therefore cannot be compared to this thesis.

This brings us to hypothesis 2, which suggest that the value of stock recommendations did not change during the crisis and therefore the Jensen's Alphas are not significant different from each other. This was researched by calculating confidence intervals which were used to compare the alphas. The data shows that the Alphas found are not statistically significant different from each other. Therefore the value of the stock recommendations did not change during the crisis. It seems that stock analysts do as good a job during the crisis as they did before.

One could however expect that the value would have changed, since not a lot of investors/analysts did see the crisis and the impact on the capital markets coming. There are only a few known cases of analysts/fund managers predicting the crisis. E.g. John Paulson, an hedge fund manager who took home an estimated $3 – 4 billion after his fund gained $15 billion. All these profits were gain by trading against the mortgage market and financial institutes (Zuckerman, 2008).

5.1 Recommendations

For future research on this topic I would suggest to use a larger sample of stocks to make sure all portfolios contain enough stocks. As mentioned before, portfolios 1 and 5 in this thesis contained only a few stocks. Besides that, it could also be interesting to include transaction costs into this research and use different frequencies of rebalancing. This was done by Barber, et al. (2001). Also, it could be interesting to include more countries/regions into this research for the same timeframe. In this way, different regions could have been compared with each other. Lastly, I would suggest to use different valuation models. E.g. multiple papers on this topic have used the Fama-French three factor model, besides the CAPM.

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