

# Do Analysts' Price Targets Change Stock Prices? A Comparison of the Impact of Price Targets on Groups of Stocks with Different Characteristics

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March 2018

## **Abstract**

This preliminary report is the foundation for our upcoming work on the final thesis submission. Our motivation comes mainly from previous empirical work showing that the Efficient Market Hypothesis does not always hold, in addition to our potential contribution to the literature by looking at which characteristics cause stocks to respond to analysts' price targets to a greater extent. In this first draft, a literature review and the theoretical background is described. It is followed by a suggested model and research methodology. This preliminary report also includes some of the possible results we can expect, as well as a progression plan for our upcoming work.

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# 1 Introduction

The influence financial analysts have on stock price movements has for long been a widely discussed topic. This has several reasons, but one of the most often quoted one is that according to the efficient market theory, financial analysts' price targets should not affect stock prices, since all available information should already be incorporated in the price. To investigate whether or not analysts do have an impact, the effect of new price targets on stocks is analyzed using recent data from components of the Standard & Poor's 500 (S&P 500) index. When looking at previous empirical work, there seems to be a gap in the literature. Therefore, we further refine the research question by investigating which characteristics make a stock price more sensitive to analysts' price targets. We focus on growth- and value stocks, age- and the volatility of the companies listed on the S&P 500. The motivation behind this is to analyze if price targets have a bigger effect on growth stocks, and younger and more volatile companies. The intuition for this is that it might be easier for investors to value stocks that trade close to fundamentals. Growth stocks on the other hand often exhibit factors that are harder to evaluate and more uncertain, such as future growth rates. Consequently, a higher emphasis might be placed on expert opinions such as equity analysts. This concept can also be applied to companies that are more volatile and younger since they also can be more difficult for investors to evaluate. Even though we might see that the three characteristics are correlated with each other, e.g. growth stocks might be characterized by higher volatility and younger age, compared to value stocks, we are interested to see which characteristics make stocks most sensitive to price targets. Our goal is to investigate if equity analysts influence stock prices, both from a theoretical and an empirical point of view. Therefore, we formulate our research question:

*Do financial analysts' price targets impact stock prices? If yes, are growth stocks and younger and more volatile companies more sensitive to price target changes?*

This preliminary report is structured as follows: We will first present theory and related literature on market efficiency, financial analysts, and stock characteristics. Next, we will explain our methodological approach. Finally, we present a progression plan for the final thesis report.

## 2 Literature and Theoretical Background

### 2.1 Efficient Market Hypothesis

The efficient markets hypothesis suggests that it is not possible to beat the market since all information should already be reflected in the stock price. This implies that financial analysts price recommendations should not have an impact on stock prices. However, this theory implies assumptions which are not always realistic. Explanations why markets are not always efficient can be found in behavioural finance and also in the transaction cost theory. If these market imperfections are applicable, the market efficiency hypothesis could be violated and therefore, analyst recommendations could move security prices. A market is said to be efficient when the price of a stock 'fully' reflects all available information, which means that it trades at fair value (Fama, 1970). This implies that it is not possible to systematically beat the market and earn abnormal returns, since there is an absence of under- and overvalued stocks. Patell and Wolfson (1984), and Edrington and Lee (1995) find that prices react very quickly once new information become public. After the change in price due to new information, no further drift related to that information in stock price should materialize according to the efficient market hypothesis (EMH) (Bodie, Kane, & Marcus, 2014). The question is whether a stock price can 'fully' reflect all available information. 'Fully' would be an unrealistic assumption since it would mean that all information that exist in the universe are included in the stock price. However, no human and no computer has access to this, let alone the capacity to meaningfully process it. Therefore, this definition would imply that no market could ever be efficient (Sewell, 2011). The EMH also relies on the assumption that information are shared (to a certain degree, depending on the level of efficiency), and that stock prices are affected by current news rather than yesterday's trends. According to this, stock prices follow a random walk. Furthermore, the EMH assumes that investors are rational. Even if there was an irrational investor, their trades would be random and not systematically move stock prices. Finally, rational investors are assumed to eliminate noise created by irrational investors (Naseer & Tariq, 2015).

The EMH is often categorized into three versions: weak-form, semistrong-form, and strong-form. The difference is mainly how the term "all 'available' information" is defined. The weak-form hypothesis states that stock prices already reflect security market information, such as market trading data, past price history and trading volume (Bodie et al., 2014). The gathering of this information is associated with low costs, since access to most of the data, e.g.

past stock prices is free of charge. The weak-form hypothesis implies that past returns cannot predict future excess returns since if the data signals information about future performance, all investors would exploit the signals which leads to a loss in value of the signals and an immediate price change (Bodie et al., 2014). A technical analysis will according to the weak-form not result in abnormal returns (Naseer & Tariq, 2015). In addition to information about past prices, the semistrong-form states that all publicly available information, e.g. financial statement, quality of management, dividend-, earning- and acquisition announcements, political- and economic events, are incorporated in the stock price. According to the semistrong form abnormal returns are not possible through a fundamental analysis (Naseer & Tariq, 2015). Finally, the strong form of market efficiency states that, in addition to what is stated in the weak- and semistrong form, stock prices reflect all possible information, including insider information. This implies that no public or private information can be used to predict future abnormal returns. In Fama's report from 1970, referred in Ang, Goetzmann, and Schaefer (2011), it is concluded that the empirical evidence up to that date gave support for the weak-form and the semistrong-form market efficiency. The strong form can be seen as unrealistic as there are legal structures available in most countries that prevent insider trading (Degutis & Novickyte, 2014).

The hypothesis of efficient markets has for long been widely researched area amongst academics. Early researchers accepted this hypothesis, but later on, anomalies from the theory became more and more present in the literature (Brealey, Myers, & Allen, 2012). The January effect and the weekend effect, which describe a pattern of higher returns in January compared to other months and higher returns on Friday's relative to Monday's, show that consistent patterns can exist (Schwert, 2003).

The underlying assumptions of the EMH can be in conflict with behavioral finance. Empirical research has shown that investors and financial analysts are not always rational. They are in fact subject to several different biases, which in turn leads to irrational decisions. Daniel and Titman (1999), argue that there is a high likelihood that investors are biased due to overconfidence. Their research shows that this momentum effect is more likely to be stronger when the analysis is based on more ambiguous information. Furthermore, they found that these momentum effects are stronger for growth stocks compared to value stocks. Shefrin and Statman (1985) find evidence for the tendency to sell winning stocks too early, and hold losers too long. The list of research that finds evidence for violations against EMH assumptions is long.

To conclude, many pieces of evidence cast doubt on market efficiency. Es-

pecially the criticism that it is not possible to include all information that exist, even if they are publicly available, is hard to argue against. The market anomalies described above present an argument against it. On the other hand, if investors can profitably trade on inefficiencies, these inefficiencies would vanish due to the market mechanisms. For example if investors would know for certain that a stock would raise the next day, they would trade on it immediately and the price of the security would go up until the point where no more alpha can be generated.

## 2.2 Financial Analysts

Collecting and analyzing information about a firm can be very costly for investors. They might lack the skill to perform a solid analysis, and it can be very time consuming to gather the information. Financial analyst provide information to investors, which can reduce the costs of monitoring a company and also improve market transparency. On the other hand, not all companies are followed by financial analysts, and reports might not be updated at all time, and costly and difficult to interpret.

There is a high competition for information amongst analysts, since uncovered information can give a competitive advantage. The incentives of financial analysts may differ due to how the analysts are compensated, and who they work for. Analysts on the buy-side are working for large institutional investment funds such as pension funds and mutual funds. The information produced is exclusively available to the particular fund and not to competing funds that can gain on the advice. Sell-side analysts usually provide information free of charge to all of the brokerage firm or investment bank clients, rather than a specific client. This is usually gathered in a research report which contains information about the industry and the company, the analysts beliefs whether or not the firm will succeed or fail, a target price of the stock for the next year(s), and finally a rating which gives a buy or sell recommendation. Since the information can give an investor lower research costs when deciding whether or not to buy or sell a stock, this can imply a higher trading frequency and therefore increased commission to the brokerage firm or investment bank. The last category of analysts are those who are not on the sell- or buy-side. They are independent analysts, compensated by the company they are following, or by selling subscription-based reports. Their goal is to produce unbiased and objective ratings.

The main source of information is financial accounting information, such as income statements, balance sheets and cash flow statements (Shipper, 1991).

Analysts also participate in public conference calls which gives opportunities to ask questions to the management, as well as visiting the company to get more insight in their operations. This information can be classified as public information. The information is analyzed through a fundamental analysis, often in combination with a technical analysis. The aim is to uncover insights that is not yet known to the rest of the market (Bodie et al., 2014).

Grossman and Stiglitz (1980), referred in Bodie et al. (2014), question why one should expect prices to reflect all available information, since there is a possibility to find relevant information that the rest of the market has overlooked. Information can, as mentioned before, be costly to analyze but on the other hand it can generate higher returns. Therefore, there is an incentive to gather and analyze information even though it contradicts the EMH. This implies that the degree of efficiency can differ across industries. Empirical research shows that larger firms are followed by more analysts (Bhushan, 1989), which implies that larger firms' stock prices are priced more efficiently than smaller firms' stock prices. Research by Chan and Hameed (2006) shows that securities which are covered by more analysts incorporate greater market-wide information, and less firm-specific information. This implies that recommended price targets do not always need to reflect all available information and in turn, that the market is not efficient. In addition to that, it is more difficult to forecast a company's earnings when a company becomes more geographically diversified (Duru & Reeb, 2002). The same authors also find evidence that analysts' earnings forecasts become less accurate as the complexity of the analyses increases (Duru & Reeb, 2002). Lim (2001) found evidence for overoptimistic earnings forecasts amongst analysts, and that they fail to incorporate for example past earnings announcements and stock returns. On the other hand, Clement (1999) referred in Piotroski and Roulstone (2004), suggests that analysts accuracy improved with industry specialization. To conclude, research shows that analysts' forecasts and analyses are most likely biased.

### **2.3 Stock Characteristics**

Up to this point, to the best of our knowledge, we have not found a research similar to our extension of the main research question that investigates the characteristics we are interested in with data from the S&P 500. Given that we cannot find other empirical work our main contribution comes from filling this potential gap in the literature.

## **Growth- and Value Stocks**

In this thesis, the stocks of the S&P 500 are categorized into growth and value stocks. The intuition behind this is that investors might place a higher emphasis on analysts opinions if they are commenting on growth stocks, as the "growth" component that they entail is harder to forecast. Therefore, opinions of experts might have a higher importance in the investment decision for these stocks. Previous empirical research by Fama and French (1998) concludes that value stocks have higher returns than growth stocks, which later empirical research also confirmed (Chan & Lakonishok, 2004). Bodie, Kane & Marcus (2014), and Skinner and Sloan (2002) suggest that two ratios can be used to classify growth or value characteristics in stocks: The price-to-book ratio (P/B) or the price-to-earnings ratio (P/E), where value stocks are characterized by low ratios. Fama and French (1998) suggest three ratios to classify growth and value stocks, where value stocks are characterized by high ratios: book-to-market equity (B/M), earnings to price (E/P), or cash flow to price (C/P).

## **Company Age**

The question whether or not the age of a company matters for performance, expected returns and price sensitivity to analysts price targets can be discussed. Intuitively, given that the company is listed on the S&P 500, the older the company, the easier it can be to estimate expected returns if the company stays within the the same industry. But to use the industry life cycle as a proxy for performance can lead to the wrong conclusions since the length of the cycle varies a lot between industries. Loderer and Waelchli (2010) investigate how firm age affects operational performance, measured by ROA, sales growth, and Tobin's Q, on listed firms. According to their research companies performs the best when they are younger, and starts to underperform the median firm in the industry about 15 years after they are listed. According to the authors, firms lose operational momentum as they get older (Loderer & Waelchli, 2010). Even though the authors suggests a more detailed analysis for the future, their evidence suggests that stock returns are unaffected by age, which is consistent with EMH assuming that investors and financial analysts can correctly incorporate the impact of company age on their estimations.

An intuition for why younger companies could be more sensitive to equity analyst opinions could stem from the fact that investors might not know about the quality of management yet or how the products of the companies will be perceived by the market. Therefore, they might turn to equity analysts who might provide a deeper insight into these factors.

## Volatility

The dispersion of stock returns is often measured by its volatility, which in turn can be described as the standard deviation or variance. Higher volatility implies higher individual risk.

We have not found a published paper that investigates whether or not the volatility of a company matters for the sensitivity in price changes to analysts' price targets. One characteristic that can lead to higher volatility is that the earnings are expected to materialize in the later future. The intuition for that is that securities that pay out high cash flows in the next five years and no cash flows afterwards are not affected as strongly in interest rate changes as stocks that have their entire payout after 20 years. If this reason is prominent among the factors that lead to the high volatility, investors might put more emphasis on the expert opinion of analysts because it could be harder to estimate cash flows that occur so late in the future.

## 3 Methodology

### 3.1 Models and Hypotheses

To analyze the effect equity analysts have on stock prices, the following model will be utilized:

$$r_{i,t} = \frac{S_{i,t}}{S_{i,t-1}} - 1 = E[r_i] + \beta_{Analyst} \times \frac{(AnalystPriceTarget_{i,t} - S_{i,t-1})}{S_{i,t-1}} + \epsilon_{i,t}$$

Where  $S_{i,t}$  is the closing stock price at the end of the month the analyst price target update was released.  $S_{i,t-1}$  is the price of the stock at the end of the month before the price target is released.  $E[r_i]$  is the return that is forecasted by the model.  $\beta_{Analyst}$  is a factor to capture the effect of analysts' price targets. Finally,  $\epsilon_{i,t}$  is an expression to capture residuals of the regression.

The equation consists of three parts:

1.  $E[r_i]$ : This part captures the expected return of the stock as forecasted by the equity model. This is to account for the fact that shareholders need to be compensated for holding a stock. The required return is determined by various factors. A description of the model can be found below.
2.  $\beta_{Analyst} \times \frac{(AnalystPriceTarget_{i,t} - S_{i,t-1})}{S_{i,t-1}}$ : This part captures the effect of the equity analyst price target. It is the difference of the price target and the price of the stock in the previous month, scaled by the latter.

3.  $\epsilon_{i,t}$ : This part contains the residuals.

Note that this model is set up as a standard linear regression. The intuition for this is that the focus is not on the interdependence of the observations but rather on the direct impact a new price target has on a stock. In other words, this model is not analyzing patterns in stock returns over time. It merely quantifies the impact of a price target on a share. For the regression, only two final data points need to be considered in the end: the difference between actual returns and expected returns, and the returns as predicted by the analysts.

This model has a limitation, which is that it cannot properly account for cases where the analyst's price target is equal to the price in the previous month, i.e. for cases where  $AnalystPriceTarget_{i,t} - S_{i,t-1} = 0$ . However, we expect these exact matches to be very rare and to not meaningfully impact our results.

### The Fama-French Five Factor Model

In our model, we compare the analyst price targets with actual stock performance. However, there is an additional factor that needs to be controlled for, and that is that stocks may appreciate merely because they are risky securities and have an expected return because investors want to be compensated for taking on risk. To not credit this part of the price appreciation to equity analysts, a model needs to account for it. In this preliminary thesis, we chose the Fama French Five Factor Model and may later include the Market Model.

Fama & French (2015) developed a model that extended the Capital Asset Pricing Model by four additional factors that can explain stock price returns:

- $SMB$ (*SmallMinusBig*): A premium for investing in small companies
- $HML$ (*HighMinusLow*): A premium for investing in value companies, defined by having a high book-to-market value
- $RMW$ (*RobusMinusWeak*): A premium for investing in firms with robust profitability
- $CMA$ (*ConservativeMinusAgressive*): A premium for high investment firms (e.g. firms that grow their asset base)

The final model proposed by Fama & French (2015, p.3):

$$R_{i,t} - R_{Ft} = a_i + b_i(R_{Mt} - R_{Ft}) + s_iSMB_t + h_iHML_t + r_iRMW_t + c_iCMA_t + \epsilon_{i,t}$$

Where  $R_{Ft}$  is the risk-free rate,  $(R_{Mt} - R_{Ft})$  is the market premium,  $b_i$ ,  $s_i$ ,  $h_i$ , and  $c_i$  are the respective factors and  $\epsilon_{i,t}$  is the residual. The subscript

$i$  already indicates that all of these factors are company specific. That means every company has its own predicted return. This result will then appear in the model equation presented in (3.1) as  $E[r_i]$ .

By utilizing the Fama-French model with its five factors, we hope to add explanatory power to general increases in prices that should not be allocated to analyst price targets.

## Hypotheses

In a subsequent step, the following hypotheses are formulated:

$H_0 : \beta_{Analyst} = 0$ , analysts price targets do not have an impact on stock prices.

This null hypothesis will be tested against the alternative hypothesis:

$H_A : \beta_{Analyst} \neq 0$ , analyst price targets have an impact on stock prices.

This part is designed to answer the first part of the research question, which is if analysts have an impact on security prices at all. This process will be repeated for subsections of stocks of the S&P Index with the following characteristics:

1. On the general population (all S&P 500 stocks)
2. On a growth stocks portfolio vs. on a value stocks portfolio
3. On a portfolio with young companies vs. on a portfolio with old companies
4. On a high volatile stocks portfolio vs. on a portfolio with low volatility stocks

Next, a second series of hypothesis tests will be conducted to answer the question if one of the subgroups (defined below in 3.2) reacts differently to analyst price targets. We run the same regression equation as defined in the model on the two different set of data and compare the betas of the two regressions. This process will be carried out for the group 2, 3 and 4 mentioned above. So for example, for the 30 most volatile companies, the regression equation would be:

$$r_{i,t} = \frac{S_{i,t}}{S_{i,t-1}} - 1 = E[r_i] + \beta_{Volatile} \times \frac{(AnalystPriceTarget_{i,t} - S_{i,t-1})}{S_{i,t-1}} + \epsilon_{i,t}$$

For the least volatile companies the process would be the same, only that the beta could be called  $\beta_{Stable}$ . The following hypotheses are formulated:  $H_0 : \beta_{Volatile} = \beta_{Stable}$ , the two portfolios react to the same extend to analyst price targets.

The null hypothesis will be tested against the alternative hypothesis:

$H_A : \beta_{Volatile} \neq \beta_{Stable}$ , the two portfolios react differently to analyst price targets.

$\beta_{Analyst}$  can also be used to analyze the sensitivity of the stocks towards the equity price targets. If this beta is higher for one group of stocks, the interpretation would be that this portfolio of stocks incorporates the analyst targets to a higher degree than another group of stocks. It could even happen that  $\beta_{Analyst}$  is negative. The interpretation could be that investors do the opposite of the analysts' recommendations and use them as a counter-indicator.

## 3.2 Data

The model is carried out using data from the S&P 500 index obtained from Bloomberg. The goal is to obtain data that go back as far as possible; we expect to get data reaching back at least 20 years.

We will look at monthly data. For every stock the closing price at the end of the month and the consensus analyst price target is collected. Since the composition of the S&P 500 changes each year, the company list is updated accordingly. As a consequence, the model draws data from more than 500 companies and some companies are only covered for a short period.

### Growth vs Value Stock Split

In a next step, the top 30 growth and top 30 value stocks are identified and the regression is run on them as well. To classify a stock into either growth or value, the price-to-book ratio is used. The 30 stocks with the highest price-to-book ratio are declared growth stocks, the ones with the lowest ratios value stocks. Since the characteristics of companies can change, this process is repeated every year, and the list of the top and bottom companies changes accordingly.

### Young vs Old Companies

In this group, the impact of price targets on the oldest companies is compared to the impact on the youngest companies. We define age as the time of the company since inception. Also this list is updated yearly, since new companies can enter the S&P 500 and therefore alter the composition of the companies. Furthermore, companies that merged can provide a challenge with regards to how to classify their age. At this point, the chosen approach is to exclude them from the observations. However, at a later point of time this could still be revised.

## High vs Low Volatility Companies

For this characteristic, the 360-day volatility is chosen as the criterion. For every year, the 30 most and least volatile companies are determined. As with value and growth companies, the composition of this list changes every year.

### 3.3 Limitations

The approach used in this thesis comes with various limitations. With regards to the data, one limitation is that we only look at companies from the S&P 500. As this index is only composed of companies with a very high market capitalization, it can only give insight into the connection between equity analysts' price targets and large companies. The impact on small companies might be different.

The next limitation also stems from the data; it comes from the fact that we use Bloomberg consensus estimates. It is merely an arithmetic mean of a number of analysts. Consequently, the ranking and the reputation of the analyst is not incorporated, every estimate counts the same.

Considering the model, further limitations apply. One of them is that it is only valid in combination with a model to estimate required returns on stock prices. Since investors expect to be compensated for taking on a risk, a certain appreciation of the securities can be expected independently of the price target. We try to account for this using the Fama-French Five Factor Model in our thesis. However, another model might yield different results and therefore lead to different conclusions.

Finally, only three different characteristics are analyzed. The companies may exhibit other characteristics that could help to explain the interdependence between analyst price targets and the subsequent stock performance. Therefore, further research could be conducted using other criteria, for example the data could be categorized according to industry.

### 3.4 Expected Results

From the literature review, one important takeaway was that the assumptions connected to the efficient market hypothesis were too strong to hold in reality. As a consequence, it is possible that analysts really move stock prices. If such an effect exists, we would predict it to be strongest for younger, more volatile and securities that can be classified as growth stocks. We hope that the model can quantify this.

## 4 Progression Plan

Our main goal is to submit a thesis with a high quality and reliable results. Therefore this progression plan is a guideline, and we are therefore including flexibility regarding changes in the time frame to achieve this goal.

<b>Timeframe</b>	<b>Work</b>
March 1 – March 31	Continue to organize and sort the dataset. Further development of the methodology and improvement of the model.
April 1 – April 30	Run regressions and statistical tests. Analyze the results.
May 1 – May 15	Update the Introduction, and Theoretical Background and Related Literature. Write conclusion.
May 16 – May 31	Hand in for feedback.
June 1 – June 15	Revise draft, proofread and review. Hand in thesis.

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